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LOGIC TO ZERO
RR CDUS IS ON PAGE 189

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L       ASSEMBLY AND OPERATION INFORMATION                                        USER'S PAGE NO.   1      EC

R00001  THIS LGC PROGRAM IS INTENDED FOR USE IN THE LM DURING THE MANNED LUNAR LANDING MISSION OR ANY SUBSET THEREOF.
R00002  THE DETAILS OF IMPLEMENTATION ARE SPECIFIED IN REPORT R-567, AS AMENDED.


R000025                          GUIDANCE SYSTEM OPERATIONS PLAN
R00003                   FOR MANNED LM EARTH ORBITAL AND LUNAR MISSIONS
R000035                              USING PROGRAM LUMINARY


R00004  THIS PROGRAM AND R-567 HAVE BEEN PREPARED BY THE INSTRUMENTATION LABORATORY, MASSACHUSETTS INSTITUTE OF
R00005  TECHNOLOGY  75 CAMBRIDGE PARKWAY, CAMBRIDGE, MASSACHUSETTS UNDER PROJECT55-238-70, SPONSORED BY THE MANNED
R00006  SPACECRAFT CENTER OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, CONTRACT NAS 9-4065.

R00007                   THIS PROGRAM IS REFERRED TO AS LUMINARY 1C
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R0001    TABLE OF LOG CARDS

R00015   ABSOLUTE ADDRESSES FOR UPDATE PROGRAM
R0002    ASSEMBLY AND OPERATION INFORMATION
R0003    TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS
R0005    CONTROLLED CONSTANTS
R0006    INPUT/OUTPUT CHANNEL BIT DESCRIPTIONS
R0007    FLAGWORD ASSIGNMENTS
R0008    SUBROUTINE CALLS


R0009    TABLE OF SUBROUTINE LOG SECTIONS
R0010              LUMERASE
R0011                        ERASABLE ASSIGNMENTS
R0012              LEMONAID
R0013                        INTERRUPT LEAD INS
R0014                        T4RUPT PROGRAM
R0015                        RCS FAILURE MONITOR
R0016                        DOWNLINK LISTS
R0017                        AGS INITIALIZATION
R0018                        FRESH START AND RESTART
R0019                        RESTART TABLES
R0020                        AOTMARK
R0021                        EXTENDED VERBS
R0022                        PINBALL NOUN TABLES
R0023                        LEM GEOMETRY
R0024                        IMU COMPENSATION PACKAGE
R0025                        R63
R0026                        ATTITUDE MANEUVER ROUTINE
R0027                        GIMBAL LOCK AVOIDANCE
R0028                        KALCMANU STEERING
R0029                        SYSTEM TEST STANDARD LEAD INS
R0030                        IMU PERFORMANCE TESTS 2
R0031                        IMU PERFORMANCE TESTS 4
R0032                        PINBALL GAMES BUTTONS AND LIGHTS
R0033                        R60,R62
R0034                        S-BAND ANTENNA FOR LM
R0035              LEMP20S
R0036                        RADAR LEADIN ROUTINES
R0037                        P20-P25
R0038              LEMP30S
R0039                        P30,P37
R0040                        P32-P35, P72-P75
R0042              KISSING
R0043                        GROUND TRACKING DETERMINATION PROGRAM - P21
R0044                        P34-P35, P74-P75
R0045                        R31
R0046                        P76
R0047                        R30
R0049              FLY
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L          ASSEMBLY AND OPERATION INFORMATION                                       USER'S PAGE NO.   3       EO

R0050                          BURN, BABY, BURN -- MASTER IGNITION ROUTINE
R0051                          P40-P47
R0052                          THE LUNAR LANDING
R0053                          THROTTLE CONTROL ROUTINES
R0054                          LUNAR LANDING GUIDANCE EQUATIONS
R0055                          P70-P71
R0056                          P12
R0057                          ASCENT GUIDANCE
R0058                          SERVICER
R0059                          LANDING ANALOG DISPLAYS
R0060                          FINDCDUW - GUIDAP INTERFACE
R0061                   LEMP50S
R0062                          P51-P53
R0063                          LUNAR AND SOLAR EPHEMERIDES SUBROUTINES
R0064                   SKIPPER
R0065                          DOWN-TELEMETRY PROGRAM
R0066                          INTER-BANK COMMUNICATION
R0067                          INTERPRETER
R0068                          FIXED-FIXED CONSTANT POOL
R0069                          INTERPRETIVE CONSTANTS
R0070                          SINGLE PRECISION SUBROUTINES
R0071                          EXECUTIVE
R0072                          WAITLIST
R0073                          LATITUDE LONGITUDE SUBROUTINES
R0074                          PLANETARY INERTIAL ORIENTATION
R0075                          MEASUREMENT INCORPORATION
R0076                          CONIC SUBROUTINES
R0077                          INTEGRATION INITIALIZATION
R0078                          ORBITAL INTEGRATION
R0079                          INFLIGHT ALIGNMENT ROUTINES
R0080                          POWERED FLIGHT SUBROUTINES
R0081                          TIME OF FREE FALL
R0082                          AGC BLOCK TWO SELF-CHECK
R0083                          PHASE TABLE MAINTENANCE
R0084                          RESTARTS ROUTINE
R0085                          IMU MODE SWITCHING ROUTINES
R0086                          KEYRUPT, UPRUPT
R0087                          DISPLAY INTERFACE ROUTINES
R0088                          SERVICE ROUTINES
R0089                          ALARM AND ABORT
R0090                          UPDATE PROGRAM
R0091                          RTB OP CODES
R0092                   LMDAP
R0093                          T6-RUPT PROGRAMS
R0094                          DAP INTERFACE SUBROUTINES
R0095                          DAPIDLER PROGRAM
R0096                          P-AXIS RCS AUTOPILOT
R0097                          Q,R-AXIS RCS AUTOPILOT
R0098                          TJET LAW
R0099                          KALMAN FILTER
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R0100                   TRIM GIMBAL CONTROL SYSTEM
R0101                   AOSTASK AND AOSJOB
R0102                   SPS BACK-UP RCS CONTROL


R0103              SYMBOL TABLE LISTING
R0104              UNREFERENCED SYMBOL LISTING
R0105              ERASABLE & EQUALS CROSS-REFERENCE TABLE
R0106              SUMMARY OF SYMBOL TABLE LISTINGS
R0107              MEMORY TYPE & AVAILABLITY DISPLAY
R0108              COUNT TABLE
R0109              PARAGRAPHS GENERATED FOR THIS ASSEMBLY
R0110              OCTAL LISTING
R0111              OCCUPIED LOCATIONS TABLE
R0112              SUBROS CALLED & PROGRAM STATUS
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P0113             VERB LIST FOR LUMINARY

R0114    REGULAR VERBS

R0115    00 NOT IN USE
R0116    01 DISPLAY OCTAL COMP 1 IN R1
R0117    02 DISPLAY OCTAL COMP 2 IN R1
R0118    03 DISPLAY OCTAL COMP 3 IN R1
R0119    04 DISPLAY OCTAL COMP 1,2 IN R1,R2
R0120    05 DISPLAY OCTAL COMP 1,2,3 IN R1,R2,R3
R0121    06 DISPLAY DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0122    07 DISPLAY DP DECIMAL IN R1,R2 (TEST ONLY)
R0123    08
R0124    09
R0125    10
R0126    11 MONITOR OCTAL COMP 1 IN R1
R0127    12 MONITOR OCTAL COMP 2 IN R1
R0128    13 MONITOR OCTAL COMP 3 IN R1
R0129    14 MONITOR OCTAL COMP 1,2 IN R1,R2
R0130    15 MONITOR OCTAL COMP 1,2,3 IN R1,R2,R3
R0131    16 MONITOR DECIMAL IN R1 OR R1,R2 OR R1,R2,R3
R0132    17 MONITOR DP DECIMAL IN R1,R2 (TEST ONLY)
R0133    18
R0134    19
R0135    20
R0136    21 LOAD COMPONENT 1 INTO R1
R0137    22 LOAD COMPONENT 2 INTO R2
R0138    23 LOAD COMPONENT 3 INTO R3
R0139    24 LOAD COMPONENT 1,2 INTO R1,R2
R0140    25 LOAD COMPONENT 1,2,3 INTO R1,R2,R3
R0141    26
R0142    27 DISPLAY FIXED MEMORY
R0143    28
R0144    29
R0145    30 REQUEST EXECUTIVE
R0146    31 REQUEST WAITLIST
R0147    32 RECYCLE PROGRAM
R0148    33 PROCEED WITHOUT DSKY INPUTS
R0149    34 TERMINATE FUNCTION
R0150    35 TEST LIGHTS
R0151    36 REQUEST FRESH START
R0152    37 CHANGE PROGRAM (MAJOR MODE)
R0153    38
R0154    39
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P0155   EXTENDED VERBS

R0156   40 ZERO CDU-S
R0157   41 COARSE ALIGN CDU-S
R0158   42 FINE ALIGN IMU
R0159   43 LOAD IMU ATT ERROR METERS
R0160   44 TERMINATE RR CONTINUOUS DESIGNATE (V41N72 OPTION 2)
R0161   45
R0162   46
R0163   47 INITIALIZE AGS (R47)
R0164   48 REQUEST DAP DATA LOAD ROUTINE (R03)
R0165   49 REQUEST CREW DEFINED MANEUVER ROUTINE (R62)
R0166   50 PLEASE PERFORM
R0167   51
R0168   52 MARK X-RETICLE
R0169   53 MARK Y-RETICLE
R0170   54 MARK X OR Y-RETICLE
R0171   55 INCREMENT AGC TIME (DECIMAL)
R0172   56 TERMINATE TRACKING (P20 + P25)
R0173   57 PERMIT LANDING RADAR UPDATES
R0174   58 INHIBIT LANDING RADAR UPDATES
R0175   59 COMMAND LR TO POSITION 2.
R0176   60 DISPLAY VEHICLE ATTITUDE RATES ON FDAI ERROR NEEDLES.
R0177   61 DISPLAY DAP FOLLOWING ATTITUDE ERRORS.
R0178   62 DISPLAY TOTAL ATTITUDE ERRORS WITH RESPECT TO NOUN 22.
R0179   63 SAMPLE RADAR ONCE PER SECOND (R04).
R0180   64 REQUEST S-BAND ANTENNA ROUTINE (R05)
R0181   65 DISABLE U AND V JET FIRINGS DURING DPS BURNS.
R0182   66 VEHICLES ARE ATTACHED.  MOVE THIS VEHICLE STATE TO OTHER VEHICLE.
R0183   67 DISPLAY W MATRIX
R0184   68
R0185   69 CAUSE RESTART
R0186   70 UPDATE LIFTOFF TIME
R0187   71 UNIVERSAL UPDATE-BLOCK  ADR
R0188   72 UNIVERSAL UPDATE-SINGLE ADR
R0189   73 UPDATE AGC TIME (OCTAL)
R0190   74 INITIALIZE ERASABLE DUMP VIA DOWNLINK
R0191   75 ENABLE U AND V JET FIRINGS DURING DPS BURNS.
R0192   76 MINIMUM IMPULSE COMMAND MODE
R0193   77 RATE COMMAND AND ATTITUDE HOLD MODE
R0194   78 LR SPURIOUS RETURN TEST START (R77)
R0195   79 LR SPURIOUS RETURN TEST STOP
R0196   80 UPDATE LEM STATE VECTOR
R0197   81 UPDATE CSM STATE VECTOR
R0198   82 REQUEST ORBIT PARAM DISPLAY (R30)
R0199   83 REQUEST REND  PARAM DISPLAY (R31)
R0200   84
R0201   85 DISPLAY RR LOS AZ AND ELEV
R0202   86
R0203   87
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R0204    88
R0205    89 REQUEST RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)
R0206    90 REQUEST RENDEZVOUS OUT OF PLANE DISPLAY ROUTINE (R36)
R0207    91 DISPLAY BANK SUM
R0208    92 OPERATE IMU PERFORMANCE TEST (P07)
R0209    93 ENABLE W MATRIX INITIALIZATION
R0210    94
R0211    95 NO UPDATE OF EITHER STATE VECTOR (P20 OR P22)
R0212    96 INTERRUPT INTEGRATION AND GO TO P00
R0213    97 PERFORM ENGINE FAIL PROCEDURE
R0214    98
R0215    99 PLEASE ENABLE ENGINE
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R0216   IN THE FOLLOWING NOUN LIST THE :NO LOAD: RESTRICTION MEANS THE NOUN
R0217   CONTAINS AT LEAST ONE COMPONENT WHICH CANNOT BE LOADED, I.E. OF
R0218   SCALE TYPE L (MIN/SEC), PP (2 INTEGERS) OR TT (LANDING RADAR POSITION).
R0219   IN THIS CASE VERBS 24 AND 25 ARE NOT ALLOWED, BUT VERBS 21, 22 OR 23
R0220   MAY BE USED TO LOAD ANY OF THE NOUN:S COMPONENTS WHICH ARE NOT OF THE
R0221   ABOVE SCALE TYPES.
R0222   THE :DEC ONLY: RESTRICTION MEANS ONLY DECIMAL OPERATION IS ALLOWED ON
R0223   EVERY COMPONENT IN THE NOUN. (NOTE THAT :NO LOAD: IMPLIES :DEC ONLY:.)

R0224   NORMAL NOUNS                         COMPONENTS  SCALE AND DECIMAL POINT      RESTRICTIONS

R0226   00  NOT IN USE
R0227   01  SPECIFY MACHINE ADDRESS (FRACTIONAL)   3COMP    .XXXXX FOR EACH
R0228   02  SPECIFY MACHINE ADDRESS (WHOLE)        3COMP    XXXXX. FOR EACH
R0229   03  SPECIFY MACHINE ADDRESS (DEGREES)      3COMP    XXX.XX DEG FOR EACH
R0230   04  ANGULAR ERROR/DIFFERENCE               1COMP    XXX.XX DEG
R0231   05  ANGULAR ERROR/DIFFERENCE               1COMP    XXX.XX DEG
R0232   06  OPTION CODE                            3COMP    OCTAL ONLY FOR EACH
R0233   LOADING NOUN 07 WILL SET OR RESET SELECTED BITS IN ANY ERASABLE REGISTER
R0234   07  ECADR OF WORD TO BE MODIFIED           3COMP    OCTAL ONLY FOR EACH
R0235       ONES FOR BITS TO BE MODIFIED
R0236       1 TO SET OR 0 TO RESET SELECTED BITS
R0237   08  ALARM DATA                             3COMP    OCTAL ONLY FOR EACH
R0238   09  ALARM CODES                            3COMP    OCTAL ONLY FOR EACH
R0239   10  CHANNEL TO BE SPECIFIED                1COMP    OCTAL ONLY
R0240   11  TIG OF CSI                             3COMP    00XXX. HRS                   DEC ONLY
R0242                                                       000XX. MIN                   MUST LOAD 3 COMPS
R0244                                                       0XX.XX SEC
R0245   12  OPTION CODE                            2COMP    OCTAL ONLY FOR EACH
R0246        (USED BY EXTENDED VERBS ONLY)
R0247   13  TIG OF CDH                             3COMP    00XXX. HRS                   DEC ONLY
R0249                                                       000XX. MIN                   MUST LOAD 3 COMPS
R0251                                                       0XX.XX SEC
R0252   14  CHECKLIST                              3COMP    XXXXX. FOR EACH
R0253        (USED BY EXTENDED VERBS ONLY)
R0254        (NOUN 25 IS PASTED AFTER DISPLAY)
R0255   15  INCREMENT MACHINE ADDRESS              1COMP    OCTAL ONLY
R0256   16  TIME OF EVENT                          3COMP    00XXX. HRS                   DEC ONLY
R0258        (USED BY EXTENDED VERBS ONLY)                  000XX. MIN                   MUST LOAD 3 COMPS
R0260                                                       0XX.XX SEC
R0261   17  SPARE
R0262   18  AUTO MANEUVER BALL ANGLES              3COMP    XXX.XX DEG FOR EACH
R0263   19  SPARE
R0264   20  ICDU ANGLES                            3COMP    XXX.XX DEG FOR EACH
R0265   21  PIPAS                                  3COMP    XXXXX. PULSES FOR EACH
R0267   22  NEW ICDU ANGLES                        3COMP    XXX.XX DEG FOR EACH
R0268   23  SPARE
R0269   24  DELTA TIME FOR AGC CLOCK               3COMP    00XXX. HRS                   DEC ONLY
R0271                                                       000XX. MIN                   MUST LOAD 3 COMPS
R0273                                                       0XX.XX SEC
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R0274    25   CHECKLIST                               3COMP    XXXXX.  FOR EACH
R0275           (USED WITH PLEASE PERFORM ONLY)
R0276    26   PRIORITY/DELAY, ADRES, BBCON            3COMP    OCTAL ONLY FOR EACH
R0277    27   SELF TEST ON/OFF SWITCH                 1COMP    XXXXX.
R0278    28   SPARE
R0279    29   SPARE
R0280    30   SPARE
R0281    31   SPARE
R0282    32   TIME FROM PERIGEE                       3COMP    00XXX. HRS                     DEC ONLY
R0284                                                          000XX. MIN                     MUST LOAD 3 COMPS
R0286                                                          0XX.XX SEC
R0287    33   TIME OF IGNITION                        3COMP    00XXX. HRS                     DEC ONLY
R0289                                                          000XX. MIN                     MUST LOAD 3 COMPS
R0291                                                          0XX.XX SEC
R0292    34   TIME OF EVENT                           3COMP    00XXX. HRS                     DEC ONLY
R0294                                                          000XX. MIN                     MUST LOAD 3 COMPS
R0296                                                          0XX.XX SEC
R0297    35   TIME FROM EVENT                         3COMP    00XXX. HRS                     DEC ONLY
R0299                                                          000XX. MIN                     MUST LOAD 3 COMPS
R0301                                                          0XX.XX SEC
R0302    36   TIME OF AGC CLOCK                       3COMP    00XXX. HRS                     DEC ONLY
R0304                                                          000XX. MIN                     MUST LOAD 3 COMPS
R0306                                                          0XX.XX SEC
R0307    37   TIG OF TPI                              3COMP    00XXX. HRS                     DEC ONLY
R0309                                                          000XX. MIN                     MUST LOAD 3 COMPS
R0311                                                          0XX.XX SEC
R0312    38   TIME OF STATE BEING INTEGRATED          3COMP    00XXX. HRS                     DEC ONLY
R0314                                                          000XX. MIN                     MUST LOAD 3 COMPS
R0316                                                          0XX.XX SEC
R0317    39   SPARE
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L       ASSEMBLY AND OPERATION INFORMATION                                                  USER'S PAGE NO.  10       EO

P0318   MIXED NOUNS                                   COMPONENTS  SCALE AND DECIMAL POINT             RESTRICTIONS

R0320   40  TIME FROM IGNITION/CUTOFF                   3COMP     XXBXX   MIN/SEC                     NO LOAD, DEC ONLY
R0322       VG,                                                   XXXX.X  FT/SEC
R0323       DELTA V (ACCUMULATED)                                 XXXX.X  FT/SEC
R0324   41  TARGET  AZIMUTH,                            2COMP     XXX.XX  DEG                         (FOR SYSTEM TEST)
R0326               ELEVATION                                     XX.XXX  DEG
R0327   42  APOGEE,                                     3COMP     XXXX.X  NAUT MI                     DEC ONLY
R0329       PERIGEE,                                              XXXX.X  NAUT MI
R0330       DELTA V (REQUIRED)                                    XXXX.X  FT/SEC
R0331   43  LATITUDE,                                   3COMP     XXX.XX  DEG                         DEC ONLY
R0333       LONGITUDE,                                            XXX.XX  DEG
R0334       ALTITUDE                                              XXXX.X  NAUT MI
R0335   44  APOGEE,                                     3COMP     XXXX.X  NAUT MI                     NO LOAD, DEC ONLY
R0337       PERIGEE,                                              XXXX.X  NAUT MI
R0338       TFF                                                   XXBXX   MIN/SEC
R0339   45  MARKS,                                      3COMP     XXXXX.                              NO LOAD, DEC ONLY
R0341       TFI OF NEXT BURN                                      XXBXX   MIN/SEC
R0342       MGA                                                   XXX.XX  DEG
R0343   46  AUTOPILOT CONFIGURATION                     1COMP     OCTAL ONLY
R0344   47  LEM WEIGHT,                                 2COMP     XXXXX.  LBS                         DEC ONLY
R0346       CSM WEIGHT                                            XXXXX.  LBS
R0347   48  GIMBAL PITCH TRIM,                          2COMP     XXX.XX  DEG                         DEC ONLY
R0349       GIMBAL ROLL TRIM                                      XXX.XX  DEG
R0350   49  DELTA R,                                    3COMP     XXXX.X  NAUT MI                     DEC ONLY
R0352       DELTA V,                                              XXXX.X  FT/SEC
R03521      RADAR DATA SOURCE CODE                                XXXXX.
R0353   50  SPARE
R0354   51  S-BAND ANTENNA ANGLES PITCH                 2COMP     XXX.XX  DEG                         DEC ONLY
R0356                                 YAW                         XXX.XX  DEG
R0357   52  CENTRAL ANGLE OF ACTIVE VEHICLE             1COMP     XXX.XX  DEG
R0358   53  SPARE
R0359   54  RANGE,                                      3COMP     XXX.XX  NAUT MI                     DEC ONLY
R0361       RANGE RATE,                                           XXXX.X  FT/SEC
R0362       THETA                                                 XXX.XX  DEG
R0363   55  NO. OF APSIDAL CROSSINGS                    3COMP     XXXXX.                              DEC ONLY
R0365       ELEVATION ANGLE                                       XXX.XX  DEG
R0366       CENTRAL ANGLE OF PASSIVE VEHICLE                      XXX.XX  DEG
R0367   56  RR LOS AZIMUTH                              2COMP     XXX.XX  DEG
R0368              ELEVATION                                      XXX.XX  DEG
R0369   57  SPARE
R0371   58  PERIGEE ALT (POST TPI)                      3COMP     XXXX.X  NAUT MI                     DEC ONLY
R0373       DELTA V TPI                                           XXXX.X  FT/SEC
R0374       DELTA V TPF                                           XXXX.X  FT/SEC
R0375   59  DELTA VELOCITY LOS                          3COMP     XXXX.X  FT/SEC FOR EA.              DEC ONLY
R0377   60  FORWARD VELOCITY                            3COMP    XXXX.X FT/SEC                        DEC ONLY
R0379       ALTITUDE RATE                                         XXXX.X  FT/SEC
R0380       COMPUTED ALTITUDE                                     XXXXX.  FEET
R0381   61  TIME TO GO IN BRAKING PHASE                 3COMP     XXBXX   MIN/SEC                     NO LOAD, DEC ONLY
R0383       TIME FROM IGNITION                                    XXBXX   MIN/SEC
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R0384       CROSS RANGE DISTANCE                           XXXX.X NAUT MI
R0385   62  ABSOLUTE VALUE OF VELOCITY             3COMP   XXXX.X FT/SEC                       NO LOAD, DEC ONLY
R0387       TIME FROM IGNITION                             XXBXX  MIN/SEC
R0388       DELTA V (ACCUMULATED)                          XXXX.X FT/SEC
R0389   63  ABSOLUTE VALUE OF VELOCITY             3COMP   XXXX.X FT/SEC                       DEC ONLY
R0391       ALTITUDE RATE                                  XXXX.X FT/SEC
R0392       COMPUTED ALTITUDE                              XXXXX. FEET
R0393   64  TIME LEFT FOR REDESIGNATION- LPD ANGLE 3COMP   XXBXX                               NO LOAD, DEC ONLY
R0395       ALTITUDE RATE                                  XXXX.X FT/SEC
R0396       COMPUTED ALTITUDE                              XXXXX. FEET
R0397   65  SAMPLED AGC TIME                       3COMP   00XXX. HRS                          DEC ONLY
R0399        (FETCHED IN INTERRUPT)                        000XX. MIN                          MUST LOAD 3 COMPS
R0401                                                      0XX.XX SEC
R0402   66  LR RANGE                               2COMP   XXXXX. FEET                         NO LOAD, DEC ONLY
R0404          POSITION                                    +0000X
R0405   67  LRVX                                   3COMP   XXXXX. FT/SEC
R0406       LRVY                                           XXXXX. FT/SEC
R0407       LRVZ                                           XXXXX. FT/SEC
R0408   68  SLANT RANGE TO LANDING SITE            3COMP   XXXX.X NAUT MI                      NO LOAD, DEC ONLY
R0410       TIME TO GO IN BRAKING PHASE                    XXBXX  MIN/SEC
R0411       LR ALTITUDE - COMPUTED ALTITUDE                XXXXX. FEET
R0412   69  LANDING SITE CORRECTION, Z-COMPONENT   3COMP   XXXXX. FEET                         DEC ONLY
R04121      LANDING SITE CORRECTION, Y-COMPONENT           XXXXX. FEET
R04122      LANDING SITE CORRECTION, X-COMPONENT           XXXXX. FEET
R0413   70  AOT DETENT CODE/STAR CODE              3COMP   OCTAL ONLY FOR EACH
R0414   71  AOT DETENT CODE/STAR CODE              3COMP   OCTAL ONLY FOR EACH
R0415   72  RR  360 - TRUNNION ANGLE               2COMP   XXX.XX DEG
R0416           SHAFT ANGLE                                XXX.XX DEG
R0417   73  NEW RR  360 - TRUNNION ANGLE           2COMP   XXX.XX DEG
R0418               SHAFT  ANGLE                           XXX.XX DEG
R0419   74  TIME FROM IGNITION                     3COMP   XXBXX  MIN/SEC                      NO LOAD, DEC ONLY
R0421       YAW AFTER VEHICLE RISE                         XXX.XX DEG
R0422       PITCH AFTER VEHICLE RISE                       XXX.XX DEG
R0423   75  DELTA ALTITUDE CDH                     3COMP   XXXX.X NAUT MI                      NO LOAD, DEC ONLY
R0425       DELTA TIME (CDH-CSI OR TPI-CDH)                XXBXX  MIN/SEC
R0426       DELTA TIME (TPI-CDH OR TPI-NOMTPI)             XXBXX  MIN/SEC
R0427   76  DESIRED HORIZONTAL VELOCITY            3COMP   XXXX.X FT/SEC                       DEC ONLY
R0429       DESIRED RADIAL VELOCITY                        XXXX.X FT/SEC
R04291      CROSS-RANGE DISTANCE                           XXXX.X NAUT MI
R0430   77  TIME TO ENGINE CUTOFF                  2COMP   XXBXX  MIN/SEC                      NO LOAD, DEC ONLY
R0432       VELOCITY NORMAL TO CSM PLANE                   XXXX.X FT/SEC
R0433   78  RR RANGE                               3COMP   XXX.XX NAUT MI                      NO LOAD, DEC ONLY
R0434          RANGE RATE                                  XXXXX. FT/SEC
R04341      TIME FROM  IGNITION                            XXBXX  MIN/SEC
R0435   79  CURSOR ANGLE                           3COMP   XXX.XX DEG                          DEC ONLY
R0437       SPIRAL ANGLE                                   XXX.XX DEG
R0438       POSITION CODE                                  XXXXX.
R0439   80  DATA INDICATOR,                        2COMP   XXXXX.
R0440       OMEGA                                          XXX.XX DEG
R0441   81  DELTA V (LV)                           3COMP   XXXX.X FT/SEC FOR EACH              DEC ONLY
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R0443   82  DELTA V (LV)                           3COMP   XXXX.X FT/SEC FOR EACH        DEC ONLY
R0445   83  DELTA V (BODY)                         3COMP   XXXX.X FT/SEC FOR EACH        DEC ONLY
R0447   84  DELTA V (OTHER VEHICLE)                3COMP   XXXX.X FT/SEC FOR EACH        DEC ONLY
R0449   85  VG (BODY)                              3COMP   XXXX.X FT/SEC FOR EACH        DEC ONLY
R0451   86  VG (LV)                                3COMP   XXXX.X FT/SEC FOR EACH        DEC ONLY
R0453   87  BACKUP OPTICS LOS AZIMUTH              2COMP   XXX.XX DEG
R0454                         ELEVATION                    XXX.XX DEG
R0455   88  HALF UNIT SUN OR PLANET VECTOR         3COMP   .XXXXX FOR EACH               DEC ONLY
R0457   89  LANDMARK LATITUDE                      3COMP   XX.XXX DEG                    DEC ONLY
R0459                LONGITUDE/2                           XX.XXX DEG
R0460                ALTITUDE                              XXX.XX NAUT MI
R0461   90  Y                                      3COMP   XXX.XX NM                     DEC ONLY
R0463       Y DOT                                          XXXX.X FPS
R0464       PSI                                            XXX.XX DEG
R0465   91  ALTITUDE                               3COMP   XXXXXB. NAUT MI
R04651      VELOCITY                                       XXXXX.  FT/SEC
R04652      FLIGHT PATH ANGLE                              XXX.XX  DEG
R0466   92  PCT FTP(10,5KLB) AT PRESENT THRUST     3COMP   XXXXX.
R04661      ALTITUDE RATE                                  XXXX.X FT/SEC
R04662      COMPUTED ALTITUDE                              XXXXX.FEET
R0467   93  DELTA GYRO ANGLES                      3COMP   XX.XXX DEG FOR EACH
R0468   94  SPARE
R0469   95  SPARE
R0470   96  SPARE
R0471   97  SYSTEM TEST INPUTS                     3COMP   XXXXX. FOR EACH
R0472   98  SYSTEM TEST RESULTS AND INPUTS         3COMP   XXXXX.
R0473                                                      .XXXXX
R0474                                                      XXXXX.
R0475   99  RMS IN POSITION                        3COMP   XXXXX.FT                      DEC ONLY
R0477       RMS IN VELOCITY                                XXXX.X FT/SEC
R04771      RMS IN BIAS                                    XX.XXX RADIANS
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P0478   REGISTERS AND SCALING  FOR NORMAL NOUNS

R0479   NOUN            REGISTER         SCALE TYPE

R0480   00        NOT IN USE
R0481   01        SPECIFY ADDRESS          B
R0482   02        SPECIFY ADDRESS          C
R0483   03        SPECIFY ADDRESS          D
R0484   04                DSPTEM1          H
R0485   05                DSPTEM1          H
R0486   06                OPTION1          A
R0487   07                XREG             A
R0488   08                ALMCADR          A
R0489   09                FAILREG          A
R0490   10        SPECIFY CHANNEL          A
R0491   11                TCSI             K
R0492   12                OPTIONX          A
R0493   13                TCDH             K
R0494   14                DSPTEMX          C
R0495   15        INCREMENT ADDRESS        A
R0496   16                DSPTEMX          K
R0497   17        SPARE
R0498   18                FDAIX            D
R0499   19        SPARE
R0500   20                CDUX             D
R0501   21                PIPAX            C
R0502   22                THETAD           D
R0503   23        SPARE
R0504   24                DSPTEM2 +1       K
R0505   25                DSPTEM1          C
R0506   26                DSPTEM1          A
R0507   27                SMODE            C
R0508   28        SPARE
R0509   29        SPARE
R0510   30        SPARE
R0511   31        SPARE
R0512   32                -TPER            K
R0513   33                TIG              K
R0514   34                DSPTEM1          K
R0515   35                TTOGO            K
R0516   36                TIME2            K
R0517   37                TTPI             K
R0518   38                TET              K
R0519   39        SPARE
```

```
P0520    REGISTERS AND SCALING FOR MIXED NOUNS

R0521    NOUN      COMP    REGISTER          SCALE TYPE

R0522    40        1       TTOGO             L
R0523              2       VGDISP            S
R0524              3       DVTOTAL           S
R0525    41        1       DSPTEM1           D
R0526              2       DSPTEM1 +1        E
R0527    42        1       HAPO              Q
R0528              2       HPER              Q
R0529              3       VGDISP            S
R0530    43        1       LAT               H
R0531              2       LONG              H
R0532              3       ALT               Q
R0533    44        1       HAPOX             Q
R0534              2       HPERX             Q
R0535              3       TFF               L
R0536    45        1       TRKMKCNT          C
R0537              2       TTOGO             L
R0538              3       +MGA              H
R0539    46        1       DAPDATR1          A
R0540    47        1       LEMMASS           KK
R0541              2       CSMMASS           KK
R0542    48        1       PITTIME           NN
R0543              2       ROLLTIME          NN
R0544    49        1       R22DISP           Q
R0545              2       R22DISP +2        S
R05451             3       WHCHREAD          C
R0546    50        SPARE
R0547    51        1       ALPHASB           H
R0548              2       BETASB            H
R0549    52        1       ACTCENT           H
R0550    53        SPARE
R0551    54        1       RANGE             JJ
R0552              2       RRATE             S
R0553              3       RTHETA            H
R0554    55        1       NN                C
R0555              2       ELEV              H
R0556              3       CENTANG           H
R0557    56        1       RR-AZ             H
R0558              2       RR-ELEV           H
R0559    57        SPARE
R0560    58        1       POSTTPI           Q
R0561              2       DELVTPI           S
R0562              3       DELVTPF           S
R0563    59        1       DVLOS             S
R0564              2       DVLOS +2          S
R0565              3       DVLOS +4          S
R0566    60        1       FORVEL            CC
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R0567            2      HDOTDISP        S
R0568            3      HCALC1          RR
R0569     61     1      TTFDISP         L
R0570            2      TTOGO           L
R0571            3      OUTOFPLN        GG
R0572     62     1      ABVEL           S
R0573            2      TTOGO           L
R0574            3      DVTOTAL         S
R0575     63     1      ABVEL           S
R0576            2      HDOTDISP        S
R0577            3      HCALC1          RR
R0578     64     1      FUNNYDSP        PP
R0579            2      HDOTDISP        S
R0580            3      HCALC           RR
R0581     65     1      SAMPTIME        K
R0582            2      SAMPTIME        K
R0583            3      SAMPTIME        K
R0584     66     1      RSTACK +6       W
R0585            2      CHANNEL  33     TT
R0586     67     1      RSTACK          X
R0587            2      RSTACK +2       Y
R0588            3      RSTACK +4       Z
R0589     68     1      RANGEDSP        GG
R0590            2      TTFDISP         L
R0591            3      DELTAH          RR
R0592     69     1      DLANDZ          RR
R05921           2      DLANDY          RR
R05922           3      DLANDX          RR
R0593     70     1      AOTCODE         A
R0594            2      AOTCODE +1      A
R0595            3      AOTCODE +2      A
R0596     71     1      AOTCODE         A
R0597            2      AOTCODE +1      A
R0598            3      AOTCODE +2      A
R0599     72     1      CDUT            WW
R0600            2      CDUS            D
R0601     73     1      TANG            WW
R0602            2      TANG +1         D
R0603     74     1      TTOGO           L
R0604            2      YAW             H
R0605            3      PITCH           H
R0606     75     1      DIFFALT         Q
R0607            2      T1TOT2          L
R0608            3      T2TOT3          L
R0609     76     1      ZDOTD           S
R0610            2      RDOTD           S
R06101           3      XRANGE          Q
R0611     77     1      TTOGO           L
R0612            2      YDOT            S
R0613     78     1      DNRRANGE        U
```

```
R0614          2      DNRRDCT         V
R06141         3      TTOTIG          L
R0615    79    1      CURSOR          D
R0616          2      SPIRAL          D
R0617          3      POSCODE         C
R0618    80    1      DATAGOOD        C
R0619          2      OMEGAD          H
R0620    81    1      DELVLVC         S
R0621          2      DELVLVC  +2     S
R0622          3      DELVLVC  +4     S
R0623    82    1      DELVLVC         S
R0624          2      DELVLVC  +2     S
R0625          3      DELVLVC  +4     S
R0626    83    1      DELVIMU         S
R0627          2      DELVIMU  +2     S
R0628          3      DELVIMU  +4     S
R0629    84    1      DELVOV          S
R0630          2      DELVOV  +2      S
R0631          3      DELVOV  +4      S
R0632    85    1      VGBODY          S
R0633          2      VGBODY  +2      S
R0634          3      VGBODY  +4      S
R0635    86    1      DELVLVC         S
R0636          2      DELVLVC  +2     S
R0637          3      DELVLVC  +4     S
R0638    87    1      AZ              D
R0639          2      EL              D
R0640    88    1      STARAD          B
R0641          2      STARAD  +2      B
R0642          3      STARAD  +4      B
R0643    89    1      LANDLAT         G
R0644          2      LANDLONG        G
R0645          3      LANDALT         JJ
R0646    90    1      RANGE           JJ
R0647          2      RRATE           S
R0648          3      RTHETA          H
R0649    91    1      P21ALT          C (MEMORY/100 TO DIPLAY TENS N.M.)
R06491         2      P21VEL          P
R06492         3      P21GAM          H
R0650    92    1      THRDISP         C
R06501         2      HDOTDISP        S
R06502         3      HCALC1          RR
R0651    93    1      OGC             G
R0652          2      OGC  +2         G
R0653          3      OGC  +4         G
R0654    94    SPARE
R0655    95    SPARE
R0656    96    SPARE
R0657    97    1      DSPTEM1         C
R0658          2      DSPTEM1  +1     C
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R0659               3       DSPTEM1  +2       C
R0660    98         1       DSPTEM2           C
R0661               2       DSPTEM2  +1       B
R0662               3       DSPTEM2  +2       C
R0663    99         1       WWPOS             XX
R0664               2       WWVEL             YY
R06641              3       WWBIAS            AAA
```

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P0665    NOUN SCALES AND FORMATS

R0666    -SCALE TYPE-                         PRECISION
R0667    UNITS                DECIMAL FORMAT       -- AGC FORMAT
R0668    ------------         --------------       -- ----------

R0669    -A-
R0670    OCTAL                XXXXX                SP OCTAL

R0671    -B-                                                   -14
R0672    FRACTIONAL           .XXXXX               SP BIT 1 = 2     UNITS
R0673                         (MAX .99996)

R0674    -C-
R0675    WHOLE                XXXXX.               SP BIT 1 = 1 UNIT
R0676                         (MAX 16383.)

R0677    -D-                                                        15
R0678    CDU DEGREES          XXX.XX DEGREES       SP BIT 1 = 360/2    DEGREES
R0679                         (MAX 359.99)            (USES 15 BITS FOR MAGNI-
R0680                                                  TUDE AND 2-S COMP.)

R0681    -E-                                                       14
R0682    ELEVATION DEGREES    XX.XXX DEGREES       SP BIT 1 = 90/2    DEGREES
R0683                         (MAX 89.999)

R0684    -F-                                                        14
R0685    DEGREES (180)        XXX.XX DEGREES       SP BIT 1 = 180/2    DEGREES
R0686                         (MAX 179.99)

R0687    -G-
R0688    DP DEGREES(90)       XX.XXX DEGREES       DP BIT 1 OF LOW REGISTER =
R0689                                                       28
R0690                                                 360/2    DEGREES
R0691    -H-
R0692    DP DEGREES (360)     XXX.XX DEGREES       DP BIT 1 OF LOW REGISTER =
R0693                                                       28
R0694                         (MAX 359.99)            360/2    DEGREES
```

```
P0695   -K-
R0696   TIME (HR, MIN, SEC)    00XXX. HR             DP BIT 1 OF LOW REGISTER =
R0697                          000XX. MIN                  -2
R0698                          0XX.XX SEC               10    SEC
R0699                          (DECIMAL ONLY.
R0700                          MAX MIN COMP=59
R0701                          MAX SEC COMP=59.99
R0702                          MAX CAPACITY=745 HRS
R0703                                     39 MINS
R0704                                     14.55 SECS.
R0705                          WHEN LOADING, ALL 3
R0706                          COMPONENTS MUST BE
R0707                          SUPPLIED.)

R0708   -L-
R0709   TIME (MIN/SEC)         XXBXX MIN/SEC         DP BIT 1 OF LOW REGISTER =
R0710                          (B IS A BLANK               -2
R0711                          POSITION, DECIMAL        10    SEC
R0712                          ONLY, DISPLAY OR
R0713                          MONITOR ONLY. CANNOT
R0714                          BE LOADED.
R0715                          MAX MIN COMP=59
R0716                          MAX SEC COMP=59
R0717                          VALUES GREATER THAN
R0718                          59 MIN 59 SEC
R0719                          ARE DISPLAYED AS
R0720                          59 MIN 59 SEC.)

R0721   -M-                                                        -2
R0722   TIME (SEC)             XXX.XX SEC            SP BIT 1 = 10    SEC
R0723                          (MAX 163.83)

R0724   -N-
R0725   TIME(SEC) DP           XXX.XX SEC            DP BIT 1 OF LOW REGISTER =
R0726                                                      -2
R0727                                                   10    SEC

R0728   -P-
R0729   VELOCITY 2             XXXXX. FEET/SEC       DP BIT 1 OF HIGH REGISTER =
R0730                          (MAX 41994.)                -7
R0731                                                   2    METERS/CENTI-SEC

R0732   -Q-
R0733   POSITION 4             XXXX.X NAUTICAL MILES DP BIT 1 OF LOW REGISTER =
R0734                                                   2 METERS

R0735   -S-
R0736   VELOCITY 3             XXXX.X FT/SEC         DP BIT 1 OF HIGH REGISTER =
R0737                                                      -7
R0738                                                   2    METERS/CENTI-SEC
```

```
R0739    -T-                                                         -2
R0740    G                         XXX.XX G             SP BIT 1 = 10   G
R0741                              (MAX 163.83)

R0742    -U-
R0743    RENDEZVOUS                XXX.XX NAUT MI       SP USES 15 BITS FOR UNSIGNED
R07433   RADAR RANGE               (DECIMAL ONLY.          MAGNITUDE.
R07436                             DISPLAY OR MONITOR      BIT 1 = 9.38 FEET
R07439                             ONLY. CANNOT BE
R0744                              LOADED.)

R0745    -V-
R0746    RENDEZVOUS                XXXXX. FEET/SEC      SP USES 15 BITS FOR UNSIGNED
R07461   RADAR RANGE RATE          (DECIMAL ONLY.          MAGNITUDE.
R07462                             DISPLAY OR MONITOR      BIT 1 = -.6278 FEET/SEC
R07463                             ONLY. CANNOT BE
R07464                             LOADED.
R07465                             BIAS OF 17000 COUNTS
R07466                             SUBTRACTED BEFORE
R0747                              DISPLAY.)

R0748    -W-
R0749    LANDING RADAR             XXXXX. FEET          DP LOW ORDER BIT OF LOW ORDER
R0750    ALTITUDE                                          WORD = 1.079 FEET

R0751    -X-
R0752    LANDING RADAR             XXXXX. FEET/SEC      DP LOW ORDER BIT OF LOW ORDER
R0753    VELX                                              WORD = -.6440 FEET/SEC

R0754    -Y-
R0755    LANDING RADAR             XXXXX. FEET/SEC      DP LOW ORDER BIT OF LOW ORDER
R0756    VELY                                              WORD = 1.212  FEET/SEC

R0757    -Z-
R0758    LANDING RADAR             XXXXX. FEET/SEC      DP LOW ORDER BIT OF LOW ORDER
R0759    VELZ                                              WORD = .8668  FEET/SEC

R0760    -AA-
R0761    INITIAL/FINAL             XXXXX. FEET          DP LOW ORDER BIT OF LOW ORDER
R0762    ALTITUDE                                          WORD = 2.345 FEET

R0763    -BB-
R0764    ALTITUDE RATE             XXXXX. FEET/SEC      SP LOW ORDER BIT = .5
R0765                              (MAX 08191.)            FEET/SEC

R0766    -CC-
R0767    FORWARD/LATERAL           XXXX.X FEET/SEC      SP LOW ORDER BIT = .5571
R0768    VELOCITY                  (MAX 09126.)            FEET/SEC

R0769    -DD-
```

```
R0770   ROTATIONAL HAND      XXXXX. DEG/SEC         SP FRACTIONAL PART OF PI RAD
R0771   CONTROLLER ANGULAR   (MAX 00044.)                                     4  SEC
R0772   RATES

R0773   -EE-
R0774   OPTICAL TRACKER      XXX.XX DEG.            DP LOW ORDER BIT OF LOW ORDER
R0775   AZIMUTH ANGLE                                              15
R0776                                                  WORD = 360/2   DEGREES

R0777   -JJ-
R0778   POSITION5            XXX.XX NAUT MI         DP BIT 1 OF LOW REGISTER =
R0779                                                  2 METERS
R0780   -KK-                                                               16
R0781   WEIGHT2              XXXXX. LBS             SP FRACTIONAL PART OF 2   KG

R0782   -NN-
R0783   TRIM DEGREES 2       XXX.XX DEG             SP BIT 1=.01SEC(TIME)
R0784                        (MAX 032.76)

R0785   -PP-
R0786   2 INTEGERS           +XXBYY                 DP BIT 1 OF HIGH REGISTER =
R0787                        (B IS A BLANK              1 UNIT OF XX
R0788                        POSITION. DECIMAL         BIT 1 OF LOW REGISTER =
R0789                        ONLY, DISPLAY OR           1 UNIT OF YY
R0790                        MONITOR ONLY. CANNOT      (EACH REGISTER MUST
R0791                        BE LOADED.)               CONTAIN A POSITIVE INTEGER
R0792                        (MAX 99B99)                LESS THAN 100)

R0793   -QQ-
R0794   POSITION7            XXXX.X NAUT MI         DP BIT 1 OF LOW REGISTER =
R0795                        (MAX 9058.9)               -4
R0796                                                  2   METERS

R0797   -RR-
R0798   COMPUTED ALTITUDE    XXXXX. FEET            DP BIT 1 OF LOW REGISTER =
R0799                                                   -4
R0800                                                  2   METERS

R0801   -SS-
R0802   DP DEGREES           XXXX.X DEGREES         DP BIT 1 OF HIGH REGISTER =
R0803                                                  1 DEGREE

R0804   -TT-
R0805   LANDING RADAR        +0000X                 CHANNEL 33,BIT 6=NOT POSIT. 1
R0806   POSITION             (DECIMAL ONLY.         CHANNEL 33,BIT 7=NOT POSIT. 2
R0807                        DISPLAY OR MONITOR     X = 1 FOR LR POSITION 1
R0808                        ONLY. CANNOT BE        X = 2 FOR LR POSITION 2
R0809                        LOADED.)

R0810   -WW-                                                               15
```

```
R0811    360-CDU DEGREES      XXX.XX DEGREES       SP BIT 1 = 360 - (360/2  )
R0812                         (MAX 359.99)            DEGREES
R0813                                                 (USES 15 BITS FOR MAGNI-
R0814                                                  TUDE AND 2-S COMP.)

R0815    -XX-
R0816    POSITION 9           XXXXX. FEET          DP BIT 1 OF LOW REGISTER =
R0817                                                  -9
R0818                                                 2   METERS

R0819    -YY-
R0820    VELOCITY 4           XXXX.X FEET/SEC      DP FRACTIONAL PART OF
R08201                        (MAX 328.0)             METERS/CENTI-SEC

R0821    -AAA-
R08211   RADIANS              XX.XXX RADIANS       DP BIT 1 OF HIGH REGISTER =
R08212                        (MAX 31.999)             -9
R08213                                                2   RADIANS

R0822    THAT-S ALL ON THE NOUNS.
```

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P0823              ALARM CODES FOR LUMINARY

R0824   *9         *18                                        *60   COLUMN

R0825   CODE    *  TYPE                                       SET BY

R0827   00107      MORE THAN 5 MARK PAIRS                     AOTMARK
R0828   00111      MARK MISSING                               AOTMARK
R0829   00112      MARK OR MARK REJECT NOT BEING ACCEPTED     AOTMARK
R0830   00113      NO INBITS                                  AOTMARK
R0831   00114      MARK MADE BUT NOT DESIRED                  AOTMARK
R0832   00115      NO MARKS IN LAST PAIR TO REJECT            AOTMARK
R0833   00206      ZERO ENCODE NOT ALLOWED WITH COARSE ALIGN  IMU MODE SWITCHING
R0834   00206       + GIMBAL LOCK.
R0835   00207      ISS TURNON REQUEST NOT PRESENT FOR 90 SEC  T4RUPT
R0836   00210      IMU NOT OPERATING                          IMU MODE SWITCH, IMU-2, R02, P51, P57
R0838   00211      COARSE ALIGN ERROR                         IMU MODE SWITCH
R0839   00212      PIPA FAIL BUT PIPA IS NOT BEING USED       IMU MODE SWITCH,T4RPT
R0840   00213      IMU NOT OPERATING WITH TURN-ON REQUEST     T4RUPT
R0841   00214      PROGRAM USING IMU WHEN TURNED OFF          T4RUPT
R0842   00217      BAD RETURN FROM IMUSTALL                   P51,P52,P57
R0843   00220      IMU NOT ALIGNED - NO REFSMMAT              R02,R47
R0844   00401      DESIRED GIMBAL ANGLE YIELDS GIMBAL LOCK    INF ALIGN, IMU-2,
R0845                                                         FINDCDUW
R0846   00402      FINDCDUW NOT CONTROLLING ATTITUDE          FINDCDUW
R0847   00404      TWO STARS NOT AVAILABLE IN ANY DETENT      R59, LUNAR SURFACE
R0848   00405      TWO STARS NOT AVAILABLE                    P52
R0849   00421      W-MATRIX OVERFLOW                          INTEGRV
R0850   00501   P  RADAR ANTENNA OUT OF LIMITS                R23
R0851   00502      BAD RADAR GIMBAL ANGLE INPUT               V41N72
R0852   00503   P  RADAR ANTENNA DESIGNATE FAIL               R21, NON-P IN V41N72
R0853   00510      RADAR AUTO DESCRETE NOT PRESENT            R25
R0854   00511      LR NOT IN POSITION 2 OR REPOSITIONING      SERVICER
R0855   00514   P  RR GOES OUT OF AUTO MODE WHILE IN USE      P20
R0856   00515      RR CDU FAIL DISCRETE PRESENT               R25
R0857   00520      RADAR RUPT NOT EXPECTED AT THIS TIME       RADAR READ
R0858   00521      COULD NOT READ RADAR                       P20
R0859   00522      LANDING RADAR POSITION CHANGE              RADAR READ
R0860   00523   P  LR ANTENNA DIDN'T ACHIEVE POSITION 2       SERVICER, V60 (NON-P IN V60)
R0862   00525   P  DELTA THETA GREATER THAN 3 DEGREES         R22
R0863   00526   P  RANGE GREATER THAN 400 NAUT. MILES         P20,P22
R0864   00527   P  LOS NOT IN MODE II COVERAGE WHILE ON       R21,R24
R0865              LUNAR SURFACE
R0866              OR VEHICLE MANEUVER REQUIRED               R24 (20)
R08665  00530   P  LOS NOT IN MODE2 COVERAGE                  R21
R08666             ON LUNAR SURFACE AFTER 600 SECS.
R0867   00600      IMAGINARY ROOTS ON FIRST ITERATION         P32, P72
R0868   00601      PERIGEE ALTITUDE CSI LT PMIN1              P32,P72,
R0869   00602      PERIGEE ALTITUDE CDH LT PMIN2              P32,P72,
R0870   00603      CSI TO CDH TIME LT TMIN12                  P32,P72,P33,P73
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R0871   00604    CDH TO TPI TIME LT TMIN23                  P32,P72,
R0872   OR COMPUTED CDH TIME GREATER THAN INPUT TPI TIME
R0873   00605    NUMBER OF ITERATIONS EXCEEDS LOOP MAXIMUM  P32, P72
R0874   00606    DV EXCEEDS MAXIMUM                         P32,P72,
R0875   00611    NO TIG FOR GIVEN ELEV ANGLE                P34,P74
R0876   00701    ILLEGAL OPTION CODE SELECTED               P57
R0877   00777    PIPA FAIL CAUSED THE ISS WARNING           T4RUPT
R0878   01102    AGC SELF TEST ERROR                        SELF CHECK
R0881   01105    DOWNLINK TOO FAST                          T4RUPT
R0882   01106    UPLINK TOO FAST                            T4RUPT
R0883   01107    PHASE TABLE FAILURE.  ASSUME               RESTART
R0884            ERASABLE MEMORY IS SUSPECT.                RESTART
R0895   01301    ARCSIN-ARCCOS ARGUMENT TOO LARGE           INTERPRETER
R0897   01406    BAD RETURN FROM ROOTPSRS                   DESCENT GUIDANCE EQS.
R0898   01407    VG INCREASING (DELTA-V ACCUMULATED         S40.8
R0899            .GT. 90 DEGREES AWAY FROM DESIRED THRUST   S40.8
R08995           VECTOR.)                                   S40.8
R0900   01410    UNINTENTIONAL OVERFLOW IN GUIDANCE         DESCENT GUIDANCE EQS.
R0901   01412    DESCENT IGNALG NOT CONVERGING              P63
R0905   01520    V37 REQUEST NOT PERMITTED AT THIS TIME     V37
R0906   01600    OVERFLOW IN DRIFT TEST                     IMU 4
R0907   01601    BAD IMU TORQUE                             OPT PRE ALIGN CALIB
R0908   01601                                               IMU 4 (LEM)
R0909   01703    IGNITION TIME SLIPPED                      MIDTOAVE
R0910   01706    INCORRECT PROGRAM REQUESTED FOR VEHICLE
R0911            CONFIGURATION                              P40, P42
R0913   02001    JET FAILURES HAVE DISABLED Y-Z TRANS.      DAP
R0914   02002    JET FAILURES HAVE DISABLED X TRANSLATION   DAP
R0915   02003    JET FAILURES HAVE DISABLED P-ROTATION      DAP
R0916   02004    JET FAILURES HAVE DISABLED U-V ROTATION    DAP
R0917   03777    ICDU FAIL CAUSED THE ISS WARNING           T4RUPT
R0918   04777    ICDU , PIPA FAILS CAUSED THE ISS WARNING   T4RUPT
R0919   07777    IMU FAIL CAUSED THE ISS WARNING            T4RUPT
R0920   10777    IMU , PIPA FAILS CAUSED THE ISS WARNING    T4RUPT
R0921   13777    IMU , ICDU  FAILS CAUSED THE ISS WARNING   T4RUPT
R0922   14777    IMU,ICDU,PIPA FAILS CAUSED ISS WARNING     T4RUPT

R0923   THE FOLLOWING CODES INDICATE THE MORE SERIOUS POODOO ABORTS THAT RESULT
R0924   IN THE PROGRAM GOING TO P00.

R0925   20105    AOTMARK SYSTEM IN USE                      AOTMARK
R0926   20430    ACCELERATION OVERFLOW IN INTEGRATION       ORBITAL INTEGRATION
R0927   20607    NO SOLN FROM TIME-THETA OR TIME-RADIUS     TIMETHET, TIMERAD
R0928   21103    UNUSED CCS BRANCH EXECUTED                 ABORT
R0929   21204    WAITLIST, VARDELAY, FIXDELAY, OR LONGCALL    WAITLIST ROUTINES
R0930              CALLED WITH ZERO OR NEGATIVE DELTA-TIME
R0933   21302    SQRT CALLED WITH NEGATIVE ARGUMENT         INTERPRETER
R0934   21406    BAD RETURN FROM ROOTPSRS                   IGNITION ALGORITHMN
R0935   21501    KEYBOARD AND DISPLAY ALARM DURING          PINBALL
R0936              INTERNAL USE(NVSUB).ABORT
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R0938   THE FOLLOWING CODES INDICATE A BAILOUT ABORT THAT RESULTS IN A SOFTWARE
R0939   RESTART

R0940   31104     DELAY ROUTINE BUSY                       EXEC
R0941   31201     EXECUTIVE OVERFLOW-NO VAC AREAS          EXEC
R0942   31202     EXECUTIVE OVERFLOW-NO CORE SETS          EXEC
R0943   31203     WAITLIST OVERFLOW-TOO MANY TASKS         WAITLIST
R09434  31206     SECOND JOB ATTEMPTS TO GO TO SLEEP VIA   PINBALL
R09436              KEYBOARD AND DISPLAY PROGRAM
R0944   31207     NO VAC AREAS FOR MARKS                   AOTMARK
R0945   31210     TWO PROGRAMS USING DEVICE AT SAME TIME   MODE SWITCHING
R0946   31211     ILLEGAL INTERRUPT OF EXTENDED VERB       AOTMARK
R09464  31502     TWO PRIO DISPLAYS WAITING                DSP INTRFCE
R0947   32000     DAP STILL IN PROGRESS AT NEXT TIME5 RUPT DAP
```

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P0948             CHECKLIST CODES FOR LUMINARY

R0949   *9       *17       *26                                             *9   COLUMN

R0951   R1CODE             ACTION TO BE EFFECTED                           PROGRAM

R0953   00013    KEY IN    NORMAL OR GYRO TORQUE COARSE ALIGN              P52
R0955   00014    PROCEED   DO IMU FINE ALIGN ROUTINE                       R51,P63,P57
R0957   00014    ENTER     DO LANDING SITE  DETERMINATION(N89DISP)         P57OPTION2
R0960   00015    PERFORM   CELESTIAL BODY ACQUISITION                      R51,P51
R0962   00062    SWITCH    AGC POWER DOWN                                  P06
R0964   00201    SWITCH    RR MODE TO AUTOMATIC                            P20,P22,R04
R0966   00203     SWITCH   GUID CONTROL TO GNC, MODE TO AUTO...            P12,P42,P71
R0968                      ALSO THR CONT TO AUTO                           P40,P63,P70
R0970   00205    PERFORM   MANUAL ACQUISITION OF RR                        R23
R0972   00500    SWITCH    LR ANTENNA TO POSITION 1                        P63
R0974
R0975                        SWITCH DENOTES CHANGE POSITION OF A CONSOLE SWITCH
R0976                        PERFORM DENOTES START OR END OF A TASK
R0977                        KEY IN DENOTES KEY IN OF DATA THRU THE DSKY
```

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L        ASSEMBLY AND OPERATION INFORMATION                                              USER'S PAGE NO.  27      EO

P0978               OPTION CODES FOR LUMINARY

R0979    THE SPECIFIED OPTION CODES WILL BE FLASHED IN COMPONENT R1 IN
R0980    CONJUNCTION WITH V04N06 OR V04N12 (FOR EXTENDED VERBS) TO REQUEST THE
R0981    ASTRONAUT TO LOAD INTO COMPONENT R2 THE OPTION HE DESIRES.

R0982    *9       *17                                *52                            *11          *25   COLUMN

R0984    OPTION
R0985    CODE     PURPOSE                            INPUT FOR COMPONENT 2          PROGRAM(S)   APPLICABILITY

R0987    00001    SPECIFY IMU ORIENTATION            1=PREF 2=NOM 3=REFSMMAT        P52          ALL
R0989                                                4=LAND SITE
R0990    00002    SPECIFY VEHICLE                    1=THIS 2=OTHER                 P21,R30      ALL
R0992    00003    SPECIFY TRACKING ATTITUDE          1=PREFERRED 2=OTHER            R63          ALL
R0994    00004    SPECIFY RADAR                      1=RR 2=LR                      R04          SUNDANCE + LUMINARY
R0996    00005    SPECIFY SOR PHASE                  1=FIRST 2=SECOND               P38          COLOSSUS + LUMINARY
R0998    00006    SPECIFY RR COARSE ALIGN OPTION     1=LOCKON 2=CONTINUOUS DESIG.   V41N72       SUNDANCE + LUMINARY
R1000    00010    SPECIFY ALIGNMENT MODE             0=ANY TIME 1=REFSMMAT +G       P57          LUMINARY
R1002                                                2=TWO BODIES 3=ONE BODY + G
R1003    00012    SPECIFY CSM ORBIT OPTION           1=NO ORBIT CHANGE 2=CHANGE     P22          LUMINARY
R1005                                                ORBIT TO PASS OVER LM
```

```
L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                     USER'S PAGE NO.   1      EO

 0001     REF    1                                       COUNT   BANKSUM
R0002               MODULE 1 CONTAINS BANKS 0 THROUGH 5

 0003                           4000                     BLOCK   02
 0004                           4000            RADARFF  EQUALS
 0005                           4000            FFTAG1   EQUALS
 0006                           4000            FFTAG2   EQUALS
 0007                           4000            FFTAG3   EQUALS
 0008                           4000            FFTAG4   EQUALS
 0009                           4000            FFTAG7   EQUALS
 0010                           4000            FFTAG8   EQUALS
 0011                           4000            FFTAG9   EQUALS
 0012                           4000            FFTAG10  EQUALS
 0013                           4000            FFTAG11  EQUALS
 0014                           4000            FFTAG12  EQUALS
 0015                           4000            FFTAG13  EQUALS
 0016       10 WORDS LEFT       5765   05765 0           BNKSUM  02
 0016                           5766   05766 0


 0017                           6000                     BLOCK   03
 0018                           6000            FFTAG5   EQUALS
 0019                           6000            FFTAG6   EQUALS
 0020       14 WORDS LEFT       7761   07761 0           BNKSUM  03
 0020                           7762   07762 0


 0021                        00,2000                     BANK    00
 0022                        00,2000            DLAYJOB  EQUALS
 0023        2 WORDS LEFT    00,3775   03775 1           BNKSUM  00
 0023                        00,3776   03776 1


 0024                        01,2000                     BANK    01
 0025                        01,2000            RESTART  EQUALS
 0026                        01,2000            LOADDAP1 EQUALS
 0027        0 WORDS LEFT    01,2000   NO NEED           BNKSUM  01


 0028                        04,2000                     BANK    04
 00285                       04,2000            ORBITAL3 EQUALS
 0029                        04,2000            R02      EQUALS
 0030                        04,2000            VERB37   EQUALS
 0031                        04,2000            PINBALL4 EQUALS
 0032                        04,2000            CONICS1  EQUALS
 0033                        04,2000            KEYRUPT  EQUALS
 0034                        04,2000            R36LM    EQUALS
 0035                        04,2000            UPDATE2  EQUALS
 0036                        04,2000            E/PROG   EQUALS
 00365                       04,2000            AOTMARK2 EQUALS
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                   USER'S PAGE NO.  2       E0

 0037     24 WORDS LEFT      04,3747   03747 0            BNKSUM 04
 0037                        04,3750   03750 0

 0038                        05,2000                      BANK   05
 0039                        05,2000             FRANDRES EQUALS
 0040                        05,2000             DOWNTELM EQUALS
 0041                        05,2000             ABORTS1  EQUALS
 0042                        05,2000             EPHEM1   EQUALS
 00425                       05,2000             ASENT3   EQUALS
 0043      3 WORDS LEFT      05,3774   03774 0            BNKSUM 05
 0043                        05,3775   03775 1

R0044          MODULE 2 CONTAINS BANKS 6 THROUGH 13

 0045                        06,2000                      BANK   06
 0046                        06,2000             IMUCOMP  EQUALS
 0047                        06,2000             T4RUP    EQUALS
 0048                        06,2000             RCSMONT  EQUALS
 00485                       06,2000             MIDDGIM  EQUALS
 00486                       06,2000             EARTHLOC EQUALS
 0049      5 WORDS LEFT      06,3772   03772 0            BNKSUM 06
 0049                        06,3773   03773 1

 0050                        07,2000                      BANK   07
 0051                        07,2000             AOTMARK1 EQUALS
 0052                        07,2000             MODESW   EQUALS
 00525                       07,2000             ASENT2   EQUALS
 0053     12 WORDS LEFT      07,3763   03763 0            BNKSUM 07
 0053                        07,3764   03764 1

 0054                        10,2000                      BANK   10
 0055                        10,2000             RTBCODES EQUALS
 0056                        10,2000             DISPLAYS EQUALS
 0057                        10,2000             PHASETAB EQUALS
 0058                        10,2000             FLESHLOC EQUALS
 00585                       10,2000             SLCTMU   EQUALS
 0059      1 WORDS LEFT      10,3776   03776 1            BNKSUM 10

 0060                        11,2000                      BANK   11
 0061                        11,2000             ORBITAL  EQUALS
 0062                        11,2000             F2DPS*11 EQUALS
 0063                        11,2000             INTVEL   EQUALS
 0065      3 WORDS LEFT      11,3774   03774 0            BNKSUM 11
 0065                        11,3775   03775 1
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                         USER'S PAGE NO.   3       EO

 0066                        12,2000                       BANK    12
 0067                        12,2000           CONICS      EQUALS
 00675                       12,2000           ORBITAL1    EQUALS
 00676                       12,2000           INTPRET2    EQUALS
 0068       4 WORDS LEFT     12,3773   03773 1             BNKSUM  12
 0068                        12,3774   03774 0


 0069                        13,2000                       BANK    13
 0070                        13,2000           LATLONG     EQUALS
 0071                        13,2000           INTINIT     EQUALS
 0072                        13,2000           LEMGEOM     EQUALS
 0073                        13,2000           P76LOC      EQUALS
 0074                        13,2000           ORBITAL2    EQUALS
 00745                       13,2000           ABTFLGS     EQUALS
 0075      15 WORDS LEFT     13,3760   03760 0             BNKSUM  13
 0075                        13,3761   03761 1
```

```
L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                  USER'S PAGE NO.  4      EO

P0076           MODULE 3 CONTAINS BANKS 14 THROUGH 21

 0077                        14,2000                     BANK    14
 0078                        14,2000            P50S1    EQUALS
 0079                        14,2000            STARTAB  EQUALS
 00795                       14,2000            ASENT4   EQUALS
 0080      2 WORDS LEFT      14,3775   03775 1           BNKSUM 14
 0080                        14,3776   03776 1

 0081                        15,2000                     BANK    15
 0082                        15,2000            P50S     EQUALS
 0083                        15,2000            EPHEM    EQUALS
 0084     15 WORDS LEFT      15,3760   03760 0           BNKSUM 15
 0084                        15,3761   03761 1

 0085                        16,2000                     BANK    16
 0086                        16,2000            DAPS1    EQUALS
 0087      1 WORDS LEFT      16,3776   03776 1           BNKSUM 16

 0088                        17,2000                     BANK    17
 0089                        17,2000            DAPS2    EQUALS
 00895                       17,2000            C13BANK  EQUALS
 0090      0 WORDS LEFT      17,2000  NO NEED            BNKSUM 17

 0091                        20,2000                     BANK    20
 0092                        20,2000            DAPS3    EQUALS
 0093                        20,2000            LOADDAP  EQUALS
 0094      0 WORDS LEFT      20,2000  NO NEED            BNKSUM 20

 0095                        21,2000                     BANK    21
 0096                        21,2000            DAPS4    EQUALS
 0098                        21,2000            R10      EQUALS
 0099                        21,2000            R11      EQUALS
 0100      0 WORDS LEFT      21,2000  NO NEED            BNKSUM 21
```

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L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                USER'S PAGE NO.  5      E0

P0101               MODULE 4 CONTAINS BANKS 22 THROUGH 27

 0102                         22,2000                      BANK     22
 0103                         22,2000            KALCMON1  EQUALS
 0104                         22,2000            KALCMON2  EQUALS
 0105                         22,2000            R30LOC    EQUALS
 0106                         22,2000            RENDEZ    EQUALS
 01065                        22,2000            SERV2     EQUALS
 01066                        22,2000            LANDCNST  EQUALS
 0107      4 WORDS LEFT       22,3773   03773 1            BNKSUM 22
 0107                         22,3774   03774 0


 0108                         23,2000                      BANK     23
 0109                         23,2000            POWFLITE  EQUALS
 0110                         23,2000            POWFLIT1  EQUALS
 0111                         23,2000            INFLIGHT  EQUALS
 0112                         23,2000            APOPERI   EQUALS
 0113                         23,2000            R61       EQUALS
 0114                         23,2000            R62       EQUALS
 0115                         23,2000            INTPRET1  EQUALS
 0116                         23,2000            MEASINC   EQUALS
 0117                         23,2000            MEASINC1  EQUALS
 0118                         23,2000            EXTVB1    EQUALS
 01185                        23,2000            P12A      EQUALS
 01186                        23,2000            NORMLIZ   EQUALS
 01187                        23,2000            ASENT7    EQUALS
 01188                        23,2000            RODTRAP   EQUALS
 0119      6 WORDS LEFT       23,3771   03771 0            BNKSUM 23
 0119                         23,3772   03772 0


 0120                         24,2000                      BANK     24
 0121                         24,2000            PLANTIN   EQUALS
 0122                         24,2000            P20S      EQUALS
 0123      0 WORDS LEFT       24,2000  NO NEED             BNKSUM 24


 0124                         25,2000                      BANK     25
 0125                         25,2000            P20S1     EQUALS
 0126                         25,2000            P20S2     EQUALS
 0127                         25,2000            RADARUPT  EQUALS
 0128                         25,2000            RRLEADIN  EQUALS
 0129                         25,2000            R29S1     EQUALS
 01295                        25,2000            PLANTIN3  EQUALS
 0130     16 WORDS LEFT       25,3757   03757 1            BNKSUM 25
 0130                         25,3760   03760 0


 0131                         26,2000                      BANK     26
```

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L          TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                        USER'S PAGE NO.   6       E0

 0132                          26,2000              P20S3     EQUALS
 0133                          26,2000              BAWLANGS  EQUALS
 0134                          26,2000              MANUVER   EQUALS
 0135                          26,2000              MANUVER1  EQUALS
 01355                         26,2000              PLANTIN1  EQUALS
 01356                         26,2000              PLANTIN2  EQUALS
 0136       2 WORDS LEFT       26,3775   03775 1              BNKSUM 26
 0136                          26,3776   03776 1

 0137                          27,2000                        BANK    27
 0138                          27,2000              TOF-FF    EQUALS
 0139                          27,2000              TOF-FF1   EQUALS
 0140                          27,2000              P40S1     EQUALS
 0141                          27,2000              VECPT     EQUALS
 0142                          27,2000              ASENT1    EQUALS
 01425                         27,2000              SERV3     EQUALS
 0143       4 WORDS LEFT       27,3773   03773 1              BNKSUM 27
 0143                          27,3774   03774 0
```

```
L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                USER'S PAGE NO.   7       EO

P0144               MODULE 5 CONTAINS BANKS 30 THROUGH 35

 0145                          30,2000                        BANK    30
 0146                          30,2000              LOWSUPER  EQUALS
 0147                          30,2000              P12       EQUALS
 0148                          30,2000              ASENT     EQUALS
 0149                          30,2000              FCDUW     EQUALS
 01495                         30,2000              FLOGSUB   EQUALS
 01496                         30,2000              V867A     EQUALS
 01497                         30,2000              ASENT5    EQUALS
 0150       9 WORDS LEFT       30,3766    03766 0             BNKSUM  30
 0150                          30,3767    03767 1


 0151                          31,2000                        BANK    31
 0152                          31,2000              FTHROT    EQUALS
 0153                          31,2000              F2DPS*31  EQUALS
 0154                          31,2000              V867      EQUALS
 0155      46 WORDS LEFT       31,3721    03721 0             BNKSUM  31
 0155                          31,3722    03722 0


 0156                          32,2000                        BANK    32
 0157                          32,2000              P20S4     EQUALS
 0158                          32,2000              F2DPS*32  EQUALS
 0159                          32,2000              ABORTS    EQUALS
 0160                          32,2000              LRS22     EQUALS
 0161                          32,2000              P66LOC    EQUALS
 0163                          32,2000              R47       EQUALS
 01635                         32,2000              SERV      EQUALS
 0164      22 WORDS LEFT       32,3751    03751 1             BNKSUM  32
 0164                          32,3752    03752 1


 0165                          33,2000                        BANK    33
 0166                          33,2000              SERVICES  EQUALS
 0167                          33,2000              R29/SERV  EQUALS
 01675                         33,2000              ASENT6    EQUALS
 0168      15 WORDS LEFT       33,3760    03760 0             BNKSUM  33
 0168                          33,3761    03761 1


 0169                          34,2000                        BANK    34
 0170                          34,2000              ASENT8    EQUALS
 0171                          34,2000              P30S1     EQUALS
 0172                          34,2000              CSI/CDH1  EQUALS
 0173                          34,2000              ASCFILT   EQUALS
 01735                         34,2000              R12STUFF  EQUALS
 01736                         34,2000              SERV4     EQUALS
 01737                         34,2000              F2DPS*34  EQUALS
```

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L          TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                   USER'S PAGE NO.   8        EO

 0174     87 WORDS LEFT       34,3650    03650 1               BNKSUM 34
 0174                         34,3651    03651 0

 0175                         35,2000                          BANK    35
 0176                         35,2000                CSI/CDH   EQUALS
 0177                         35,2000                P30S      EQUALS
 0178                         35,2000                P40S3     EQUALS
 0179                         35,2000                P40S2     EQUALS
 0180     33 WORDS LEFT       35,3736    03736 0               BNKSUM 35
 0180                         35,3737    03737 1
```

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L        TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                   USER'S PAGE NO.   9       ED

P0181              MODULE 6 CONTAINS BANKS 36 THROUGH 43

 0182                          36,2000                         BANK    36
 0183                          36,2000              P40S       EQUALS
 0184      6 WORDS LEFT        36,3771    03771 0              BNKSUM 36
 0184                          36,3772    03772 0


 0185                          37,2000                         BANK    37
 0186                          37,2000              P05P06     EQUALS
 0187                          37,2000              IMU2       EQUALS
 0188                          37,2000              IMU4       EQUALS
 0189                          37,2000              R31        EQUALS
 0190                          37,2000              IMUSUPER   EQUALS
 0191                          37,2000              SERV1      EQUALS
 0192      6 WORDS LEFT        37,3771    03771 0              BNKSUM 37
 0192                          37,3772    03772 0


 0193                          40,2000                         BANK    40
 0194                          40,2000              PINBALL1   EQUALS
 0195                          40,2000              SELFSUPR   EQUALS
 0196                          40,2000              PINSUPER   EQUALS
 0196                          40,2000              R31LOC     EQUALS
 0197     17 WORDS LEFT        40,3756    03756 0              BNKSUM 40
 0197                          40,3757    03757 1


 0198                          41,2000                         BANK    41
 0199                          41,2000              PINBALL2   EQUALS
 0200     23 WORDS LEFT        41,3750    03750 0              BNKSUM 41
 0200                          41,3751    03751 1


 0201                          42,2000                         BANK    42
 0202                          42,2000              SBAND      EQUALS
 0203                          42,2000              PINBALL3   EQUALS
 0204      7 WORDS LEFT        42,3770    03770 1              BNKSUM 42
 0204                          42,3771    03771 0


 0205                          43,2000                         BANK    43
 0206                          43,2000              EXTVERBS   EQUALS
 0207                          43,2000              SELFCHEC   EQUALS

 0208      1 WORDS LEFT        43,3776    03776 1              BNKSUM 43
```

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L         TAGS FOR RELATIVE SETLOC AND BLANK BANK CARDS                                    USER'S PAGE NO.  10       E0

 0209    REF   1                23,2523            HI6ZEROS EQUALS ZEROVECS          ZERO VECTOR ALWAYS IN HIGH MEMORY
 0210    REF   1                12,2006            LO6ZEROS EQUALS ZEROVEC           ZERO VECTOR ALWAYS IN LOW MEMORY
 0211    REF   1                23,2521            HIDPHALF EQUALS UNITX
 0212    REF   1                12,2004            LODPHALF EQUALS XUNIT
 0213    REF   1                23,2513            HIDP1/4  EQUALS DP1/4TH
 0214    REF   1                24,3002            LODP1/4  EQUALS D1/4              2DEC .25
 0215    REF   2  LAST    37    23,2521            HIUNITX  EQUALS UNITX
 0216    REF   1                23,2517            HIUNITY  EQUALS UNITY
 0217    REF   1                23,2515            HIUNITZ  EQUALS UNITZ
 0218    REF   2  LAST    37    12,2004            LOUNITX  EQUALS XUNIT             2DEC  .5
 0219    REF   1                12,2002            LOUNITY  EQUALS YUNIT             2DEC  0
 0220    REF   1                12,2000            LOUNITZ  EQUALS ZUNIT             2DEC  0
R0221    .


 0222    REF   1                22,3541            DELRSPL  EQUALS SPLRET            COL PGM, ALSO CALLED BY R30 IN LUMINARY
R0223    ROPE-SPECIFIC ASSIGNS OBVIATING NEED TO CHECK COMPUTER FLAG IN              DETERMINING INTEGRATION AREA ENTRIES.

 0225    REF   1                13,2733            ATOPTHIS EQUALS ATOPLEM
 0226    REF   1                13,2660            ATOPOTH  EQUALS ATOPCSM
 0227    REF   1                13,3042            OTHPREC  EQUALS CSMPREC
 0228    REF   1                   0174            MOONTHIS EQUALS LMOONFLG
 0229    REF   1                   0173            MOONOTH  EQUALS CMOONFLG
 0230    REF   1                13,2746            MOVATHIS EQUALS MOVEALEM
 0231    REF   1                12,2017            RMM      =      LODPMAX
 0232    REF   1                12,2021            RME      =      LODPMAX1
 0233    REF   1                13,3056            THISPREC EQUALS LEMPREC
 0234    REF   2  LAST    37    23,2515            THISAXIS =      UNITZ
 0235    REF   1                23,2515            NB1NB2   EQUALS THISAXIS          FOR R31
 0236    REF   1                   5011            ERASID   EQUALS BITS2-10          DOWNLINK ERASABLE DUMP ID
 0237    REF   1                   4752            DELAYNUM EQUALS TWO
```

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L        CONTROLLED CONSTANTS                                                          USER'S PAGE NO.   1        EO

P0001    DPS AND APS ENGINE PARAMETERS


 0002    REF   1            36,2000                         SETLOC P40S
 0003                       36,2000                         BANK
 0004    REF   1                                            COUNT* $$/P40

R0005    *** THE ORDER OF THE FOLLOWING SIX CONSTANTS MUST NOT BE CHANGED ***

 0006                       36,2000   01056 0  FDPS     2DEC    4.3670 B-7      9817.5 LBS FORCE IN NEWTONS
 0006                       36,2001   37167 0
 0007                       36,2002   00457 1  MDOTDPS  2DEC    0.1480 B-3      32.62 LBS/SEC IN KGS/CS.
 0007                       36,2003   03250 0
 0008                       36,2004   77777 0  DTDECAY  2DEC    -38             40 PERCENT FTP-DPS TAILOFF FOR P40
 0008                       36,2005   77731 1
 0009                       36,2006   00307 0  FAPS     2DEC    1.5569 B-7      3500 LBS FORCE IN NEWTONS
 0009                       36,2007   11040 0
 0010                       36,2010   00151 1  MDOTAPS  2DEC    0.05135 B-3     11.32 LBS/SEC IN KGS/CS
 0010                       36,2011   05214 0
 0011                       36,2012   77777 0  ATDECAY  2DEC    -18             618 LB-SEC  TAILOFF FOR APS
 0011                       36,2013   77755 0
R0012    ********************************************************************

 00122                      36,2014   00003 1  100PCTTD 2DEC    24 B-17         100 PERCENT FTP-DPS TAILOFF FOR P70
 00122                      36,2015   00000 1
R00124   ********************************************************************

 0013                       36,2016   00026 0  FRCS4    2DEC    0.17792 B-7     400 LBS FORCE IN NEWTONS
 0013                       36,2017   30605 1
 0014                       36,2020   00013 0  FRCS2    2DEC    0.08896 B-7     200 LBS FORCE IN NEWTONS
 0014                       36,2021   14303 1
 0015    REF   1            27,2000                         SETLOC P40S1
 0016                       27,2000                         BANK
 0017    REF   1                                            COUNT* $$/P40

R0018    *** APS IMPULSE DATA FOR P42 ****************************************

 0019                       27,2000   00000 1  K1VAL    2DEC    124.55 B-23     2800 LB-SEC
 0019                       27,2001   07622 0
 0020                       27,2002   00000 1  K2VAL    2DEC    31.138 B-24     700  LB-SEC
 0020                       27,2003   00762 1
 0021                       27,2004   00030 1  K3VAL    2DEC    1.5569 B-10     FAPS ( 3500 LBS THRUST)
 0021                       27,2005   35104 1
R0022    ********************************************************************

 0023                       27,2006   00016 0  S40.136  2DEC    .4671 B-9       .4671 M NEWTONS (DPS)
 0023                       27,2007   36237 1
 0024                       27,2010   35711 0  S40.136_ 2DEC    .4671 B+1       S40.136 SHIFTED LEFT 10.
 0024                       27,2011   35663 1
 0025    REF   1            27,2000                         SETLOC ASENT1
```

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L          CONTROLLED CONSTANTS                                                                     USER'S PAGE NO.  2       EO S3

 0026                           27,2012                         BANK
 0027    REF    1                                               COUNT*  $$/P70

 0028                           27,2012   03631 0  (1/DV)A   2DEC    15.20 B-7          2 SECONDS WORTH OF INITIAL ASCENT
 0028                           27,2013   23146 0
A0029                                                                                   STAGE ACCELERATION -- INVERTED (M/CS)
A0030                                                                                   1) PREDICATED ON A LIFTOFF MASS OF
A0031                                                                                      4869.9 KG (SNA-8-D-027  7/11/68)
A0032                                                                                   2) PREDICATED ON A CONTRIBUTION TO VEH-
A0033                                                                                      ICLE ACCELERATION FROM RCS THRUSTERS
A0034                                                                                      EQUIV. TO 1 JET ON CONTINUOUSLY.
 0035                           27,2014   33226 1  K(1/DV)   2DEC    436.70 B-9         DPS ENGINE THRUST IN NEWTONS / 100 CS.
 0035                           27,2015   14632 0
 0036                           27,2016   05306 1  (AT)A     2DEC    3.2883 E-4 B9      INITIAL ASC. STG. ACCELERATION ** M/CS.
 0036                           27,2017   15503 0
A0037                                                                                   ASSUMPTIONS SAME AS FOR (1/DV)A.
 0038                           27,2020   26337 1  (TBUP)A   2DEC    91902 B-17         ESTIMATED BURN-UP TIME OF THE ASCENT STG
 0038                           27,2021   30000 1
A0039                                                                                   ASSUMPTIONS SAME AS FOR (1/DV)A WITH THE
A0040                                                                                   ADDITIONAL ASSUMPTION THAT NET MASS-FLOW
A0041                                                                                   RATE = 5.299 KG/SEC = 5.135 (APS) +
A0042                                                                                   .164 (1 RCS JET).
 0043    REF    1               30,2000                         SETLOC  ASENT
 0044                           30,2000                         BANK
 0045    REF    1                                               COUNT*  $$/ASENT
 0046                           30,2000   02445 0  AT/RCS    2DEC    .0000785 B+10      4 JETS IN A DRY LEM
 0046                           30,2001   00274 0
 0047    REF    1               33,2000                         SETLOC  SERVICES
 0048                           33,2000                         BANK
 0049    REF    1                                               COUNT*  $$/SERV

R0050    *** THE ORDER OF THE FOLLOWING TWO CONSTANTS MUST NOT BE CHANGED *******

 0051                           33,2000   41545 0  ARSVEX    DEC     -3030 E-2 B-5     9942 FT/SEC IN M/CS.

 0052                           33,2001   42341 1  DRSVEX    DEC*    -2.95588868E+ 1B-05*     VE (DPS)     +2.95588868E+ 3

R0053    ***********************************************************************************

 0054    REF    1               31,2000                         SETLOC  F2DPS*31
 0055                           31,2000                         BANK
 0056    REF    1                                               COUNT*  $$/F2DPS

 0057                           31,2000   00222 0  TRIMACCL  2DEC*   +3.50132708E- 5B+08*     A (T)        +3.50132708E- 1
 0057                           31,2001   33316 0
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L        CONTROLLED CONSTANTS                                                                   USER'S PAGE NO.  3      EO S3

P0058    THROTTLING AND THRUST DETECTION PARAMETERS

 0059    REF    2  LAST   38    36,2000                        SETLOC P40S
 0060                           36,2022                        BANK
 0061    REF    2 LAST   38 TO   38:      18     18*           COUNT* $$/P40

 0062                           36,2022   00030 1  THRESH1   DEC     24

 0063                           36,2023   00014 1  THRESH3   DEC     12

 0064    REF    1                  4737            HIRTHROT  =       BIT13

 0065    REF    1                  6000                        SETLOC FFTAG5
 0066                              6000                        BANK
 0067    REF    1                                              COUNT* $$/P40

 0068                              6000   00464 1  THRESH2   DEC     308

 0069    REF    1               31,2000                        SETLOC FTHROT
 0070                           31,2002                        BANK
 0071    REF    1                                              COUNT* $$/THROT

 0072                           31,2002   07401 0  FMAXODD   DEC     +        3841                  FSAT         +4.81454413E+ 4

 0073                           31,2003   06613 0  FMAXPOS   DEC     +        3467                  FMAX         +4.34546769E+ 4

 0074                           31,2004   00024 1  THROTLAG  DEC     +          20                  TAU (TH)     +1.99999999E- 1

 00745                          31,2005   03C07 0  SCALEFAC  2DEC*   +7.97959872E+ 2B-16*          BITPERF      +7.97959872E- 2
 00745                          31,2006   17534 0
 0075    REF    1               32,2000                        SETLOC F2DPS*32
 0076                           32,2000                        BANK
 0077    REF    1                                              COUNT* $$/F2DPS

 0078                           32,2000   00044 1  DPSTHRSH  DEC     36                 (THRESH1 + THRESH3 FOR P63)
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L       CONTROLLED CONSTANTS                                                                      USER'S PAGE NO.  4      EO S3

P0082   LM HARDWARE-RELATED PARAMETERS


 0083   REF    1               25,2000                           SETLOC  RADARUPT
 0084                          25,2000                           BANK
 0085   REF    1                                                 COUNT*  $$/RRUPT

 0086                          25,2000    47777 0  LVELBIAS DEC     -12288              LANDING RADAR BIAS FOR 153.6 KC.

 0087                          25,2001    00001 0  RDDTBIAS 2DEC    17000               BIAS COUNT FOR RR RANGE RATE.
 0087                          25,2002    01150 1

 0088   REF    1               32,2000                           SETLOC  LRS22
 0089                          32,2001                           BANK
 0090   REF    1                                                 COUNT*  $$/LRS22

 0091                          32,2001    70123 0  RDDTCONV 2DEC    -.0019135344 87 CONVERTS RR RDDT READING TO M/CS AT 2(7)
 0091                          32,2002    40702 0
 0092                          32,2003    13337 1  RANGCONV 2DEC    2.859024 8-3    CONVERTS RR RANGE READING TO M. AT 2(-29
 0092                          32,2004    10776 0
 0098   REF    2  LAST    39   33,2000                           SETLOC  SERVICES
 0099                          33,2002                           BANK
 0100   REF    2 LAST    39 TO  39:       2      2*              COUNT*  $$/SERV

 0101                          33,2002    61000 0  HBEAMANT 2DEC    -.4687018041        RANGE BEAM IN LR ANTENNA COORDINATES.
 0101                          33,2003    71210 1
 0102                          33,2004    00000 1           2DEC    0
 0102                          33,2005    00000 1
 0103                          33,2006    72333 1           2DEC    -.1741224271
 0103                          33,2007    45546 1

 0104                          33,2010    65363 1  HSCAL    2DEC    -.3288792           SCALES 1.079 FT/BIT TO 2(22)M.
 0104                          33,2011    64451 0
R0105   ***** THE SEQUENCE OF THE FOLLOWING CONSTANTS MUST BE PRESERVED ********

 0106                          33,2012    21241 0  VZSCAL   2DEC    +.5410829105        SCALES .8668 FT/SEC/BIT TO 2(18) M/CS.
 0106                          33,2013    03216 1

 0107                          33,2014    30153 0  VYSCAL   2DEC    +.7565672446        SCALES 1.212 FT/SEC/BIT TO 2(18) M/CS.
 0107                          33,2015    23101 0

 0108                          33,2016    63105 0  VXSCAL   2DEC    -.4020043770        SCALES -.644 FT/SEC/BIT TO 2(18) M/CS.
 0108                          33,2017    61733 1

R0109   *******************************************************************************

 0110                          33,2020    01507 1  KPIP     DEC     .0512               SCALES DELV TO UNITS OF 2(5) M/CS.
 0111                          33,2021    00321 1  KPIP1    2DEC    .0128               SCALES DELV TO UNITS OF 2(7) M/CS.
 0111                          33,2022    26706 1
 0112                          33,2023    00150 0  KPIP2    2DEC    .0064               SCALES DELV TO UNITS OF 2(8) M/CS.
 0112                          33,2024    33343 0
```

8 m/s

32 m/cs =

3~~000~~ m/s

.32

```
 0113                       33,2025   02630 0  ALTCONV   2DEC    1.399078846 B-4 CONVERTS M*2(-24) TO BIT UNITS *2(-28).
 0113                       33,2026   25010 1
 0114                       33,2027   24402 1  ARCONV1   2DEC    656.167979 B-10 CONV. ALTRATE COMP, TO BIT UNITS<
 0114                       33,2030   26003 0
 0115    REF    1           21,2000                      SETLOC R10
 0116                       21,2000                      BANK
 0117    REF    1                                        COUNT* $$/R10

 0118                       21,2000   24402 1  ARCONV    OCT     24402              656.1679798B-10 CONV ALTRATE TO BIT UNIT

 0119                       21,2001   01551 1  ARTOA     DEC     .1066098 B-1       .25/2.345 B-1 4X/SEC CYCLE RATE.

 0120                       21,2002   21357 0  ARTOA2    DEC     .0021322 B8        (.5)/(2.345)(100)

 0121                       21,2003   22316 0  VELCONV   OCT     22316              588.914 B-10 CONV VEL. TO BIT UNITS.

 0122                       21,2004   01507 1  KPIP1(5)  DEC     .0512              SCALES DELV TO M/CS*2(-5).

 0123                       21,2005   00547 1  MAXVBITS  OCT     00547              MAX. DISPLAYED VELOCITY 199 9989 FT/SEC.

 0124    REF    1           20,2000                      SETLOC DAPS3
 0125                       20,2000                      BANK
 0126    REF    1                                        COUNT* $$/DAPAO

 0127                       20,2000   01150 1  TORKJET1  DEC     .03757             550 / .2 SCALED AT (+16) 64 / 180
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P0128    PARAMETERS RELATING TO MASS, INERTIA, AND VEHICLE DIMENSIONS

 0129    REF     1                 05,2000                          SETLOC  FRANDRES
 0130                              05,2000                          BANK
 0131    REF     1                                                  COUNT*  $$/START

 0132                              05,2000    02357 1   FULLAPS     DEC     5050 B-16        NOMINAL FULL ASCENT MASS -- 2(16) KG.

 0133    REF     1                 01,2000                          SETLOC  LOADDAP1
 0134                              01,2000                          BANK
 0135    REF     1                                                  COUNT*  $$/R03

 0136                              01,2000    76466 1   MINLMD      DEC     -2850 B-16       MIN. DESCENT STAGE MASS -- 2(16) KG.

 0137                              01,2001    76731 0   MINMINLM    DEC     -2200 B-16       MIN ASCENT STAGE MASS -- 2(16) KG.

 0138    REF     1                    4741              MINCSM      =       BIT11            MIN CSM MASS (CK FOR 1/ACCS)  = 9050 LBS

 0139    REF     2   LAST    42    20,2000                          SETLOC  DAPS3
 0140                              20,2001                          BANK
 0141    REF     2 LAST    42 TO    43:       1      1*             COUNT*  $$/DAPAO

 0142                              20,2001    01046 1   LOASCENT    DEC     2200 B-16        MIN ASCENT LEM MASS -- 2(16) KG.

 0143                              20,2002    07361 1   HIDESCNT    DEC     15300 B-16       MAX DESCENT LEM MASS -- 2(16) KG.

 0144                              20,2003    00666 1   LODESCNT    DEC     1750 B-16        MIN DESCENT STAGE (ALONE) -- 2(16) KG.
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P0145    PHYSICAL CONSTANTS ( TIME - INVARIANT )

 0146    REF    1                 37,2000                              SETLOC IMU2
 0147                             37,2000                              BANK
 0148    REF    1                                                      COUNT* $$/P07

 0149                             37,2000    07623 1  OMEG/MS   2DEC    .24339048
 0149                             37,2001    26552 1
 0150    REF    1                 22,2000                              SETLOC R30LOC
 0151                             22,2000                              BANK
 0152    REF    1                                                      COUNT* $$/R30

R0153    *** THE ORDER OF THE FOLLOWING TWO CONSTANTS MUST BE PRESERVED *********

 0154                             22,2000    27533 1  1/RTMUM   2DEC*   .45162595 E-4 B14*
 0154                             22,2001    07571 0
 0155                             22,2002    25004 1  1/RTMUE   2DEC*   .50087529 E-5 B17*
 0155                             22,2003    06702 1
R0156    ****************************************************************************

 0157    REF    2   LAST    38    27,2000                              SETLOC P40S1
 0158                             27,2022                              BANK
 0159    REF    1                                                      COUNT* $$/S40.9

 0160                             27,2022    55340 0  EARTHMU   2DEC*   -3.986032 E10 B-36*            M(3)/CS(2)
 0160                             27,2023    61710 0
 0165    REF    2   LAST    38    27,2000                              SETLOC ASENT1
 0166                             27,2024                              BANK
 0167    REF    1                                                      COUNT* $$/P12

 0168                             27,2024    00072 1  MUM(-37)  2DEC*   4.9027780 E8 B-37*
 0168                             27,2025    16206 1
 0169                             27,2026    00344 1  MOONRATE  2DEC*   .26616994890062991 E-7 B+19*  RAD/CS.
 0169                             27,2027    24331 0
 0170    REF    3   LAST    41    33,2000                              SETLOC SERVICES
 0171                             33,2031                              BANK
 0172    REF    3 LAST    41 TO    42:      23     25*                 COUNT* $$/SERV

R0173    *** THE ORDER OF THE FOLLOWING TWO CONSTANTS MUST BE PRESERVED *********

 0174                             33,2031    61377 0  -MUDT     2DEC*   -7.9720645 E+12 B-44*
 0174                             33,2032    55754 1
 0175                             33,2033    77644 1  -MUDT1    2DEC*   -9.8055560 E+10 B-44*
 0175                             33,2034    65556 1
R0176    ****************************************************************************

 0177                             33,2035    64453 1  -MUDTMUN  2DEC*   -9.8055560 E+10 B-38*
 0177                             33,2036    55670 0
 0178                             33,2037    00002 0  RESQ      2DEC*   40.6809913 E12 B-58*
 0178                             33,2040    11777 0
 0179                          33,2041   01023 1  20J       2DEC    3.24692010 E-2
 0179                          33,2042   37155 1
 0180                          33,2043   00065 1  2J        2DEC    3.24692010 E-3
 0180                          33,2044   06244 0
 0181    REF    1              14,2000                      SETLOC P50S1
 0182                          14,2000                      BANK
 0183    REF    1                                           COUNT* $$/LCSAM

 0184                          14,2000   26723 0  RSUBEM    2DEC    384402000 B-29
 0184                          14,2001   00450 0
 0185                          14,2002   00065 1  RSUBM     2DEC    1738090 B-29
 0185                          14,2003   01265 1
 0186                          14,2004   00302 0  RSUBE     2DEC    6378166 B-29
 0186                          14,2005   24533 1
 0187                          14,2006   00052 0  ROE       2DEC    .00257125
 0187                          14,2007   04047 0
 0188    REF    1              04,2000                      SETLOC CONICS1
 0189                          04,2000                      BANK
 0190    REF    1                                           COUNT* $$/LT-LG

 0191                          04,2000   00302 0  ERAD      2DEC    6373338 B-29     PAD RADIUS
 0191                          04,2001   17755 0
 0192                          04,2002   00065 1  504RM     2DEC  . 1738090 B-29     METERS B-29 (EQUATORIAL MOON RADIUS)
 0192                          04,2003   01265 1
 0193    REF    2  LAST    45  04,2000                      SETLOC CONICS1
 0194                          04,2004                      BANK
 0195    REF    1                                           COUNT* $$/CONIC

R0196    *** THE ORDER OF THE FOLLOWING CONSTANTS MUST BE PRESERVED ************

 0197                          04,2004   22437 1  MUTABLE   2DEC*   3.986032 E10 B-36* MUE
 0197                          04,2005   16067 1
 0198                          04,2006   15625 1            2DEC*   .25087606 E-10 B+34*      1/MUE
 0198                          04,2007   21042 1
 0199                          04,2010   30276 1            2DEC*   1.99650495 E5 B-18*       SQRT(MUE)
 0199                          04,2011   04773 0
 0200                          04,2012   25004 1            2DEC*   .50087529 E-5  B+17*      1/SQRT(MUE)
 0200                          04,2013   06702 1


 0201                          04,2014   16471 1            2DEC*   4.902778 E8 B-30*         MUM
 0201                          04,2015   01352 1
 0202                          04,2016   21412 0            2DEC*   .203966 E-8  B+28*        1/MUM
 0202                          04,2017   20500 0
 0203                          04,2020   25477 1            2DEC*   2.21422176 E4  B-15*      SQRT(MUM)
 0203                          04,2021   03367 0
 0204                          04,2022   27533 1            2DEC*   .45162595 E-4  B+14*      1/SQRT(MUM)
 0204                          04,2023   07571 0
R0205    ************************************************************************
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L        CONTROLLED CONSTANTS                                                         USER'S PAGE NO.   9      EO S3

 0206    REF    1             13,2000                       SETLOC  INTINIT
 0207                         13,2000                       BANK
 0208    REF    1                                           COUNT*  $$/INTIN

 0209                         13,2000   07112 1  OMEGMOON  2DEC*   2.66169947 E-6 B+23*
 0209                         13,2001   05620 0
 0210    REF    1             13,2000                       SETLOC  ORBITAL2
 0211                         13,2002                       BANK
 0212    REF    1                                           COUNT*  $$/ORBIT

R0213    *** THE ORDER OF THE FOLLOWING CONSTANTS MUST NOT BE CHANGED ***********

 0214                         13,2002   27446 1            2DEC*   1.32715445 E16 B-54*      S
 0214                         13,2003   14620 0
 0215                         13,2004   16471 1  MUM       2DEC*   4.9027780 E8 B-30*        M
 0215                         13,2005   01352 1
 0216                         13,2006   22437 1  MUEARTH   2DEC*   3.986032 E10 B-36*
 0216                         13,2007   16067 1
 0217                         13,2010   00000 1            2DEC    0
 0217                         13,2011   00000 1
 0218                         13,2012   02302 1  J4REQ/J3  2DEC*   .4991607391 E7 B-26*
 0218                         13,2013   24736 0
 0219                         13,2014   77651 0            2DEC    -176236.02 B-25
 0219                         13,2015   76237 0
 0220                         13,2016   77776 1  2J3RE/J2  2DEC*   -.1355426363 E5 B-27*
 0220                         13,2017   53032 0
 0221                         13,2020   10407 0            2DEC*   .3067493316 E18 B-60*
 0221                         13,2021   05344 1
 0222                         13,2022   13710 0  J2REQSQ   2DEC*   1.75501139 E21 B-72*
 0222                         13,2023   35320 0
 0223                         13,2024   12160 0  3J22R2MU  2DEC*   9.20479048 E16 B-58*
 0223                         13,2025   12124 0
R0224    *****************************************************************************

 0225    REF    1             27,2000                       SETLOC  TOF-FF1
 0226                         27,2030                       BANK
 0227    REF    1                                           COUNT*  $$/TFF

 0228                         27,2030   24775 1  1/RTMU    2DEC*   .5005750271 E-5 B17*   MODIFIED EARTH MU
 0228                         27,2031   30424 0
 0229    REF    1             42,2000                       SETLOC  SBAND
 0230                         42,2000                       BANK
 0231    REF    1                                           COUNT*  $$/R05

 0232                         42,2000   26723 0  REMDIST   2DEC    384402000 B-29  MEAN DISTANCE BETWEEN EARTH AND MOON.
 0232                         42,2001   00450 0
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R0233   PHYSICAL CONSTANTS (TIME - VARIANT)
 0234   REF   1                14,2000                 SETLOC  STARTAB
 0235                          14,2010                 BANK
 0236   REF   1                                        COUNT*  $$/STARS

 0237                          14,2010   15262 0       2DEC    +.8342971408 B-1      STAR 37       X
 0237                          14,2011   21773 1
 0238                          14,2012   74130 0       2DEC    -.2392481515 B-1      STAR 37       Y
 0238                          14,2013   42420 1
 0239                          14,2014   70033 0       2DEC    -.4966976975 B-1      STAR 37       Z
 0239                          14,2015   41533 1
 0240                          14,2016   15014 0       2DEC    +.8139832631 B-1      STAR 36       X
 0240                          14,2017   04650 0
 0241                          14,2020   67067 1       2DEC    -.5557243189 B-1      STAR 36       Y
 0241                          14,2021   60150 0
 0242                          14,2022   02551 1       2DEC    +.1691204557 B-1      STAR 36       Z
 0242                          14,2023   15723 0
 0243                          14,2024   07210 0       2DEC    +.4541086270 B-1      STAR 35       X
 0243                          14,2025   01664 1
 0244                          14,2026   67276 0       2DEC    -.5392368197 B-1      STAR 35       Y
 0244                          14,2027   62232 0
 0245                          14,2030   13262 0       2DEC    +.7092312789 B-1      STAR 35       Z
 0245                          14,2031   00563 1
 0246                          14,2032   05076 0       2DEC    +.3201817378 B-1      STAR 34       X
 0246                          14,2033   35561 0
 0247                          14,2034   70716 0       2DEC    -.4436021946 B-1      STAR 34       Y
 0247                          14,2035   40260 1
 0248                          14,2036   62466 1       2DEC    -.8370786986 B-1      STAR 34       Z
 0248                          14,2037   64656 0
 0249                          14,2040   10652 1       2DEC    +.5520184464 B-1      STAR 33       X
 0249                          14,2041   04246 0
 0250                          14,2042   63235 0       2DEC    -.7933187400 B-1      STAR 33       Y
 0250                          14,2043   44200 0
 0251                          14,2044   73710 0       2DEC    -.2567508745 B-1      STAR 33       Z
 0251                          14,2045   66230 0
 0252                          14,2046   07204 0       2DEC    +.4537196908 B-1      STAR 32       X
 0252                          14,2047   33712 0
 0253                          14,2050   61747 1       2DEC    -.8779508801 B-1      STAR 32       Y
 0253                          14,2051   72343 0
 0254                          14,2052   02343 1       2DEC    +.1527766153 B-1      STAR 32       Z
 0254                          14,2053   21362 0
 0255                          14,2054   03237 1       2DEC    +.2069525789 B-1      STAR 31       X
 0255                          14,2055   13301 1
 0256                          14,2056   62030 0       2DEC    -.8719885748 B-1      STAR 31       Y
 0256                          14,2057   65332 0
 0257                          14,2060   70715 0       2DEC    -.4436288486 B-1      STAR 31       Z
 0257                          14,2061   71267 1
 0258                          14,2062   01745 0       2DEC    +.1217293692 B-1      STAR 30       X
 0258                          14,2063   06477 0
 0259                          14,2064   63531 0       2DEC    -.7702732847 B-1      STAR 30       Y
 0259                          14,2065   75365 0
 0260                    14,2066   12010 0        2DEC    +.6259880410 B-1       STAR 30       Z
 0260                    14,2067   03005 1
 0261                    14,2070   76146 0        2DEC    -.1124304773 B-1       STAR 29       X
 0261                    14,2071   77014 1
 0262                    14,2072   60371 1        2DEC    -.9694934200 B-1       STAR 29       Y
 0262                    14,2073   75073 1
 0263                    14,2074   03370 0        2DEC    +.2178116072 B-1       STAR 29       Z
 0263                    14,2075   12003 1
 0264                    14,2076   76125 0        2DEC    -.1146237858 B-1       STAR 28       X
 0264                    14,2077   40037 1
 0265                    14,2100   72436 0        2DEC    -.3399692557 B-1       STAR 28       Y
 0265                    14,2101   77062 0
 0266                    14,2102   61041 0        2DEC    -.9334250333 B-1       STAR 28       Z
 0266                    14,2103   54164 0
 0267                    14,2104   72277 0        2DEC    -.3516499609 B-1       STAR 27       X
 0267                    14,2105   51044 0
 0268                    14,2106   62641 0        2DEC    -.8240752703 B-1       STAR 27       Y
 0268                    14,2107   45471 1
 0269                    14,2110   70711 1        2DEC    -.4441196390 B-1       STAR 27       Z
 0269                    14,2111   70546 1
 0270                    14,2112   67364 1        2DEC    -.5326876930 B-1       STAR 26       X
 0270                    14,2113   47073 0
 0271                    14,2114   64425 0        2DEC    -.7160644554 B-1       STAR 26       Y
 0271                    14,2115   77777 0
 0272                    14,2116   07157 0        2DEC    +.4511047742 B-1       STAR 26       Z
 0272                    14,2117   16322 0
 0273                    14,2120   63327 1        2DEC    -.7861763936 B-1       STAR 25       X
 0273                    14,2121   64446 0
 0274                    14,2122   67515 1        2DEC    -.5217996305 B-1       STAR 25       Y
 0274                    14,2123   55266 0
 0275                    14,2124   05230 0        2DEC    +.3311371675 B-1       STAR 25       Z
 0275                    14,2125   25476 0
 0276                    14,2126   64754 0        2DEC    -.6898393233 B-1       STAR 24       X
 0276                    14,2127   72604 0
 0277                    14,2130   71235 0        2DEC    -.4182330640 B-1       STAR 24       Y
 0277                    14,2131   72553 1
 0278                    14,2132   66427 0        2DEC    -.5909338474 B-1       STAR 24       Z
 0278                    14,2133   42171 0
 0279                    14,2134   66546 0        2DEC    -.5812035376 B-1       STAR 23       X
 0279                    14,2135   70765 1
 0280                    14,2136   73260 1        2DEC    -.2909171294 B-1       STAR 23       Y
 0280                    14,2137   71643 0
 0281                    14,2140   14121 0        2DEC    +.7599800468 B-1       STAR 23       Z
 0281                    14,2141   30153 0
 0282                    14,2142   61247 1        2DEC    -.9170097662 B-1       STAR 22       X
 0282                    14,2143   73310 1
 0283                    14,2144   72313 0        2DEC    -.3502146628 B-1       STAR 22       Y
 0283                    14,2145   41247 0
 0284                    14,2146   74744 0        2DEC    -.1908999176 B-1       STAR 22       Z
 0284                    14,2147   44566 1
 0285              14,2150   70606 0       2DEC   -.4523440203 B-1   STAR 21     X
 0285              14,2151   54564 1
 0286              14,2152   77153 0       2DEC   -.0493710140 B-1   STAR 21     Y
 0286              14,2153   61536 0
 0287              14,2154   61601 1       2DEC   -.8904759346 B-1   STAR 21     Z
 0287              14,2155   47046 0
 0288              14,2156   60604 0       2DEC   -.9525211695 B-1   STAR 20     X
 0288              14,2157   76224 1
 0289              14,2160   77031 0       2DEC   -.0593434796 B-1   STAR 20     Y
 0289              14,2161   73354 1
 0290              14,2162   73161 0       2DEC   -.2986331746 B-1   STAR 20     Z
 0290              14,2163   63065 1
 0291              14,2164   60431 1       2DEC   -.9656605484 B-1   STAR 19     X
 0291              14,2165   51702 0
 0292              14,2166   00656 1       2DEC   +.0525933156 B-1   STAR 19     Y
 0292              14,2167   33013 0
 0293              14,2170   04044 0       2DEC   +.2544280809 B-1   STAR 19     Z
 0293              14,2171   10627 0
 0294              14,2172   62164 0       2DEC   -.8608205219 B-1   STAR 18     X
 0294              14,2173   45040 1
 0295              14,2174   07325 1       2DEC   +.4636213989 B-1   STAR 18     Y
 0295              14,2175   37443 0
 0296              14,2176   03267 1       2DEC   +.2098647835 B-1   STAR 18     Z
 0296              14,2177   06626 0
 0297              14,2200   63471 0       2DEC   -.7742591356 B-1   STAR 17     X
 0297              14,2201   50471 0
 0298              14,2202   11660 1       2DEC   +.6152504197 B-1   STAR 17     Y
 0298              14,2203   04151 0
 0299              14,2204   75501 1       2DEC   -.1482892839 B-1   STAR 17     Z
 0299              14,2205   46664 1
 0300              14,2206   70430 1       2DEC   -.4657947941 B-1   STAR 16     X
 0300              14,2207   46540 1
 0301              14,2210   07507 1       2DEC   +.4774785033 B-1   STAR 16     Y
 0301              14,2211   20100 1
 0302              14,2212   13727 1       2DEC   +.7450164351 B-1   STAR 16     Z
 0302              14,2213   05455 0
 0303              14,2214   72160 0       2DEC   -.3612508532 B-1   STAR 15     X
 0303              14,2215   64202 0
 0304              14,2216   11144 0       2DEC   +.5747270840 B-1   STAR 15     Y
 0304              14,2217   05203 0
 0305              14,2220   64200 1       2DEC   -.7342932655 B-1   STAR 15     Z
 0305              14,2221   65331 0
 0306              14,2222   71322 1       2DEC   -.4118589524 B-1   STAR 14     X
 0306              14,2223   41512 1
 0307              14,2224   16402 0       2DEC   +.9065485360 B-1   STAR 14     Y
 0307              14,2225   16205 1
 0308              14,2226   01365 0       2DEC   +.0924226975 B-1   STAR 14     Z
 0308              14,2227   04034 1
 0309              14,2230   75054 1       2DEC   -.1820751783 B-1   STAR 13     X
 0309              14,2231   56052 0
```

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L        CONTROLLED CONSTANTS                                                                   USER'S PAGE NO.  13        EO S4

 0310                                  14,2232   17030 1         2DEC     +.9404899869 B-1     STAR 13        Y
 0310                                  14,2233   17635 1
 0311                                  14,2234   73321 0         2DEC     -.2869271926 B-1     STAR 13        Z
 0311                                  14,2235   57603 0
 0312                                  14,2236   77010 0         2DEC     -.0614937230 B-1     STAR 12        X
 0312                                  14,2237   47623 0
 0313                                  14,2240   11515 0         2DEC     +.6031563286 B-1     STAR 12        Y
 0313                                  14,2241   01640 1
 0314                                  14,2242   63215 1         2DEC     -.7952489957 B-1     STAR 12        Z
 0314                                  14,2243   52176 0
 0315                                  14,2244   02143 0         2DEC     +.1371725575 B-1     STAR 11        X
 0315                                  14,2245   26755 1
 0316                                  14,2246   12715 1         2DEC     +.6813721061 B-1     STAR 11        Y
 0316                                  14,2247   31470 0
 0317                                  14,2250   13401 0         2DEC     +.7189685267 B-1     STAR 11        Z
 0317                                  14,2251   31222 1
 0318                                  14,2252   03157 1         2DEC     +.2011399589 B-1     STAR 10        X
 0318                                  14,2253   27504 0
 0319                                  14,2254   17402 1         2DEC     +.9690337941 B-1     STAR 10        Y
 0319                                  14,2255   12312 1
 0320                                  14,2256   75552 1         2DEC     -.1432348512 B-1     STAR 10        Z
 0320                                  14,2257   63657 0
 0321                                  14,2260   05471 0         2DEC     +.3507315038 B-1     STAR  9        X
 0321                                  14,2261   06122 0
 0322                                  14,2262   16220 0         2DEC     +.8926333307 B-1     STAR  9        Y
 0322                                  14,2263   16362 1
 0323                                  14,2264   04417 1         2DEC     +.2831839492 B-1     STAR  9        Z
 0323                                  14,2265   32762 0
 0324                                  14,2266   06443 1         2DEC     +.4105636020 B-1     STAR  8        X
 0324                                  14,2267   12622 1
 0325                                  14,2270   07766 1         2DEC     +.4988110001 B-1     STAR  8        Y
 0325                                  14,2271   10237 0
 0326                                  14,2272   14154 1         2DEC     +.7632988371 B-1     STAR  8        Z
 0326                                  14,2273   36154 1
 0327                                  14,2274   13200 1         2DEC     +.7032235469 B-1     STAR  7        X
 0327                                  14,2275   31653 0
 0328                                  14,2276   13244 1         2DEC     +.7075846047 B-1     STAR  7        Y
 0328                                  14,2277   21036 1
 0329                                  14,2300   01067 1         2DEC     +.0692868685 B-1     STAR  7        Z
 0329                                  14,2301   23106 1
 0330                                  14,2302   10560 0         2DEC     +.5450107404 B-1     STAR  6        X
 0330                                  14,2303   27227 0
 0331                                  14,2304   10402 0         2DEC     +.5314955466 B-1     STAR  6        Y
 0331                                  14,2305   00275 1
 0332                                  14,2306   65477 0         2DEC     -.6484410356 B-1     STAR  6        Z
 0332                                  14,2307   77044 1
 0333                                  14,2310   00153 0         2DEC     +.0130968840 B-1     STAR  5        X
 0333                                  14,2311   11212 0
 0334                                  14,2312   00077 1         2DEC     +.0078062795 B-1     STAR  5        Y
 0334                                  14,2313   36275 1
 0335                        14,2314   17777 0           2DEC   +.9998837600 B-1      STAR  5     Z
 0335                        14,2315   01417 1
 0336                        14,2316   07674 0           2DEC   +.4917678276 B-1      STAR  4     X
 0336                        14,2317   21771 0
 0337                        14,2320   03416 1           2DEC   +.2204887125 B-1      STAR  4     Y
 0337                        14,2321   07626 1
 0338                        14,2322   62413 0           2DEC   -.8423473935 B-1      STAR  4     Z
 0338                        14,2323   57536 0
 0339                        14,2324   07510 1           2DEC   +.4775639450 B-1      STAR  3     X
 0339                        14,2325   06414 0
 0340                        14,2326   01673 1           2DEC   +.1166004340 B-1      STAR  3     Y
 0340                        14,2327   06065 1
 0341                        14,2330   15735 1           2DEC   +.8708254803 B-1      STAR  3     Z
 0341                        14,2331   31531 1
 0342                        14,2332   16745 0           2DEC   +.9342640400 B-1      STAR  2     X
 0342                        14,2333   17555 1
 0343                        14,2334   02615 1           2DEC   +.1735073142 B-1      STAR  2     Y
 0343                        14,2335   13716 0
 0344                        14,2336   73010 1           2DEC   -.3115219339 B-1      STAR  2     Z
 0344                        14,2337   40311 0
 0345                        14,2340   15776 0           2DEC   +.8748658918 B-1      STAR  1     X
 0345                        14,2341   34660 0
 0346                        14,2342   00325 0           2DEC   +.0260879174 B-1      STAR  1     Y
 0346                        14,2343   26625 1
 0347                        14,2344   07572 0           2DEC   +.4836621670 B-1      STAR  1     Z
 0347                        14,2345   05105 0
 0348                        14,2346   15472 1  CATLOG   DEC    6970
R0349   ************************************************************************************

 0350   REF   1              05,2000                     SETLOC EPHEM1
 0351                        05,2001                     BANK
 0352   REF   1                                          COUNT* $$/EPHEM

 0353                        05,2001   20000 0  KONMAT   2DEC   1.0 B-1                  *************
 0353                        05,2002   00000 1
 0354                        05,2003   00000 1           2DEC   0                                    *
 0354                        05,2004   00000 1
 0355                        05,2005   00000 1           2DEC   0                                    *
 0355                        05,2006   00000 1
 0356                        05,2007   00000 1           2DEC   0                                    *
 0356                        05,2010   00000 1
 0357                        05,2011   16533 0           2DEC   .91745 B-1       K1 COS(OBL)         *
 0357                        05,2012   30007 0
 0358                        05,2013   77333 1           2DEC   -.03571 B-1      K2 SIN(OBL)SIN(IM)  *
 0358                        05,2014   56654 0
 0359                        05,2015   00000 1           2DEC   0                                    *
 0359                        05,2016   00000 1
 0360                        05,2017   06273 1           2DEC   .39784 B-1       K3 SIN(OBL)         *
 0360                        05,2020   03275 1
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L         CONTROLLED CONSTANTS                                                   USER'S PAGE NO.  15        EC S4

 0361                         05,2021   01242 1            2DEC    .082354 B-1     K4 COS(OBL)SIN(IM)  *
 0361                         05,2022   24467 1
 0362                         05,2023   00020 0  CSTODAY   2DEC    8640000 B-33                        * NOTE            *
 0362                         05,2024   17260 0
 0363                         05,2025   00002 0  RCB-13    OCT     00002                               * TABLES CONTAIN  *
 0364                         05,2026   00000 1            OCT     00000                               * CONSTANTS FOR   *
 0365                         05,2027   22572 1  RATESP    2DEC    .03660098 B+4   LOMR                * 1969 - 1970     *
 0365                         05,2030   27214 0
 0366                         05,2031   01315 1            2DEC    .00273779 B+4   LOSR
 0366                         05,2032   26177 1
 0367                         05,2033   77731 1            2DEC    -.00014719 B+4  LONR
 0367                         05,2034   55217 0
 0368                         05,2035   32055 0            2DEC    .81528336       LOMO
 0368                         05,2036   22576 0
 0369                         05,2037   10624 0            2DEC    .274674910      LOSO
 0369                         05,2040   10605 0
 0370                         05,2041   37436 1            2DEC    .986209499      LONO
 0370                         05,2042   01635 0
 0371                         05,2043   01065 0  VAL67     2DEC*   .01726666666 B+1* AMOD
 0371                         05,2044   31323 1
 0372                         05,2045   20770 0            2DEC    .53078445       AARG
 0372                         05,2046   13725 0
 0373                         05,2047   02245 0            2DEC    .036291712 B+1  1/27
 0373                         05,2050   06475 1
 0374                         05,2051   00162 1            2DEC    .003505277 B+1  BMOD
 0374                         05,2052   33431 1
 0375                         05,2053   22566 1            2DEC    .585365625      BARG
 0375                         05,2054   24130 0
 0376                         05,2055   02000 0            2DEC    .03125 B+1      1/32
 0376                         05,2056   00000 1
 0377                         05,2057   00256 0            2DEC    .005325277 B+1  CMOD
 0377                         05,2060   17752 1
 0378                         05,2061   77512 1            2DEC    -.01106341036   CARG
 0378                         05,2062   67453 1
 0379                         05,2063   00131 1            2DEC    .002737925 B+1  1/365
 0379                         05,2064   26730 1
R0380   ************************************************************************


 0381   REF    1              26,2000                      SETLOC  PLANTIN2
 0382                         26,2000                      BANK
 0383   REF    1                                           COUNT*  $$/LURCT

 0384                         26,2000   17775 1  COSI      2DEC*   9.996417320 E-1 B-1*    COS (5521.5 SEC.)
 0384                         26,2001   02052 1
 0385                         26,2002   00333 1  SINI      2DEC*   2.676579050 E-2 B-1*    SIN (5521.5 SEC.)
 0385                         26,2003   10374 0
 0386                         26,2004   77665 1  NODDOT    2DEC*   -1.703706190 E-11 B28*  REV/CSEC
 0386                         26,2005   42175 1
 0387                         26,2006   22211 0  FDCT      2DEC*   4.253263473 E-9 B27*    REV/CSEC
 0387                         26,2007   00636 1
 0388                         26,2010   77777 0  BDCT      2DEC*   -1.145529388 E-16 B28*  REV/CSEC
 0388                         26,2011   77767 1
 0389                         26,2012   37436 1  NODIO     2DEC*   9.862094363 E-1*        REV
 0389                         26,2013   01614 0
 0390                         26,2014   32417 1  FSUBO     2DEC*   8.290901511 E-1*        REV
 0390                         26,2015   32011 0
 0391                         26,2016   02052 1  BSUBO     2DEC    6.512013939 E-2         REVS
 0391                         26,2017   35552 0
 0392                         26,2020   37116 0  WEARTH    2DEC*   1.160576171 E-7 B23*    REV/CSEC
 0392                         26,2021   32631 1
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A000001
R000002      ***  CHANNEL DESCRIPTIONSF WORDS ARE ALLOCATED IN ERASABLE ASSIGNMENTS ***


R000005           CHANNEL 1    IDENTICAL TO COMPUTER REGISTER L (0001)
A0001

R0002             CHANNEL 2    IDENTICAL TO COMPUTER REGISTER Q (0002)
A0003

R0004             CHANNEL 3    HISCALAR; INPUT CHANNEL; MOST SIGNIFICANT 14 BITS FROM 33 STAGE BINARY COUNTER. SCALE
R0006                          FACTOR IS B23 IN CSEC, SO MAX VALUE ABOUT 23.3 HOURS AND LEAST SIGNIFICANT BIT 5.12 SECS.
A0008

R0009             CHANNEL 4    LOSCALAR; INPUT CHANNEL; NEXT MOST SIGNIFICANT 14 BITS FROM THE 33 STAGE BINARY COUNTER
R0011                          ASSOCIATED WITH CHANNEL 3. SCALE FACTOR IS B9 IN  CSEC. SO MAX VAL IS 5.12 SEC AND LEAST
R0013                          SIGNIFICANT BIT IS 1/3200 SEC. SCALE FACTOR OF D.P. WORD WITH CHANNEL 3 IS B23 CSEC.
A0015

R0016             CHANNEL 5    PYJETS; OUTPUT CHANNEL; PITCH RCS JET CONTROL.   (REACTION CONTROL SYSTEM) USES BITS 1-8.
A0018

R0019             CHANNEL 6    ROLLJETS; OUTPUT CHANNEL; ROLL RCS JET CONTROL.   (REACTION CONTROL SYSTEM) USES BIT 1-8.
A0021

R0022             CHANNEL 7    SUPERBNK; OUTPUT CHANNEL; NOT RESET BY RESTART;   FIXED EXTENSION BITS USED TO SELECT THE
R0024                          APPROPRIATE FIXED MEMORY BANK IF FBANK IS 30 OCTAL OR MORE. USES BITS 5-7.
A0026

R0027             CHANNEL 10   OUTO; OUTPUT CHANNEL; REGISTER USED TO TRANSMIT   LATCHING-RELAY DRIVING INFORMATION FOR
R0029                          THE DISPLAY SYSTEM. BITS 15-12 ARE SET TO THE ROW NUMBER (1-14 OCTAL) OF THE RELAY TO BE
R0031                          CHANGED AND BITS 11-1 CONTAIN THE REQUIRED SETTINGS FOR THE RELAYS IN THE ROW.
A0033

R0034             CHANNEL 11   DSALMOUT; OUTPUT CHANNEL; REGISTER WHOSE BITS ARE USED FOR ENGINE ON-OFF CONTROL AND TO
R0036                          DRIVE INDIVIDUAL INDICATORS OF THE DISPLAY SYSTEM. BITS 1-7 ARE A RELAYS.
A0038
R0039               BIT 1      ISS WARNING
A0040
R0041               BIT 2      LIGHT COMPUTER ACTIVITY LAMP
A0042
R0043               BIT 3      LIGHT UPLINK ACTIVITY LAMP
A0044
R0045               BIT 4      LIGHT TEMP CAUTION LAMP
A0046
R0047               BIT 5      LIGHT KEYBOARD RELEASE LAMP
A0048
R0049               BIT 6      FLASH VERB AND NOUN LAMPS
A0050
R0051               BIT 7      LIGHT OPERATOR ERROR LAMP
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A0052
R0053              BIT 8       SPARE
A0054
R0055              BIT 9       TEST CONNECTOR OUTBIT
A0056
R0057              BIT 10      CAUTION RESET
A0058
R0059              BIT 11      SPARE
A0060
R0061              BIT 12      SPARE
A0062
R0063              BIT 13      ENGINE ON
A0064
R0065              BIT 14      ENGINE OFF
A0066
R0067              BIT 15      SPARE
A0068

R0069            CHANNEL 12    CHAN12; OUTPUT CHANNEL; BITS USED TO DRIVE NAVIGATION AND SPAECRAFT HARDWARE
A0071
R0072              BIT 1       ZERO RR CDU; CDU'S GIVE RRADAR INFORMATION FOR LM
A0073
R0074              BIT 2       ENABLE CDU RADAR ERROR COUNTERS
A0075
R0076              BIT 3       NOT USED
A0077
R0078              BIT 4       COARSE ALIGN ENABLE OF IMU
A0079
R0080              BIT 5       ZERO IMU CDU'S
A0081
R0082              BIT 6       ENABLE IMU ERROR COUNTER, CDU ERROR COUNTER.
A0083
R0084              BIT 7       SPARE
A0085
R0086              BIT 8       DISPLAY INERTIAL DATA
A0087
R0088              BIT 9       -PITCH GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0089
R0090              BIT 10      +PITCH GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0091
R0092              BIT 11      -ROLL  GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0093
R0094              BIT 12      +ROLL  GIMBAL TRIM (BELL MOTION) DESCENT ENGINE
A0095
R0096              BIT 13      LR POSITION 2 COMMAND
A0097
R0098              BIT 14      ENABLE RENDESVOUS RADAR LOCK-ON;AUTO ANGLE TRACK'G
A0099
R0100              BIT 15      ISS TURN ON DELAY COMPLETE
A0101
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R0102              CHANNEL 13   CHAN13; OUTPUT CHANNEL
A0103
R0104                BIT 1      RADAR C         PROPER SETTING OF THE A,B,C MATRIX
R0105                BIT 2      RADAR B         SELECTS CERTAIN RADAR
R0106                BIT 3      RADAR A         PARAMETERS TO BE READ.
A0107
R0108                BIT 4      RADAR ACTIVITY
A0109
R0110                BIT 5      NOT USED (CONNECTS AN ALTERNATE INPUT TO UPLINK)
A0111
R0112                BIT 6      SPARE
A0113
R0114                BIT 7      DOWNLINK TELEMETRY WORD ORDER CODE BIT
A0115
R0116                BIT 8      RHC COUNTER ENABLE (READ HAND CONTROLLER ANGLES)
A0117
R0118                BIT 9      START RHC READ INTO COUNTERS IF BIT 8 SET
A0119
R0120                BIT 10     TEST ALARMS, TEST DSKY LIGHTS
A0121
R0122                BIT 11     ENABLE STANDBY
A0123
R0124                BIT 12     RESET TRAP 31-A    ALWAYS APPEAR TO BE SET TO 0
A0125
R0126                BIT 13     RESET TRAP 31-B    ALWAYS APPEAR TO BE SET TO 0
A0127
R0128                BIT 14     RESET TRAP 32      ALWAYS APPEAR TO BE SET TO 0
A0129
R0130                BIT 15     ENABLE T6 RUPT
A0131

R0132              CHANNEL 14   CHAN14; OUTPUT CHANNEL; USED TO CONTROL COMPUTER  COUNTER CELLS (CDU,GYRO,SPACECRAFT FUNC.
A0134
R0135                BIT 1      OUTLINK ACTIVITY (NOT USED)
A0136
R0137                BIT 2      ALTITUDE RATE OR ALTITUDE SELECTOR
A0138
R0139                BIT 3      ALTITUDE METER ACTIVITY
A0140
R0141                BIT 4      THRUST DRIVE ACTIVITY FOR DESCENT ENGINE
A0142
R0143                BIT 5      SPARE
A0144
R0145                BIT 6      GYRO ENABLE POWER FOR PULSES
A0146
R0147                BIT 7      GYRO SELECT B    PAIR OF BITS IDENTIFIES AXIS OF -
R0148                BIT 8      GYRO SELECT A    GYRO SYSTEM TO BE TORQUED.
A0149
R0150                BIT 9      GYRO TORQUING COMMAND IN NEGATIVE DIRECTION
A0151
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R0152             BIT 10      GYRO ACTIVITY
A0153
R0154             BIT 11      DRIVE CDU S
A0155
R0156             BIT 12      DRIVE CDU T
A0157
R0158             BIT 13      DRIVE CDU Z
A0159
R0160             BIT 14      DRIVE CDU Y
A0161
R0162             BIT 15      DRIVE CDU X
A0163

R0164           CHANNEL 15    MNKEYIN; INPUT CHANNEL;KEY CODE INPUT FROM KEYBOARD OF DSKY, SENSED BY PROGRAM WHEN
R0166                         PROGRAM INTERRUPT #5 IS RECEIVED. USES BITS 5-1
A0167

R0168           CHANNEL 16    NAVKEYIN; INPUT CHANNEL; OPTICS MARK INFORMATION AND NAVIGATION PANEL DSKY (CM) OR THRUST
R0170                         CONTROL (LM) SENSED BY PROGRAM WHEN PROGRAM INTER-RUPT #6 IS RECEIVED. USES BITS 3-7 ONLY.
A0172
R0173             BIT 1       NOT ASSIGNED
A0174
R0175             BIT 2       NOT ASSIGNED
A0176
R0177             BIT 3       OPTICS X-AXIS MARK SIGNAL FOR ALIGN OPTICAL TSCOPE
A0178
R0179             BIT 4       OPTICS Y-AXIS MARK SIGNAL FOR AOT
A0180
R0181             BIT 5       OPTICS MARK REJECT SIGNAL
A0182
R0183             BIT 6       DESCENT+ ; CREW DESIRED SLOWING RATE OF DESCENT
A0184
R0185             BIT 7       DESCENT- ; CREW DESIRED SPEEDING UP RATE OF D'CENT
A0186

R0187           NOTE: ALL BITS IN CHANNELS 30-33 ARE INVERTED AS SENSED BY THE  PROGRAM, SO THAT A VALUE OF ZERO MEANS
R0189           THAT THE INDICATED SIGNAL IS PRESENT.
A0190

R0191           CHANNEL 30    INPUT CHANNEL
A0192
R0193             BIT 1       ABORT WITH DESCENT STAGE
A0194
R0195             BIT 2          UNUSED
A0196
R0197             BIT 3       ENGINE ARMED SIGNAL
A0198
R0199             BIT 4       ABORT WITH ASCENT ENGINE STAGE
A0200
R0201             BIT 5       AUTO THROTTLE; COMPUTER CONTROL OF DESCENT ENGINE
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A0202
R0203                BIT 6      DISPLAY INERTIAL DATA
A0204
R0205                BIT 7      RR CDU FAIL
A0206
R0207                BIT 8      SPARE
A0208
R0209                BIT 9      IMU OPERATE WITH NO MALFUNCTION
A0210
R0211                BIT 10     LM COMPUTER (NOT AGS) HAS CONTROL OF LM
A0212
R0213                BIT 11     IMU CAGE COMMAND TO DRIVE IMU GIMBAL ANGLES TO 0.
A0214
R0215                BIT 12     IMU CDU FAIL (MALFUNCTION OF IMU CDU,S)
A0216
R0217                BIT 13     IMU FAIL (MALFUNCTION OF IMU STABILIZATION LOOPS)
A0218
R0219                BIT 14     ISS TURN ON REQUESTED
A0220
R0221                BIT 15     TEMPERATURE OF STABLE MEMBER WITHIN DESIGN LIMITS
A0222

R0223             CHANNEL 31    INPUT CHANNEL; BITS ASSOCIATED WITH THE ATTITUDE  CONTROLLER, TRANSLATIONAL CONTROLLER,
R0225                           AND SPACECRAFT ATTITUDE CONTROL; USED BY RCS DAP
A0226
R0227                BIT 1      ROTATION (BY RHC) COMMANDED IN POSITIVE PITCH DIRECTION; MUST BE IN MINIMUM IMPULSE MODE.
R0229                           ALSO POSITIVE ELEVATION CHANGE FOR LANDING POINT  DESIGNATOR
A0231
R0232                BIT 2      AS BIT 1 EXCEPT NEGATIVE PITCH AND ELEVATION
A0233
R0234                BIT 3      ROTATION (BY RHC) COMMANDED IN POSITIVE YAW DIRECTION; MUST BE IN MINUMUM IMPULSE MODE.
A0236
R0237                BIT 4      AS BIT 3 EXCEPT NEGATIVE YAW
A0238
R0239                BIT 5      ROTATION (BY RHC) COMMANDED IN POSITIVE ROLL DIRECTION; MUST BE IN MINIMUM IMPULSE MODE.
R0241                           ALSO POSITIVE AZIMUTH CHANGE FOR LANDING POINT DESIGNATOR
A0243
R0244                BIT 6      AS BIT 5 EXCEPT NEGATIVE ROLL AND AZIMUTH
A0245
R0246                BIT 7      TRANSLATION IN +X DIRECTION COMMANDED BY THC
A0247
R0248                BIT 8      TRANSLATION IN -X DIRECTION COMMANDED BY THC
A0249
R0250                BIT 9      TRANSLATION IN +Y DIRECTION COMMANDED BY THC
A0251
R0252                BIT 10     TRANSLATION IN -Y DIRECTION COMMANDED BY THC
A0253
R0254                BIT 11     TRANSLATION IN +Z DIRECTION COMMANDED BY THC
A0255
R0256                BIT 12     TRANSLATION IN -Z DIRECTION COMMANDED BY THC
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A0257
R0258             BIT 13    ATTITUDE HOLD MODE ON SCS MODE CONTROL SWITCH
A0259
R0260             BIT 14    AUTO STABILIZATION OF ATTITUDE ON SCS MODE SWITCH
A0261
R0262             BIT 15    ATTITUDE CONTROL OUT OF DETENT (RHC NOT IN NEUTRAL
A0263

R0264           CHANNEL 32      INPUT CHANNEL.
A0265
R0266             BIT 1         THRUSTERS 2 & 4 DISABLED BY CREW
A0267
R0268             BIT 2         THRUSTERS 5 & 8 DISABLED BY CREW
A0269
R0270             BIT 3         THRUSTERS 1 & 3 DISABLED BY CREW
A0271
R0272             BIT 4         THRUSTERS 6 & 7 DISABLED BY CREW
A0273
R0274             BIT 5         THRUSTERS 14 & 16 DISABLED BY CREW
A0275
R0276             BIT 6         THRUSTERS 13 & 15 DISABLED BY CREW
A0277
R0278             BIT 7         THRUSTERS 9  & 12 DISABLED BY CREW
A0279
R0280             BIT 8         THRUSTERS 10 & 11 DISABLED BY CREW
A0281
R0282             BIT 9         DESCENT ENGINE GIMBALS DISABLED BY CREW
A0284
R0285             BIT 10        APPARENT DESCENT ENGINE GIMBAL FAILURE
A0286
R0287             BIT 14    INDICATES PROCEED KEY IS DEPRESSED
A0288

R0289           CHANNEL 33  CHAN33; INPUT CHANNEL; FOR HARDWARE STATUS AND COMMAND INFORMATION. BITS 15-11 ARE FLIP-
R0291                       FLOP BITS RESET BY A CHANNEL "WRITE" COMMAND THAT ARE RESET BY A RESTART & BY T4RUPT LOOP.
A0293
R0294             BIT 1     SPARE
A0295
R0296             BIT 2     RR AUTO-POWER ON
A0297
R0298             BIT 3     RR RANGE LOW SCALE
A0299
R0300             BIT 4     RR DATA GOOD
A0301
R0302             BIT 5     LR RANGE DATA GOOD
A0303
R0304             BIT 6     LR POS1
A0305
R0306             BIT 7     LR POS2
A0307
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R0308               BIT 8       LR VEL DATA GOOD
A0309
R0310               BIT 9       LR RANGE LOW SCALE
A0311
R0312               BIT 10      BLOCK UPLINK INPUT
A0313
R0314               BIT 11      UPLINK TOO FAST
A0315
R0316               BIT 12      DOWNLINK TOO FAST
A0317
R0318               BIT 13      PIPA FAIL
A0319
R0320               BIT 14      WARNING OF REPEATED ALARMS: RESTART,COUNTER FAIL, VOLTAGE FAIL,AND SCALAR DOUBLE.
A0322
R0323               BIT 15      LGC OSCILLATOR STOPPED
A0324

R0325             CHANNEL 34    DNT M1; OUTPUT CHANNEL; DOWNLINK 1  FIRST OF TWO WORDS SERIALIZATION.
R0328             CHANNEL 35    DNT M2; OUTPUT CHANNEL DOWNLINK 2 SOCOND OF TWO   WORDS SERIALIZATION.
A0330
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L        FLAGWORD ASSIGNMENTS                                                             USER'S PAGE NO.   1       EO S4

A0001

R0002              FLAGWORDS 0-11 ARE DOWNLINKED AND CAN BE SET AND CLEARED BY UP-FLAG AND DOWN-FLAG INSTRUCTIONS IN THE
R0004                             INTERPRETER. THESE WERE PREVIOUSLY LISTED UNDER "INTERPRETIVE SWITCH BIT ASSIGNMENTS" IN
R0006                             THE ERASABLE LOG SECTION. FLAGWORDS 12 & 13 WEREPREVIOUSLY RADMODES AND DAPBOOLS AND
R0008                             ARE STILL DOWNLINKED UNDER THOSE NAMES.

A0009

R0010              ALPHABETICAL LIST OF FLAGWORDS

R00105  9                 25                 41                 61        COLUMN NO.
R0011   FLAGWORD          DEC. NUMBER        BIT AND FLAG       BIT NAME

R00111  ABTTGFLG          143                BIT 7  FLAG 9      ABTTGBIT
R0012   ACCOKFLG          207                BIT 3   FLAG 13    ACCSOKAY
R0013   ACC4-2FL          199                BIT 11  FLAG 13    ACC4OR2X
R0014   ACMODFLG          032                BIT 13  FLAG 2     ACMODBIT
R0015   ALTSCALE          186                BIT 9   FLAG 12    ALTSCBIT
R0016   ANTENFLG          183                BIT 12  FLAG 12    ANTENBIT
R0017   AORBSFLG          085                BIT 5  FLAG 5      AORBSYST
R0018   AORBTFLG          200                BIT 10  FLAG 13    AORBTRAN
R0032   CDESFLAG          180                BIT 15  FLAG 12    CDESBIT
R0033   CMOONFLG          123                BIT 12  FLAG 8     CMOONBIT
R0034   COGAFLAG          131                BIT 4   FLAG 8     COGAFBIT
R0037   CSMDKFLG          197                BIT 13  FLAG 13    CSMDOCKD
R0038   CULTFLAG          053                BIT 7   FLAG 3     CULTBIT
R0040   DAPBOOLS                             FLGWRD13
R0041   DBSELFLG          206                BIT 4   FLAG 13    DBSELECT
R00411  DBSL2FLG          205                BIT 5  FLAG 13     DBSLECT2
R0042   DESIGFLG          185                BIT 10  FLAG 12    DESIGBIT
R0043   DIDFLAG           016                BIT 14  FLAG       DIDFLBIT
R0044   DIMOFLAG          059                BIT 1   FLAG 3     DIMOBIT
R0045   DMENFLG           081                BIT 9   FLAG 5     DMENFBIT
```

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R0019    APSESW      130            BIT 5  FLAG 8      APSESBIT
R0020    APSFLAG     152            BIT 13 FLAG 10     APSFLBIT
R0021    ASTNFLAG    108            BIT 12 FLAG 7      ASTNBIT
R0022    ATTFLAG     104            BIT 1  FLAG 6      ATTFLBIT
R0023    AUTOMODE    193            BIT 2  FLAG 12     AUTOMBIT
R0024    AUTR1FLG    209            BIT 1  FLAG 13     AUTRATE1
R0025    AUTR2FLG    208            BIT 2  FLAG 13     AUTRATE2
R0026    AUXFLAG     103            BIT 2  FLAG 6      AUXFLBIT
R0027    AVEGFLAG    115            BIT 5  FLAG 7      AVEGFBIT
R0028    AVEMIDSW    149            BIT 1  FLAG 9      AVEMDBIT
R0029    AVFLAG      040            BIT 5  FLAG 2      AVFLBIT
R0030    CALCMAN2    043            BIT 2  FLAG 2      CALC2BIT
R0031    CALCMAN3    042            BIT 3  FLAG 2      CALC3BIT
```

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R0046    DRIFTDFL    202            BIT 8  FLAG 13     DRIFTBIT
R0047    DRIFTFLG    030            BIT 15 FLAG 2      DRFTBIT
R0048    DSKYFLAG    075            BIT 15 FLAG 5      DSKYFBIT
R0049    D6OR9FLG    058            BIT 2  FLAG 3      D6OR9BIT
R0050    ENGONFLG    083            BIT 7  FLAG 5      ENGONBIT
R0051    ERADFLAG    017            BIT 13 FLAG 1      ERADFBIT
R0052    ETPIFLAG    038            BIT 7  FLAG 2      ETPIBIT
R0054    FINALFLG    039            BIT 6  FLAG 2      FINALBIT
R0056    FLAGWRD0    (000-014)      (STATE +0)
R0057    FLAGWRD1    (015-029)      (STATE +1)
R0058    FLAGWRD2    (030-044)      (STATE +2)
R0059    FLAGWRD3    (045-059)      (STATE +3)
R0060    FLAGWRD4    (060-074)      (STATE +4)
R0061    FLAGWRD5    (075-089)      (STATE +5)
R0062    FLAGWRD6    (090-104)      (STATE +6)
R0063    FLAGWRD7    (105-119)      (STATE +7)
R0064    FLAGWRD8    (120-134)      (STATE +8D)
R0065    FLAGWRD9    (135-149)      (STATE +9D)
R0066    FLAP        142            BIT 8  FLAG 9      FLAPBIT
R0067    FLGWRD10    (150-164)      (STATE +10D)
R0068    FLGWRD11    (165-179)      (STATE +11D)
R0069    FLGWRD12    (180-194)      (STATE +12D)
R0070    FLGWRD13    (195-209)      (STATE +13D)
R0071    FLPC        138            BIT 12 FLAG 9      FLPCBIT
R0072    FLPI        139            BIT 11 FLAG 9      FLPIBIT
R0073    FLRCS       140            BIT 10 FLAG 9      FLRCSBIT
R0074    FLUNDISP    125            BIT 10 FLAG 8      FLUNDBIT
R0075    FLVR        136            BIT 14 FLAG 9      FLVRBIT
R0077    FREEFLAG    012            BIT 3  FLAG 0      FREEFBIT
R00775   FSPASFLG    005            BIT 10 FLAG 0      FSPASBIT
R0078    GLOKFAIL    046            BIT 14 FLAG 3      GLOKFBIT
R0079    GMBDRVSW    095            BIT 10 FLAG 6      GMBDRBIT
R0080    GUESSW      028            BIT 2  FLAG 1      GUESSBIT
R0081    HFLSHFLG    179            BIT 1  FLAG 11     HFLSHBIT
R0082    IDLEFLAG    113            BIT 7  FLAG 7      IDLEFBIT
R0083    IGNFLAG     107            BIT 13 FLAG 7      IGNFLBIT
R0084    IMPULSW     036            BIT 9  FLAG 2      IMPULBIT
R0085    IMUSE       007            BIT 8  FLAG 0      IMUSEBIT
R0086    INFINFLG    128            BIT 7  FLAG 8      INFINBIT
R0087    INITALGN    133            BIT 2  FLAG 8      INITABIT
R0088    INTFLAG     151            BIT 14 FLAG 10     INTFLBIT
R0089    INTYPFLG    056            BIT 4  FLAG 3      INTYPBIT
R0090    ITSWICH     105            BIT 15 FLAG 7      ITSWBIT
R0091    JSWITCH     001            BIT 14 FLAG 0      JSWCHBIT
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 R0092    LETABORT          141                BIT 9   FLAG 9         LETABBIT
 R0093    LMOONFLG          124                BIT 11  FLAG 8         LMOONBIT
 R0094    LOKONSW           010                BIT 5   FLAG 0         LOKONBIT
 R0095    LOSCMFLG          033                BIT 12  FLAG 2         LOSCMBIT
 R00955   LPOS2FLG          174                BIT 6  FLAG 11         LPOS2BIT
 R0096    LRALTFLG          190                BIT 5   FLAG 12        LRALTBIT
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L         FLAGWORD ASSIGNMENTS                                                                          USER'S PAGE NO.   3      EO S4

R0097     LRBYPASS          165                 BIT 15 FLAG 11        LRBYBIT
R0098     LRINH             172                 BIT 8  FLAG 11        LRINHBIT
R0099     LRPOSFLG          189                 BIT 6  FLAG 12        LRPOSBIT
R0100     LRVELFLG          187                 BIT 8  FLAG 12        LRVELBIT
R0101     LUNAFLAG          048                 BIT 12 FLAG 3         LUNABIT
R0102     MANUFLAG          106                 BIT 14 FLAG 7         MANUFBIT
R0103     MGLVFLAG          088                 BIT 2  FLAG 5         MGLVFBIT
R0104     MIDAVFLG          148                 BIT 2  FLAG 9         MIDAVBIT
R0105     MIDFLAG           002                 BIT 13 FLAG 0         MIDFLBIT
R0106     MID1FLAG          147                 BIT 3  FLAG 9         MID1BIT
R0107     MKOVFLAG          072                 BIT 3  FLAG 4         MKOVBIT
R0108     MOONFLAG          003                 BIT 12 FLAG 0         MOONBIT
R0109     MRKIDFLG          060                 BIT 15 FLAG 4         MRKIDBIT
R0110     MRKNVFLG          066                 BIT 9  FLAG 4         MRKNVBIT
R0111     MRUPTFLG          070                 BIT 5 FLAG 4          MRUPTBIT
R0112     MUNFLAG           097                 BIT 8 FLAG 6          MUNFLBIT
R0113     MWAITFLG          064                 BIT 11 FLAG 4         MWAITBIT
R0114     NEEDLFLG          011                 BIT 4  FLAG 0         NEEDLBIT
R01141    NEED2FLG          000                 BIT 15 FLAG 0         NEED2BIT
R0115     NEWIFLG           122                 BIT 13 FLAG 8         NEWIBIT
R0116     NJETSFLG          015                 BIT 15 FLAG           NJETSBIT
R0117     NODOFLAG          044                 BIT 1  FLAG 2         NODOBIT
R0118     NOLRREAD          170                 BIT 10 FLAG 11        NOLRRBIT
R0119     NORMSW            110                 BIT 10 FLAG 7         NORMSBIT
R0120     NORRMON           086                 BIT 4  FLAG 5         NORRMBIT
R0121     NOR29FLG          049                 BIT 11 FLAG 3         NR29FBIT
R0122     NOTHROTL          078                 BIT 12 FLAG 5         NOTHRBIT
R0123     NOUPFLAG          024                 BIT 6  FLAG 1         NOUPFBIT
R01235    NO511FLG          177                 BIT 3 FLAG 11         NO511BIT
R0124     NRMNVFLG          067                 BIT 8  FLAG 4         NRMNVBIT
R0125     NRMIDFLG          062                 BIT 13 FLAG 4         NRMIDBIT
R0126     NRUPTFLG          071                 BIT 4  FLAG 4         NRUPTBIT
R0127     NTARGFLG          102                 BIT 3  FLAG 6         NTARGBIT
R0128     NWAITFLG          065                 BIT 10 FLAG 4         NWAITBIT
R0129     OLDESFLG          014                 BIT 1  FLAG 0         OLDESBIT
R0132     ORBWFLAG          054                 BIT 6  FLAG 3         ORBWFBIT
R0133     ORDERSW           129                 BIT 6  FLAG 8         ORDERBIT
R0134     OURRCFLG          198                 BIT 12 FLAG 13        OURRCBIT
R0135     PDSPFLAG          063                 BIT 12 FLAG 4         PDSPFBIT
R0136     PFRATFLG          041                 BIT 4  FLAG 2         PFRATBIT
R0137     PINBRFLG          069                 BIT 6  FLAG 4         PINBRBIT
R01375    POOHFLAG          045                 BIT 15 FLAG 3         POOHBIT
R0139     PRECIFLG          052                 BIT 8  FLAG 3         PRECIBIT
R0140     PRIODFLG          061                 BIT 14 FLAG 1         PRIODBIT
R0141     PRONVFLG          068                 BIT 7  FLAG 4         PRONVBIT
R0142     PSTHIGAT          169                 BIT 11 FLAG 11        PSTHIBIT
R0143     PULSEFLG          195                 BIT 15 FLAG 13        PULSES
R01432    P21FLAG           004                 BIT 11 FLAG 0         P21FLBIT
R0144     P25FLAG           006                 BIT 9  FLAG 0         P25FLBIT
R0145     P7071FLG          137                 BIT 13 FLAG 9         P7071BIT
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R0146    QUITFLAG      145          BIT 5   FLAG 9      QUITBIT
R0147    RADMODES                   FLGWRD12
R0148    RASFLAG                    FLGWRD10
R0149    RCDUFAIL      188          BIT 7   FLAG 12     RCDUFBIT
R0150    RCDU0FLG      182          BIT 13  FLAG 12     RCDU0BIT
R0152    READRFLG      051          BIT 9   FLAG 3      READRBIT          EQUIVALENT FLAG NAME:  R04FLAG
R0154    READVEL       175          BIT 5   FLAG 11     READVBIT
R0155    REDFLAG       099          BIT 6   FLAG 6      REDFLBIT
R0156    REFSMFLG      047          BIT 13  FLAG 3      REFSMBIT
R0157    REINTFLG      158          BIT 7   FLAG 10     REINTBIT
R0158    REMODFLG      181          BIT 14  FLAG 12     REMODBIT
R0159    RENDWFLG      089          BIT 1   FLAG 5      RENDWBIT
R0160    REROSMON      184          BIT 11  FLAG 12     REROSBIT
R0161    RHCSCFLG      203          BIT 7   FLAG 13     RHCSCALE
R0162    RNDVZFLG      008          BIT 7   FLAG 0      RNDVZBIT
R0163    RNGEDATA      176          BIT 4   FLAG 11     RNGEDBIT
R0164    RNGSCFLG      080          BIT 10  FLAG 5      RNGSCBIT
R01642   RODFLAG       018          BIT 12  FLAG 1      RODFLBIT
R01644   ROTFLAG       144          BIT  6  FLAG 9      ROTFLBIT
R0165    RPQFLAG       120          BIT 15  FLAG 8      RPQFLBIT
R0166    RRDATAFL      191          BIT 4   FLAG 12     RRDATABT
R0167    RRNBSW        009          BIT 6 FLAG 0        RRNBBIT
R0168    RRRSFLAG      192          BIT 3   FLAG 12     RRRSBIT
R0169    RVSW          111          BIT 9   FLAG 7      RVSWBIT
R0170    R04FLAG       051          BIT 9   FLAG 3      R04FLBIT          EQUIVALENT FLAG NAME:  READRFLG
R0172    R10FLAG       013          BIT 2   FLAG 0      R10FLBIT
R0173    R61FLAG       020          BIT 10  FLAG 1      R61FLBIT
R0174    R77FLAG       079          BIT 11  FLAG 5      R77FLBIT
R0176    SLOPESW       027          BIT 3   FLAG 1      SLOPEBIT
R0177    SNUFFER       077          BIT 13  FLAG 5      SNUFFBIT
R0178    SOLNSW        087          BIT 3   FLAG 5      SOLNSBIT
R0179    SRCHOPTN      031          BIT 14  FLAG 2      SRCHOBIT
R0180    STATEFLG      055          BIT 5   FLAG 3      STATEBIT
R0181    STEERSW       034          BIT 11  FLAG 2      STEERBIT
R0182    SURFFLAG      127          BIT 8   FLAG 8      SURFFBIT
R0183    SWANDISP      109          BIT 11  FLAG 7      SWANDBIT
R0184    S32.1F1       090          BIT 15  FLAG 6      S32BIT1
R0185    S32.1F2       092          BIT 14  FLAG 6      S32BIT2
R0186    S32.1F3A      092          BIT 13  FLAG 6      S32BIT3A
R0187    S32.1S3B      093          BIT 12  FLAG 6      S32BIT3B
R0188    TFFSW         119          BIT 1   FLAG 7      TFFSWBIT
R0189    TRACKFLG      025          BIT 5   FLAG 1      TRACKBIT
R0190    TURNONFL      194          BIT 1   FLAG 12     TURNONBT
R0191    ULLAGFLG      204          BIT 6   FLAG 13     ULLAGER
R0192    UPDATFLG      023          BIT 7   FLAG 1      UPDATBIT
R0193    UPLOCKFL      116          BIT 4   FLAG 7      UPLOCBIT
R0194    USEQRFLG      196          BIT 14  FLAG 13     USEQRJTS
R0195    VEHUPFLG      022          BIT 8   FLAG 1      VEHUPBIT
R0196    VELDATA       173          BIT 7   FLAG 11     VELDABIT
R0197    VERIFLAG      117          BIT 3   FLAG 7      VERIFBIT
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R0198   VFLAG            050              BIT 10 FLAG 3      VFLAGBIT
R0199   VFLSHFLG         178              BIT 2  FLAG 11     VFLSHBIT
R0200   VINTFLAG         057              BIT 3  FLAG 3      VINTFBIT
R0201   VXINH            168.             BIT 12 FLAG 11     VXINHBIT
R0202   V37FLAG          114              BIT 6  FLAG 7      V37FLBIT
R0203   V67FLAG          112              BIT 8  FLAG 7      V67FLBIT
R0204   VB2EMFLG         118              BIT 2  FLAG 7      VB2EMBIT
R0205   XDELVFLG         037              BIT 8  FLAG 2      XDELVBIT
R0206   XDSPFLAG         074              BIT 1  FLAG 4      XDSPBIT
R0207   XORFLG           171              BIT 9  FLAG 11     XORFLBIT
R0208   XOVINFLG         201              BIT 9  FLAG 13     XOVINHIB
R0209   ZOOMFLAG         082              BIT 8  FLAG 5      ZOOMBIT
R0210   3AXISFLG         084              BIT 6 FLAG 5       3AXISBIT
R0211   360SW            134              BIT 1  FLAG 8      360SWBIT
A0212


R0213                ASSIGNMENT AND DESCRIPTION OF FLAGWORDS


 0214   REF  1                 0074         FLAGWRD0 =      STATE +0        (000-014)

A0215                                                                       (SET)                  (RESET)

A0216                                                       BIT 15 FLAG 0   (S)
 0217                          0000         NEED2FLG =      000D            DISPLAY DAP RATES      CHECK BIT 4 OF THIS
 0218   REF  1                 4735         NEED2BIT =      BIT15           ON FDAI NEEDLES.       WORD FOR DISPLAY
A0219                                                                                              MODES (1 OR 2).

A0220                                                       BIT 14 FLAG 0   (S)
 0221                          0001         JSWITCH  =      001D            INTEGRATION OF W       INTEGRATION OF STATE
 0222   REF  1                 4736         JSWCHBIT =      BIT14           MATRIX                 VECTOR
A0223

A0224                                                       BIT 13 FLAG 0   (S)
 0225                          0002         MIDFLAG  =      002D            INTEGRATION WITH       INTEGRATION WITHOUT
A0226                                                                       SECONDARY BODY AND     SOLAR PERTURBATIONS
 0227   REF  2  LAST   40      4737         MIDFLBIT =      BIT13           SOLAR PERTURBATIONS
A0228

A0229                                                       BIT 12 FLAG 0   (L)
 0230                          0003         MOONFLAG =      003D            MOON IS SPHERE OF      EARTH IS SPHERE OF
 0231   REF  1                 4740         MOONBIT  =      BIT12           INFLUENCE              INFLUENCE
A0232

A0233                                                       BIT 11 FLAG 0
 0234                          0004         P21FLAG  =      004D            USE BASE VECTORS       1ST PASS -- CALC-
 0235   REF  2  LAST   43      4741         P21FLBIT =      BIT11           ALREADY CALCULATED     ULATE BASE VECTORS
A0236
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A0237                                        BIT 10 FLAG 0
 0238                0005      FSPASFLG =    005D          FIRST PASS THROUGH  NOT FIRST PASS THRU
 0239   REF   1      4742      FSPASBIT =    BIT10         REPOSITION ROUTINE  REPOSITION ROUTINE
A0240

A0241                                        BIT 9  FLAG 0  (S)
 0242                0006      P25FLAG  =    006D          P25 OPERATING       P25 NOT OPERATING
 0243   REF   1      4743      P25FLBIT =    BIT9
A0244

A0245                                        BIT 8  FLAG 0  (S)
 0246                0007      IMUSE    =    007D          IMU IN USE          IMU NOT IN USE
 0247   REF   1      4744      IMUSEBIT =    BIT8
A0248

A0249                                        BIT 7  FLAG 0  (S)
 0250                0010      RNDVZFLG =    008D          P20 RUNNING (RADAR  P20 NOT RUNNING
 0251   REF   1      4745      RNDVZBIT =    BIT7          IN USE)
A0252

A0253                                        BIT 6  FLAG 0  (S)
 0254                0011      RRNBSW   =    009D          RADAR TARGET IN     RADAR TARGET IN
 0255   REF   1      4746      RRNBBIT  =    BIT6          NB COORDINATES      SM COORDINATES
A0256

A0257                                        BIT 5  FLAG 0  (S)
 0258                0012      LOKONSW  =    010D          RADAR LOCK-ON       RADAR LOCK-ON NOT
 0259   REF   1      4747      LOKONBIT =    BIT5          DESIRED             DESIRED
A0260

A0261                                        BIT 4  FLAG 0  (S)
 0262                0013      NEEDLFLG =    011D          TOTAL ATTITUDE      A/P FOLLOWING
 0263   REF   1      4750      NEEDLBIT =    BIT4          ERROR DISPLAYED     ERROR DISPLAYED
A0264

A0265                                        BIT 3  FLAG 0
 0266                0014      FREEFLAG =    012D          (USED BY P51-53 TEMP IN MANY DIFFERENT
A0267                                                      ROUTINES & BY LUNAR + SOLAR EPHEMERIDES)
 0268   REF   1      4751      FREEFBIT =    BIT3
A0269

A0270                                        BIT 2  FLAG 0
 0271                0015      R10FLAG  =    013D          R10 OUTPUTS DATA TO BESIDES OUTPUT WHEN
 0272   REF   1      4752      R10FLBIT =    BIT2          ALTITUDE & ALTITUDE SET, R10 ALSO OUTPUT
A0273                                                      RATE METERS ONLY    TO FORWARD & LATERAL
A0274                                                                          VELOCITY CROSSPOINTR
A0275

A0276                                        BIT 1  FLAG 0  (L)
 0277                0016      OLDESFLG =    014D          R29 GYRO CMD LOOP   R29 GYRO CMD LOOP
 0278   REF   1                  4753            CLDESBIT =      BIT1            REQUESTED          NOT REQUESTED

A0279

 0280   REF   2  LAST   65       0075            FLAGWRD1 =      STATE +1        (015-029)

A0281                                                                            (SET)              (RESET)

A0282                                                            BIT 15 FLAG 1   (S)
 0283                            0017            NJETSFLG =      015D            TWO JET RCS BURN   FOUR JET RCS BURN
 0284   REF   2  LAST   65       4735            NJETSBIT =      BIT15
A0285

A0286                                                            BIT 14 FLAG 1   (L)
 0287                            0020            DIDFLAG  =      0160            INERTIAL DATA IS   PERFORM DATA DISPLAY
 0288   REF   2  LAST   65       4736            DIDFLBIT =      BIT14           AVAILABLE          INITIALIZATION FUNCS
A0289

A0290                                                            BIT 13 FLAG 1   (S)
 0291                            0021            ERADFLAG =      0170            COMPUTE REARTH     USE CONSTANT REARTH
 0292   REF   3  LAST   65       4737            ERADFBIT =      BIT13           FISCHER ELLIPSOID  PAD RADIUS
A0293

A0294                                                            BIT12  FLAG 1
 0295                            0022            RODFLAG  =      01BD            IF IN P66, NORMAL   IF IN P66, RE-INIT-
 0296   REF   2  LAST   65       4740            RODFLBIT =      BIT12           OPERATION CONTINUES. IALIZATION IS PER-
A0297                                                                            RESTART CLEARS FLAG  FORMED AND FLAG IS
A02975

A0298                                                            BIT 11  FLAG 1
A0299                                                     =      0190
A02995                                                    =      BIT11
A0300                                                            BIT 10  FLAG 1  (L)
 0301                            0024            R61FLAG  =      02CD            RUN R61 LEM        RUN R65 LEM
 0302   REF   2  LAST   66       4742            R61FLBIT =      BIT10
A0303

A0304                                                            BIT 9 FLAG 1
A0305                                                     =      021D
A0306                                                     =      BIT9
A0307

A0308                                                            BIT 8 FLAG 1    (S)
 0309                            0026            VEHUPFLG =      022D            CSM STATE VECTOR   LEM STATE VECTOR
 0310   REF   2  LAST   66       4744            VEHUPBIT =      BIT8            BEING UPDATED      BEING UPDATED
A0311

A0312                                                            BIT 7 FLAG 1    (S)
 0313                            0027            UPDATFLG =      023D            UPDATING BY MARKS  UPDATING BY MARKS
 0314   REF   2  LAST   66       4745            UPDATBIT =      BIT7            ALLOWED            NOT ALLOWED
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A0315

A0316                                                 BIT 6  FLAG 1     (S)
 0317                      0030        NOUPFLAG =     024D              NEITHER CSM          EITHER STATE
A0318                                                                   NOR LM STATE VECTOR  VECTOR MAY BE
 0319   REF   2  LAST  66  4746        NOUPFBIT =     BIT6              MAY BE UPDATED       UPDATED
A0320

A0321                                                 BIT 5  FLAG 1     (S)
 0322                      0031        TRACKFLG =     025D              TRACKING ALLOWED     TRACKING NOT ALLOWED
 0323   REF   2  LAST  66  4747        TRACKBIT =     BIT5
A0324

A0325                                                 BIT 4  FLAG 1
A0326                                           =     026D
A0327                                           =     BIT4
A0328

A0329                                                 BIT 3  FLAG 1     (S)
 0330                      0033        SLOPESW  =     027D              ITERATE WITH BIAS    ITERATE WITH REGULAR
A0331                                                                   METHOD IN ITERATOR   FALSI METHOD IN
 0332   REF   2  LAST  66  4751        SLOPEBIT =     BIT3                                   ITERATOR
A0333

A0334                                                 BIT 2  FLAG 1     (S)
 0335                      0034        GUESSW   =     028D              NO STARTING VALUE    STARTING VALUE FOR
 0336   REF   2  LAST  66  4752        GUESSBIT =     BIT2              FOR ITERATION        ITERATION EXISTS
A0337

A0338                                                 BIT 1  FLAG 1
A0339                                           =     029D
A0340

 0341   REF   3  LAST  67  0076        FLAGWRD2 =     STATE +2          (030-044)

A0342                                                                   (SET)                (RESET)

A0343                                                 BIT 15 FLAG 2     (S)
 0344                      0036        DRIFTFLG =     030D              T3RUPT CALLS GYRO    T3RUPT DOES NO GYRO
 0345   REF   3  LAST  67  4735        DRFTBIT  =     BIT15             COMPENSATION         COMPENSATION
A0346

A0347                                                 BIT 14 FLAG 2     (S)
 0348                      0037        SRCHOPTN =     031D              RADAR IN AUTOMATIC   RADAR NOT IN AUTO-
 0349   REF   3  LAST  67  4736        SRCHOBIT =     BIT14             SEARCH OPTION(R24)   MATIC SEARCH OPTION
A0350

A0351                                                 BIT 13 FLAG 2     (S)
 0352                      0040        ACMODFLG =     032D              MANUAL ACQUISITION   AUTO ACQUISITION
 0353   REF   4  LAST  67  4737        ACMODBIT =     BIT13             BY RENDESVOUS RADAR  BY RENDESVOUS RADAR
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A0354

A0355                                                 BIT 12 FLAG 2    (S)
 0356                      0041       LOSCMFLG =      033D             LINE OF SIGHT BEING LINE OF SIGHT NOT
A0357                                                                  COMPUTED (R21)      BEING COMPUTED
 0358   REF   3  LAST  67  4740       LOSCMBIT =      BIT12
A0359                                                                  IN R29 (L): RR GYRO IN R29 (L): RR GYRO
A0360                                                                  CMD LOOP RUNNING    CMD LOOP OFF

A0361                                                 BIT 11 FLAG 2    (S)
 0362                      0042       STEERSW  =      034D             SUFFICIENT THRUST   INSUFFICIENT THRUST
 0363   REF   3  LAST  65  4741       STEERBIT =      BIT11            IS PRESENT          IS PRESENT
A0364

A0365                                                 BIT 10 FLAG 2    (S)
A0368

A0369                                                 BIT 9 FLAG 2     (S)
 0370                      0044       IMPULSW  =      036D             MINIMUM IMPULSE     STEERING BURN (NO
A0371                                                                  BURN (CUTOFF TIME   CUTOFF TIME YET
 0372   REF   2  LAST  66  4743       IMPULBIT =      BIT9             SPECIFIED)          AVAILABLE)
A0373

A0374                                                 BIT 8 FLAG 2     (S)
 0375                      0045       XDELVFLG =      037D             EXTERNAL DELTAV VG  LAMBERT (AIMPOINT)
 0376   REF   3  LAST  67  4744       XDELVBIT =      BIT8             COMPUTATION         VG COMPUTATION
A0377

A0378                                                 BIT 7 FLAG 2     (S)
 0379                      0046       ETPIFLAG =      038D             ELEVATION ANGLE     TPI TIME SUPPLIED
A0380                                                                  SUPPLIED FOR        FOR P34,74 TO COMPUT
 0381   REF   3  LAST  67  4745       ETPIBIT  =      BIT7             P34,74              ELEVATION
A0382

A0387                                                 BIT 6 FLAG 2     (S)
 0388                      0047       FINALFLG =      039D             LAST PASS THROUGH   INTERIM PASS THROUGH
A0389                                                                  RENDEZVOUS PROGRAM  RENDEZVOUS PROGRAM
 0390   REF   3  LAST  68  4746       FINALBIT =      BIT6             COMPUTATIONS        COMPUTATIONS
A0391

A0392                                                 BIT 5 FLAG 2     (S)
 0393                      0050       AVFLAG   =      040D             LEM IS ACTIVE       CSM IS ACTIVE
 0394   REF   3  LAST  68  4747       AVFLBIT  =      BIT5             VEHICLE             VEHICLE
A0395

A0396                                                 BIT 4 FLAG 2     (S)
 0397                      0051       PFRATFLG =      041D             PREFERRED ATTITUDE  PREFERRED ATTITUDE
 0398   REF   2  LAST  66  4750       PFRATBIT =      BIT4             COMPUTED            NOT COMPUTED
A0399
```

```
L        FLAGWORD ASSIGNMENTS                                              USER'S PAGE NO.  10        EO S4

A0400                                                    BIT 3  FLAG 2     (S)
 0401                             0052     CALCMAN3 =    042D              NO FINAL ROLL        FINAL ROLL IS
 0402   REF    3   LAST    68     4751     CALC3BIT =    BIT3                                   NECESSARY
A0403

A0404                                                    BIT 2  FLAG 2     (S)
 0405                             0053     CALCMAN2 =    043D              PERFORM MANEUVER     BYPASS STARTING
 0406   REF    3   LAST    68     4752     CALC2BIT =    BIT2              STARTING PROCEDURE   PROCEDURE
A0407

A0408                                                    BIT 1  FLAG 2     (S)
 0409                             0054     NODOFLAG =    044D              V37 NOT PERMITTED    V37 PERMITTED
 0410   REF    2   LAST    67     4753     NODOBIT  =    BIT1
A0411

 0412   REF    4   LAST    68     0077     FLAGWRD3 =    STATE +3          (045-059)

A0413                                                                      (SET)                (RESET)

A0414                                                    BIT 15 FLAG 3
 0415                             0055     POOHFLAG =    045D              INHIBIT BACKWARDS    ALLOW BACKWARDS
 0416   REF    4   LAST    68     4735     POOHBIT  =    BIT15             INTEGRATION          INTEGRATION
A04165

A0417                                                    BIT 14 FLAG 3     (S)
 0418                             0056     GLOKFAIL =    046D              GIMBAL LOCK HAS      NOT IN GIMBAL LOCK
 0419   REF    4   LAST    68     4736     GLOKFBIT =    BIT14             OCCURRED
A0420

A0421                                                    BIT 13 FLAG 3     *** PROTECTED FROM FRESH START ***
 0422                             0057     REFSMFLG =    047D              REFSMMAT GOOD        REFSMMAT NO GOOD
 0423   REF    5   LAST    68     4737     REFSMBIT =    BIT13
A0424

A0425                                                    BIT 12 FLAG 3     (S)
 0426                             0060     LUNAFLAG =    048D              LUNAR LAT-LONG       EARTH LAT-LONG
 0427   REF    4   LAST    69     4740     LUNABIT  =    BIT12
A0428

A0429                                                    BIT 11 FLAG 3     (L)
 0430                             0061     NOR29FLG =    049D              R29 NOT ALLOWED      R29 ALOWED (RR DES-
 0431   REF    4   LAST    69     4741     NR29FBIT =    BIT11                                  IGNATE, POWERED FLT)
A0432

A0433                                                    BIT 10 FLAG 3     (S)
 0434                             0062     VFLAG    =    050D              LESS THAN TWO STARS  TWO STARS IN FIELD
 0435   REF    3   LAST    67     4742     VFLAGBIT =    BIT10             IN FIELD OF VIEW     OF VIEW
A0436

A0437                                                    BIT 9  FLAG 3     (S)
```

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  0438                          0063          R04FLAG  =      051D          ALARM 521           ALARM 521 ALLOWED
 A0439                                                                      SUPPRESSED
  0440   REF   3  LAST   69     4743          R04FLBIT =      BIT9
 A0441

 A0442                                                        BIT 9 FLAG 3  (L)
  0443   REF   1                0063          READRFLG =      R04FLAG       READING RR DATA     NOT READING RR DATA
  0444   REF   4  LAST   71     4743          READRBIT =      BIT9          PURSUANT TO R29     PURSUANT TO R29
 A0445

 A0446                                                        BIT 8 FLAG 3  (S)
  0447                          0064          PRECIFLG =      052D          NORMAL INTEGRATION  ENGAGES 4-TIME STEP
 A0448                                                                      IN P00              (P00) LOGIC IN INTE-
  0449   REF   4  LAST   69     4744          PRECIBIT =      BIT8                              GRATION
 A0450

 A0451                                                        BIT 7 FLAG 3  (S)
  0452                          0065          CULTFLAG =      053D          STAR OCCULTED       STAR NOT OCCULTED
  0453   REF   4  LAST   69     4745          CULTBIT  =      BIT7
 A0454

 A0455                                                        BIT 6 FLAG 3  (S)
  0456                          0066          ORBWFLAG =      054D          W MATRIX VALID FOR  W MATRIX INVALID FOR
  0457   REF   4  LAST   69     4746          ORBWFBIT =      BIT6          ORBITAL NAVIGATION  ORBITAL NAVIGATION
 A0458

 A0459                                                        BIT 5 FLAG 3  (S)
  0460                          0067          STATEFLG =      055D          PERMANENT STATE     PERMANENT STATE
  0461   REF   4  LAST   69     4747          STATEBIT =      BIT5          VECTOR UPDATED      VECTOR NOT UPDATED
 A0462

 A0463                                                        BIT 4 FLAG 3  (S)
  0464                          0070          INTYPFLG =      056D          CONIC INTEGRATION   ENCKE INTEGRATION
  0465   REF   3  LAST   69     4750          INTYPBIT =      BIT4
 A0466

 A0467                                                        BIT 3 FLAG 3  (S)
  0468                          0071          VINTFLAG =      057D          CSM STATE VECTOR    LEM STATE VECTOR
  0469   REF   4  LAST   70     4751          VINTFBIT =      BIT3          BEING INTEGRATED    BEING INTEGRATED
 A0470

 A0471                                                        BIT 2 FLAG 3  (S)
  0472                          0072          D6OR9FLG =      058D          DIMENSION OF W IS 9 DIMENSION OF W IS 6
  0473   REF   4  LAST   70     4752          D6OR9BIT =      BIT2          FOR INTEGRATION     FOR INTEGRATION
 A0474

 A0475                                                        BIT 1 FLAG 3  (S)
  0476                          0073          DIMOFLAG =      059D          W MATRIX IS TO BE   W MATRIX IS NOT TO
  0477   REF   3  LAST   70     4753          DIMOBIT  =      BIT1          USED                BE USED
 A0478
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L        FLAGWORD ASSIGNMENTS                                                   USER'S PAGE NO. 12        EQ S4

 0479   REF   5  LAST   70     0100         FLAGWRD4 =     STATE +4       (060-074)

A0480                                                                    (SET)                (RESET)

A0481                                                      BIT 15 FLAG 4  (S)
 0482                           0074         MRKIDFLG =     060D           MARK DISPLAY IN      NO MARK DISPLAY IN
 0483   REF   5  LAST   70     4735         MRKIDBIT =     BIT15          ENDIDLE              ENDIDLE
A0484

A0485                                                      BIT 14 FLAG 4  (S)
 0486                           0075         PRIODFLG =     061D           PRIORITY DISPLAY IN NO PRIORITY DISPLAY
 0487   REF   5  LAST   70     4736         PRIODBIT =     BIT14          ENDIDLE              IN ENDIDLE
A0488

A0489                                                      BIT 13 FLAG 4  (S)
 0490                           0076         NRMIDFLG =     062D           NORMAL DISPLAY IN    NO NORMAL DISPLAY
 0491   REF   6  LAST   70     4737         NRMIDBIT =     BIT13          ENDIDLE              IN ENDIDLE
A0492

A0493                                                      BIT 12 FLAG 4  (S)
 0494                           0077         PDSPFLAG =     063D           P20 SETS SO AS TO    LEAVE AS NORMAL DISP
A0495                                                                     TURN A NORMAL DIS-
 0496   REF   5  LAST   70     4740         PDSPFBIT =     BIT12          PLAY INTO A PRIORITY
A0497                                                                     DISPLAY IN R60
A0498

A0499                                                      BIT 11 FLAG 4  (S)
 0500                           0100         MWAITFLG =     064D           HIGHER PRIORITY      NO HIGHER PRIORITY
A0501                                                                     DISPLAY OPERATING    DISPLAY OPERATING
 0502   REF   5  LAST   70     4741         MWAITBIT =     BIT11          WHEN MARK DISPLAY    WHEN MARK DISPLAY
A0503                                                                     INITIATED            INITIATED

A0504                                                      BIT 10 FLAG 4  (S)
 0505                           0101         NWAITFLG =     065D           HIGHER PRIORITY      NO HIGHER PRIORITY
A0506                                                                     DISPLAY OPERATING    DISPLAY OPERATING
 0507   REF   4  LAST   70     4742         NWAITBIT =     BIT10          WHEN NORMAL          WHEN NORMAL DISPLAY
A0508                                                                     DISPLAY INITIATED    INITIATED

A0509                                                      BIT 9 FLAG 4   (S)
 0510                           0102         MRKNVFLG =     066D           ASTRONAUT USING      ASTRONAUT NOT USING
A0511                                                                     KEYBOARD WHEN MARK   KEYBOARD WHEN MARK
 0512   REF   5  LAST   71     4743         MRKNVBIT =     BIT9           DISPLAY INITIATED    DISPLAY INITIATED
A0513

A0514                                                      BIT 8 FLAG 4   (S)
 0515                           0103         NRMNVFLG =     067D           ASTRONAUT USING      ASTRONAUT NOT USING
A0516                                                                     KEYBOARD WHEN        KEYBOARD WHEN
 0517   REF   5  LAST   71     4744         NRMNVBIT =     BIT8           NORMAL DISPLAY       NORMAL DISPLAY
A0518                                                                     INITIATED            INITIATED
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A0519                                                  BIT 7 FLAG 4    (S)
 0520                         0104     PRONVFLG =      068D            ASTRONAUT USING      ASTRONAUT NOT USING
A0521                                                                  KEYBOARD WHEN        KEYBOARD WHEN
 0522  REF   5  LAST   71     4745     PRONVBIT =      BIT7            PRIORITY DISPLAY     PRIORITY DISPLAY
A0523                                                                  INITIATED            INITIATED

A0524                                                  BIT 6 FLAG 4    (S)
 0525                         0105     PINBRFLG =      069D            ASTRONAUT HAS        ASTRONAUT HAS NOT
A0526                                                                  INTERFERED WITH      INTERFERED WITH
 0527  REF   5  LAST   71     4746     PINBRBIT =      BIT6            EXISTING DISPLAY     EXISTING DISPLAY
A0528

A0529                                                  BIT 5 FLAG 4    (S)
 0530                         0106     MRUPTFLG =      070D            MARK DISPLAY         MARK DISPLAY NOT
A0531                                                                  INTERRUPTED BY       INTERRUPTED BY
 0532  REF   5  LAST   71     4747     MRUPTBIT =      BIT5            PRIORITY DISPLAY     PRIORITY DISPLAY
A0533

A0534                                                  BIT 4 FLAG 4    (S)
 0535                         0107     NRUPTFLG =      071D            NORMAL DISPLAY       NORMAL DISPLAY NOT
A0536                                                                  INTERRUPTED BY       INTERRUPTED BY
 0537  REF   4  LAST   71     4750     NRUPTBIT =      BIT4            PRIORITY OR MARK     PRIORITY OR MARK
A0538                                                                  DISPLAY              DISPLAY

A0539                                                  BIT 3 FLAG 4    (S)
 0540                         0110     MKOVFLAG =      072D            MARK DISPLAY OVER    NO MARK DISPLAY OVER
 0541  REF   5  LAST   71     4751     MKOVBIT  =      BIT3            NORMAL               NORMAL
A0542

A0543                                                  BIT 2 FLAG 4
A0544                                           =      073D

A0545

A0546                                                  BIT 1 FLAG 4    (S)
 0547                         0112     XDSPFLAG =      074D            MARK DISPLAY NOT     NO SPECIAL MARK
 0548  REF   4  LAST   71     4753     XDSPBIT  =      BIT1            TO BE INTERRUPTED    INFORMATION
A0549

 0550  REF   6  LAST   72     0101     FLAGWRD5 =      STATE +5        (075-089)
A0551                                                                  (SET)                (RESET)

A0552                                                  BIT 15 FLAG 5   (S)
 0553                         0113     DSKYFLAG =      075D            DISPLAYS SENT TO     NO DISPLAYS TO DSKY
 0554  REF   6  LAST   72     4735     DSKYFBIT =      BIT15           DSKY
A0555

A0556                                                  BIT 14 FLAG 5
A0557                                           =      076D
A0558                                           =      BIT14
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A0559

A0560                                                  BIT 13 FLAG 5   (S,L)
 0561                     0115        SNUFFER  =      077D            U,V JETS DISABLED    U,V JETS ENABLED
A0562                                                                 DURING DPS           DURING DPS
 0563   REF   7  LAST   72   4737        SNUFFBIT =      BIT13           BURNS (V65)          BURNS (V75)
A0564

A0565                                                  BIT 12 FLAG 5   (S)
 0566                     0116        NOTHROTL =      078D            INHIBIT FULL         PERMIT FULL THROTTLE
 0567   REF   6  LAST   72   4740        NOTHRBIT =      BIT12           THROTTLE
A0568

A0569                                                  BIT 11 FLAG 5   (S,L)
 0570                     0117        R77FLAG  =      079D            R77 IS ON,          R77 IS NOT ON.
A0571                                                                 SUPPRESS ALL RADAR
A0572                                                                 ALARMS AND TRACKER
 0573   REF   6  LAST   72   4741        R77FLBIT =      BIT11           FAILS
A0574

A0575                                                  BIT 10 FLAG 5   (S)
 0576                     0120        RNGSCFLG =      080D            SCALE CHANGE HAS     NO SCALE CHANGE HAS
A0577                                                                 OCCURRED DURING      OCCURRED DURING
 0578   REF   5  LAST   72   4742        RNGSCBIT =      BIT10           RR READING           RR READING
A0579

A0580                                                  BIT 9 FLAG 5    (S)
 0581                     0121        DMENFLG  =      081D            DIMENSION OF W IS 9 DIMENSION OF W IS 6
 0582   REF   6  LAST   72   4743        DMENFBIT =      BIT9            FOR INCORPORATION    FOR INCORPORATION
A0583

A0584                                                  BIT 8 FLAG 5    (S)
 0585                     0122        ZOOMFLAG =      082D            THROTTLE-UP HAS      THROTTLE-UP HAS NOT
 0586   REF   6  LAST   72   4744        ZOOMBIT  =      BIT8            OCCURRED IN P63.     YET OCCURRED IN P63.
A0587

A0588                                                  BIT 7 FLAG 5    (S)
 0589                     0123        ENGONFLG =      083D            ENGINE TURNED ON     ENGINE TURNED OFF
 0590   REF   6  LAST   73   4745        ENGONBIT =      BIT7
A0591

A0592                                                  BIT 6 FLAG 5    (S)
 0593                     0124        3AXISFLG =      084D            MANEUVER SPECIFIED   MANEUVER SPECIFIED
A0594                                                                 BY THREE AXES        BY ONE AXIS; R60
 0595   REF   6  LAST   73   4746        3AXISBIT =      BIT6                                 CALLS VECPOINT.
A0596

A0597                                                  BIT 5 FLAG 5
 0598                     0125        AORBSFLG =      085D            PREFER PAXIS JET     PREFER PAXIS JET
 0599   REF   6  LAST   73   4747        AORBSYST =      BIT5            PAIRS 7,15 AND 8,16   PAIRS 4,12 AND 3,11
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A05995

A0600                                                    BIT 4 FLAG 5     (S)
 0601                        0126        NORRMON   =     0B6D             BYPASS RR GIMBAL      PERFORM
 0602   REF   5  LAST   73   4750        NORRMBIT  =     BIT4             MONITOR               RR GIMBAL MONITOR
A0603

A0604                                                    BIT 3 FLAG 5     (S)
 0605                        0127        SOLNSW    =     0B7D             LAMBERT DOES NOT      LAMBERT CONVERGES OR
A0606                                                                     CONVERGE,OR TIME-RADTIME-RADIUS NON
 0607   REF   6  LAST   73   4751        SOLNSBIT  =     BIT3             NEARLY CIRCULAR       CIRCULAR
A0608

A0609                                                    BIT 2 FLAG 5     (S)
 0610                        0130        MGLVFLAG  =     0B8D             LOCAL VERTICAL        MIDDLE GIMBAL ANGLE
A0611                                                                     COORDINATES           COMPUTED
 0612   REF   5  LAST   71   4752        MGLVFBIT  =     BIT2             COMPUTED
A0613

A0614                                                    BIT 1 FLAG 5     (S)
 0615                        0131        RENDWFLG  =     0B9D             W MATRIX VALID        W MATRIX INVALID
A0616                                                                     FOR RENDEZVOUS        FOR RENDEZVOUS
 0617   REF   5  LAST   73   4753        RENDWBIT  =     BIT1             NAVIGATION            NAVIGATION
A0618

 0619   REF   7  LAST   73   0102        FLAGWRD6  =     STATE +6         (090-104)

A0620                                                                     (SET)                 (RESET)

A0621                                                    BIT 15 FLAG 6    (S)
 0622                        0132        S32.1F1   =     090D             DELTA V AT CSI TIME  DVT1 LESS THEN MAX
 0623   REF   7  LAST   73   4735        S32BIT1   =     BIT15            ONE EXCEEDS MAX
A0624

A0625                                                    BIT 14 FLAG 6    (S)
 0626                        0133        S32.1F2   =     091D             FIRST PASS OF         REITERATION OF
 0627   REF   6  LAST   72   4736        S32BIT2   =     BIT14            NEWTON ITERATION      NEWTON
A0628

A0629                                                    BIT 13 FLAG 6    (S)
 0630                        0134        S32.1F3A  =     092D             BIT 13 AND BIT 12 FUNCTION AS AN ORDERED
 0631   REF   8  LAST   74   4737        S32BIT3A  =     BIT13            PAIR (13,12) INDICATING THE POSSIBLE OC-
A0632                                                                     CURRANCE OF 2NEWTON ITERATIONS FOR S32.1
A0633                                                                     IN THE PROGRAM IN THE FOLLOWING ORDER:
A0634                                                    BIT 12 FLAG 6    (0,1) (I.E.BIT 13 RESET,BIT 12 SET)
 0635                        0135        S32.1F3B  =     093D                   = FIRST NEWTON ITERATION BEING DONE
 0636   REF   7  LAST   74   4740        S32BIT3B  =     BIT12            (0,0)= FIRST PASS OF SECOND NEWT.ITERAT.
A0637                                                                     (1,1)= 50 FT/SEC STAGE OF SEC. NEWT.ITER
A0638                                                                     (1,0)= REMAINDER OF SECOND NEWTON ITERA.
A0639
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A0640                                                        BIT 11 FLAG 6     (S)
A0643

A0644                                                        BIT 10 FLAG 6     (S)
 0645                          0137        GMBDRVSW =        095D              TRIMGIMB OVER        TRIMGIMB NOT OVER
 0646    REF    6  LAST   74   4742        GMBDRBIT =        BIT10
A0647

A0648                                                        BIT 9  FLAG 6
A0649                                               =        096D
A0650                                               =        BIT9
A0651

A0654                                                        BIT 8  FLAG 6     (S)
 0655                          0141        MUNFLAG  =        097D              SERVICER CALLS       SERVICER CALLS
 0656    REF    7  LAST   74   4744        MUNFLBIT =        BIT8              MUNRVG               CALCRVG
A0657

A0658                                                        BIT 7  FLAG 6     (L)
 0659                          0142                 =        098D
 0660    REF    7  LAST   74   4745                 =        BIT7
A0661

A0662                                                        BIT 6  FLAG 6     (L)
 0663                          0143        REDFLAG  =        099D              LANDING SITE         LANDING SITE
A0664                                                                          REDESIGNATION        REDESIGNATION NOT
 0665    REF    7  LAST   74   4746        REDFLBIT =        BIT6              PERMITTED            PERMITTED
A0666

A0667                                                        BIT 5  FLAG 6
A0668                                               =        100D
A0669

A0670                                                        BIT 4  FLAG 6
A0671                                               =        101D

A0672                                                        BIT 3  FLAG 6     (S)
 0673                          0146        NTARGFLG =        102D              ASTRONAUT DID        ASTRONAUT DID NOT
A0674                                                                          OVERWRITE DELTA      OVERWRITE DELTA
 0675    REF    7  LAST   75   4751        NTARGBIT =        BIT3              VELOCITY AT TPI      VELOCITY
A0676                                                                          OR TPM (P34,35)

A0677                                                        BIT 2  FLAG 6
 0678                          0147        AUXFLAG  =        103D              PROVIDING IDLEFLAG   SERVICER WILL SKIP
 0679    REF    6  LAST   75   4752        AUXFLBIT =        BIT2              IS NOT SET, SERV-    DVMON ON ITS NEXT
A0680                                                                          ICER WILL EXERCISE   PASS EVEN IF THE
A0681                                                                          DVMON ON ITS NEXT    IDLEFLAG IS NOT SET.
A0682                                                                          PASS.                IT WILL THEN SET
A0683                                                                                               AUXFLAG.
```

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A0684                                                        BIT  1  FLAG  6    (L)
 0685                         0150         ATTFLAG   =       104D               LEM ATTITUDE EXISTS  NO LEM ATTITUDE
A0686                                                                           IN MOON-FIXED        AVAILABLE IN MOON-
 0687    REF   6  LAST   75   4753         ATTFLBIT  =       BIT1               COORDINATES          FIXED COORDINATES
A0688

 0689    REF   8  LAST   75   0103         FLAGWRD7  =       STATE +7           (105-119)

A0690                                                                           (SET)                (RESET)

A0691                                                        BIT 15  FLAG  7    (S)
 0692                         0151         ITSWICH   =       105D               P34;TPI TIME TO BE   TPI HAS BEEN
 0693    REF   8  LAST   75   4735         ITSWBIT   =       BIT15              COMPUTED             COMPUTED
A0694

A0695                                                        BIT 14  FLAG  7    (S)
 0696                         0152         MANUFLAG  =       106D               ATTITUDE MANEUVER    NO ATTITUDE MANEUVER
A0697                                                                           GOING DURING RR      DURING RR SEARCH
 0698    REF   7  LAST   75   4736         MANUFBIT  =       BIT14              SEARCH
A0699

A0700                                                        BIT 13  FLAG  7    (S)
 0701                         0153         IGNFLAG   =       107D               TIG HAS ARRIVED      TIG HAS NOT ARRIVED
 0702    REF   9  LAST   75   4737         IGNFLBIT  =       BIT13
A0703

A0704                                                        BIT 12  FLAG  7    (S)
 0705                         0154         ASTNFLAG  =       108D               ASTRONAUT HAS        ASTRONAUT HAS NOT
 0706    REF   8  LAST   75   4740         ASTNBIT   =       BIT12              OKAYED IGNITION      OKAYED IGNITION
A0707

A0708                                                        BIT 11  FLAG  7    (L)
 0709                         0155         SWANDISP  =       109D               LANDING ANALOG       LANDING ANALOG
 0710    REF   7  LAST   74   4741         SWANDBIT  =       BIT11              DISPLAYS ENABLED     DISPLAYS SUPPRESSED
A0711

A0712                                                        BIT 10  FLAG  7    (S)
 0713                         0156         NORMSW    =       110D               UNIT NORMAL INPUT    LAMBERT COMPUTES ITS
 0714    REF   7  LAST   76   4742         NORMSBIT  =       BIT10              TO LAMBERT           OWN UNIT NORMAL
A0715

A0716                                                        BIT  9  FLAG  7    (S)
 0717                         0157         RVSW      =       111D               DO NOT COMPUTE       COMPUTE FINAL STATE
A0718                                                                           FINAL STATE VECTOR   VECTOR IN TIME-THETA
 0719    REF   7  LAST   74   4743         RVSWBIT   =       BIT9               IN TIME-THETA
A0720

A0721                                                        BIT  8  FLAG  7    (S)
 0722                         0160         V67FLAG   =       112D               ASTRONAUT OVERWRITE   ASTRONAUT DOES NOT
A0723                                                                           W-MATRIX INITIAL     OVERWRITE W-MATRIX
```

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 0724   REF   8  LAST   76        4744          V67FLBIT =        BIT8             VALUES              INITIAL VALUES
A0725

A0726                                                           BIT 7  FLAG 7    (S)
 0727                             0161          IDLEFLAG =        113D             NO DV MONITOR       CONNECT DV MONITOR
 0728   REF   8  LAST   76        4745          IDLEFBIT =        BIT7
A0729

A0730                                                           BIT 6  FLAG 7    (S)
 0731                             0162          V37FLAG  =        114D             AVERAGEG (SERVICER) AVERAGEG (SERVICER)
 0732   REF   8  LAST   76        4746          V37FLBIT =        BIT6             RUNNING             OFF
A0733

A0734                                                           BIT 5  FLAG 7    (S)
 0735                             0163          AVEGFLAG =        115D             AVERAGEG (SERVICER) AVERAGEG (SERVICER)
 0736   REF   7  LAST   74        4747          AVEGFBIT =        BIT5             DESIRED             NOT DESIRED
A0737

A0738                                                           BIT 4  FLAG 7    (S)
 0739                             0164          UPLOCKFL =        116D             K-KBAR-K FAIL       NO K-KBAR-K FAIL
 0740   REF   6  LAST   75        4750          UPLOCBIT =        BIT4
A0741

A0742                                                           BIT 3  FLAG 7    (S)
 0743                             0165          VERIFLAG =        117D             CHANGED WHEN V33E OCCURS AT END OF R27
 0744   REF   8  LAST   76        4751          VERIFBIT =        BIT3
A0745

A0746                                                           BIT 2  FLAG 7    (L,C)
 0747                             0166          V82EMFLG =        118D             MOON VICINITY       EARTH VICINITY
 0748   REF   7  LAST   76        4752          V82EMBIT =        BIT2
A0749

A0750                                                           BIT 1  FLAG 7    (S)
 0751                             0167          TFFSW    =        119D             CALCULATE TPERIGEE  CALCULATE TFF
 0752   REF   7  LAST   77        4753          TFFSWBIT =        BIT1
A0753

 0754   REF   9  LAST   77        0104          FLAGWRD8 =        STATE +8D        (120-134)

A0755                                                                            (SET)               (RESET)

A0756                                                           BIT 15  FLAG 8   (S)
 0757                             0170          RPQFLAG  =        120D             RPQ NOT COMPUTED    RPQ COMPUTED
A0758                                                                            (RPQ = VECTOR BE-
 0759   REF   9  LAST   77        4735          RPQFLBIT =        BIT15            TWEEN SECONDARY BODY
A0760                                                                            AND PRIMARY BODY
A0761

A0762                                                           BIT 14  FLAG 8
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A0763                                                        =      121D
A0764                                                        =      BIT14
A0765

A0766                                                               BIT 13 FLAG 8    (S)
 0767                             0172          NEWIFLG      =      122D             FIRST PASS THROUGH   SUCCEEDING ITERATION
 0768   REF  10  LAST    77       4737          NEWIBIT      =      BIT13            INTEGRATION          OF INTEGRATION
A0769

A0770                                                               BIT 12 FLAG 8    *** PROTECTED FROM FRESH START ***
 0771                             0173          CMOONFLG     =      123D             PERMANENT CSM STATE PERMANENT CSM STATE
 0772   REF   9  LAST    77       4740          CMOONBIT     =      BIT12            IN LUNAR SPHERE      IN EARTH SPHERE
A0773

A0774                                                               BIT 11 FLAG 8    *** PROTECTED FROM FRESH START ***
 0775                             0174          LMOONFLG     =      124D             PERMANENT LM STATE   PERMANENT LM STATE
 0776   REF   8  LAST    77       4741          LMOONBIT     =      BIT11            IN LUNAR SPHERE      IN EARTH SPHERE
A0777

A0778                                                               BIT 10 FLAG 8    (L)
 0779                             0175          FLUNDISR     =      125D             CURRENT GUIDANCE     CURRENT GUIDANCE
 0780   REF   8  LAST    77       4742          FLUNDBIT     =      BIT10            DISPLAYS INHIBITED   DISPLAYS PERMITTED
A0781

A0782                                                               BIT 9 FLAG 8     (L)
A0783                                                        =      126D
A0784                                                        =      BIT9
A0785

A0786                                                               BIT 8 FLAG 8     *** PROTECTED FROM FRESH START ***
 0787                             0177          SURFFLAG     =      127D             LM ON LUNAR SURFACE LM NOT ON LUNAR
 0788   REF   9  LAST    78       4744          SURFFBIT     =      BIT8                                  SURFACE
A0789

A0790                                                               BIT 7 FLAG 8     (S)
 0791                             0200          INFINFLG     =      128D             NO CONIC SOLUTION    CONIC SOLUTION
A0792                                                                                (CLOSURE THROUGH     EXISTS
 0793   REF   9  LAST    78       4745          INFINBIT     =      BIT7             INFINITY REQUIRED)
A0794

A0795                                                               BIT 6 FLAG 8     (S)
 0796                             0201          ORDERSW      =      129D             ITERATOR USES 2ND    ITERATOR USES 1ST
 0797   REF   9  LAST    78       4746          ORDERBIT     =      BIT6             ORDER MINIMUM MODE   ORDER STANDARD MODE
A0798

A0799                                                               BIT 5 FLAG 8     (S)
 0800                             0202          APSESW       =      130D             RDESIRED OUTSIDE     RDESIRED INSIDE
A0801                                                                                PERICENTER-APOCENTERPERICENTER-APOCENTER
 0802   REF   8  LAST    78       4747          APSESBIT     =      BIT5             RANGE IN TIME-RADI   RANGE IN TIME-RADIUS
A0803
```

```
A0804                                                   BIT 4 FLAG 8    (S)
 0805                        0203         COGAFLAG =    1310            NO CONIC SOLUTION - CONIC SOLUTION
A0806                                                                   TOO CLOSE TO RECTI- EXISTS(COGA DOES NOT
 0807   REF   7  LAST   78   4750         COGAFBIT =    BIT4            LINEAR(COGA OVRFLWS) OVERFLOW)
A0808

A0809                                                   BIT 3 FLAG 8
A0810                                              =    132D

A0811                                                   BIT 2 FLAG 8    (L)
 0812                        0205         INITALGN =    1330            INITIAL PASS THRU   SECOND PASS THRU R57
 0813   REF   8  LAST   78   4752         INITABIT =    BIT2            P57               (CHECK RESET-MILLARD)
A0814

A0815                                                   BIT 1 FLAG 8    (S)
 0816                        0206         360SW    =    134D            TRANSFER ANGLE NEAR TRANSFER ANGLE NOT
 0817   REF   8  LAST   78   4753         360SWBIT =    BIT1            360 DEGREES         NEAR 360 DEGREES
A0818

 0819   REF  10  LAST   78   0105         FLAGWRD9 =    STATE +9D       (135 - 149)

A0820                                                                   (SET)               (RESET)
A0821

A0822                                                   BIT 15 FLAG 9
A0823                                              =    1350
A08231                                             =    BIT15

A0824                                                   BIT 14 FLAG 9   (L)
 0825                        0210         FLVR     =    136D            VERTICAL RISE       NON-VERTICAL RISE
 0826   REF   8  LAST   77   4736         FLVRBIT  =    BIT14           (ASCENT GUIDANCE)
A0827

A0828                                                   BIT 13 FLAG 9
 0829                        0211         P7071FLG =    137D            P70 OR P71 IS USING  R12 IS USING THE
 08295  REF  11  LAST   79   4737         P7071BIT =    BIT13           ASCENT GUID. EQS.   ASCENT GUID. EQS.
A0830

A0831                                                   BIT 12 FLAG 9   (L)
 0832                        0212         FLPC     =    138D            NO POSITION CONTROL  POSITION CONTROL
 0833   REF  10  LAST   79   4740         FLPCBIT  =    BIT12           (ASCENT GUIDANCE)
A0834

A0835                                                   BIT 11 FLAG 9   (L)
 0836                        0213         FLPI     =    139D            PRE-IGNITION PHASE  REGULAR GUIDANCE
 0837   REF   9  LAST   79   4741         FLPIBIT  =    BIT11           (ASCENT GUIDANCE)
A0838

A0839                                                   BIT 10 FLAG 9   (L)
 0840                        0214         FLRCS    =    140D            RCS INJECTION MODE  MAIN ENGINE MODE
```

```
0841     REF  9  LAST  79      4742          FLRCSBIT  =   BIT10           (ASCENT GUIDANCE)
A0842

A0843                                                      BIT 9 FLAG 9    (L)
0844                           0215          LETABORT  =   141D            ABORT PROGRAMS       ABORT PROGRAMS
0845     REF  8  LAST  77      4743          LETABBIT  =   BIT9            ARE ENABLED          ARE NOT ENABLED
A0846

A0847                                                      BIT 8 FLAG 9    (L)
0848                           0216          FLAP      =   142D            APS CONTINUED ABORT  APS ABORT IS NOT A
A0849                                                                      AFTER DPS STAGING    CONTINUATION
0850     REF 10  LAST  79      4744          FLAPBIT   =   BIT8            (ASCENT GUIDANCE)
A0851

A0852                                                      BIT 7 FLAG 9    (L)
0853                           0217          ABTTGFLG  =   143D            J2,K2 PARAMETERS     J1,K1 PARAMETERS
08535    REF 10  LAST  79      4745          ABTTGBIT  =   BIT7            USED FOR ABORT       USED FOR ABORT
A08537                                                                     TARGETING            TARGETING

A0854                                                      BIT 6 FLAG 9    (L)
0855                           0220          ROTFLAG   =   144D            P70 AND P71 WILL     P70 AND P71 WILL NOT
0856     REF 10  LAST  79      4746          ROTFLBIT  =   BIT6            FORCE VEHICLE        FORCE VEHICLE
A0857                                                                      ROTATION IN THE      ROTATION IN THE
A0858                                                                      PREFERRED DIRECTION. PREFERRED DIRECTION

A0859                                                      BIT 5 FLAG 9    (S)
0860                           0221          QUITFLAG  =   145D            DISCONTINUE INTEGR.  CONTINUE INTEGRATION
0861     REF  9  LAST  79      4747          QUITBIT   =   BIT5
A0862

A0863                                                      BIT 4 FLAG 9
A0864                                                  =   146D
A0865                                                  =   BIT4
A0866

A0867                                                      BIT 3 FLAG 9    (L)
0868                           0223          MID1FLAG  =   147D            INTEGRATE TO TDEC    INTEGRATE TO THE
0869     REF  9  LAST  78      4751          MID1FBIT  =   BIT3                                 THEN-PRESENT TIME
A0870

A0871                                                      BIT 2 FLAG 9    (L)
0872                           0224          MIDAVFLG  =   148D            INTEGRATION ENTERED  INTEGRATION WAS
A0873                                                                      FROM ONE OF MIDTOAV  NOT ENTERED VIA
0874     REF  9  LAST  80      4752          MIDAVBIT  =   BIT2            PORTALS              MIDTOAV
A0875
A0876                                                      BIT 1 FLAG 9    (S)
0877                           0225          AVEMIDSW  =   149D            AVETOMID CALLING     NO AVETOMID W INTEGR
A0878                                                                      FOR W.MATRIX INTEGR  ALLOW SET UP RN,VN,
0879     REF  9  LAST  80      4753          AVEMDBIT  =   BIT1            DONT WRITE OVER RN,  PIPTIME
A0880                                                                      VN,PIPTIME
```

```
A0881

 0882  REF   1                 0106          RASFLAG  EQUALS FLGWRD10      WAS ONLY AN INSTALL- ERASTALL FLAG
A0883

 0884  REF  11  LAST   80      0106          FLGWRD10 =      STATE +10D    (150 - 164)

A0885                                                                      (SET)                (RESET)

A0886                                                        BIT 15 FLAG 10
A0887                                                 =      150D
A0888

A0889                                                        BIT 14 FLAG 10  (L,C)
 0890                          0227          INTFLAG  =      151D            INTEGRATION IN       INTEGRATION NOT IN
 0891  REF   9  LAST   80      4736          INTFLBIT =      BIT14           PROGRESS             PROGRESS
A0892

A0893                                                        BIT 13 FLAG 10  (S,L)
 0894                          0230          APSFLAG  =      152D            ASCENT STAGE         DESCENT STAGE
 0895  REF  12  LAST   80      4737          APSFLBIT =      BIT13           ***PROTECTED FROM FRESH START ***
A0896

A0897                                                        BIT 12 FLAG 10
A0898                                                 =      153D
A0899

A0900                                                        BIT 11 FLAG 10
A0901                                                 =      154D
A0902

A0903                                                        BIT 10 FLAG 10
A0904                                                 =      155D
A0905

A0906                                                        BIT  9 FLAG 10
A0907                                                 =      156D
A0908

A0909                                                        BIT  8 FLAG 10
A0910                                                 =      157D
A0911

A0912                                                        BIT 7 FLAG 10   (L,C)
 0913                          0236          REINTFLG =      158D            INTEGRATION ROUTINE  INTEGRATION ROUTINE
 0914  REF  11  LAST   81      4745          REINTBIT =      BIT7            TO BE RESTARTED      NOT TO BE RESTARTED
A0915

A0916                                                        BIT  6 FLAG 10
A0917                                                 =      159D
```

```
A0918

A0919                                                        BIT  5 FLAG 10
A0920                                                 =      160D
A0921

A0922                                                        BIT  4 FLAG 10
A0923                                                 =      161D
A0924

A0925                                                        BIT  3 FLAG 10
A0926                                                 =      162D
A0927

A0928                                                        BIT  2 FLAG 10
A0929                                                 =      163D
A0930

A0931                                                        BIT  1 FLAG 10
A0932                                                 =      164D
A0933

A0934


 0935   REF  12  LAST   82       0107        FLGWRD11 =      STATE +11D       (165 - 179)

A0936                                                                         (SET)                (RESET)

A0937                                                        BIT 15 FLAG 11   (L)(R12)
 0938                            0245        LRBYPASS =      165D             BYPASS ALL LANDING   DO NOT BYPASS LR
 0939   REF  10  LAST   78       4735        LRBYBIT  =      BIT15            RADAR UPDATES        UPDATES
A0940

A0941                                                        BIT 14 FLAG 11
A0942                                                 =      166D
A0943                                                 =      BIT14
A0944

A0945                                                 =      BIT 13 FLAG 11
A0946                                                 =      167D
A0947                                                 =      BIT13
A0948

A0949                                                        BIT 12 FLAG 11   (L)(R12)
 0950                            0250        VXINH    =      168D             IF Z VELOCITY DATA   UPDATE X AXIS
A0951                                                                         UNREASONABLE,        VELOCITY
 0952   REF  11  LAST   80       4740        VXINHBIT =      BIT12            BYPASS X VELOCITY
A0953                                                                         UPDATE ON NEXT PASS
```

```
A0954                                                    BIT 11 FLAG 11   (L)(R12)
 0955                       0251       PSTHIGAT =        169D             PAST HIGATE          PREHIGATE
 0956   REF  10  LAST  80   4741       PSTHIBIT =        BIT11
A0957

A0958                                                    BIT 10 FLAG 11   (L)(R12)
 0959                       0252       NOLRREAD =        170D             LANDING RADAR        LR NOT REPOSITIONING
A0960                                                                     REPOSITIONING;
 0961   REF  10  LAST  81   4742       NOLRRBIT =        BIT10            BYPASS UPDATE
A0962

A0963                                                    BIT 9 FLAG 11    (L)(R12)
 0964                       0253       XORFLG   =        171D             BELOW LIMIT          ABOVE LIMIT DO
A0965                                                                     INHIBIT X AXIS       NOT INHIBIT
 0966   REF   9  LAST  81   4743       XORFLBIT =        BIT9             OVERRIDE
A0967

A0968                                                    BIT 8 FLAG 11
 0969                       0254       LRINH    =        172D             LANDING RADAR UP-    LR UPDATES INHIBITED
 0970   REF  11  LAST  81   4744       LRINHBIT =        BIT8             DATES PERMITTED      BY ASTRONAUT
A0971                                                                     BY ASTRONAUT
A0972

A0973                                                    BIT 7 FLAG 11    (L)(R12)
 0974                       0255       VELDATA  =        173D             LR VELOCITY          LR VELOCITY MEASURE
 0975   REF  12  LAST  82   4745       VELDABIT =        BIT7             MEASUREMENT MADE     NOT MADE
A0976

A0977                                                    BIT 6 FLAG 11    (L)(R12)
 0978                       0256       LPOS2FLG =        174D             USE LR POSITION 2    USE LR POSITION 1
 0979   REF  11  LAST  81   4746       LPOS2BIT =        BIT6             TRANSFORMATION        TRANSFORMATION
A0980

A0981                                                    BIT 5 FLAG 11    (L)(R12)
 0982                       0257       READVEL  =        175D             OK TO READ LR        DO NOT READ LR
 0983   REF  10  LAST  81   4747       READVBIT =        BIT5             VELOCITY DATA        VELOCITY DATA
A0984

A0985                                                    BIT 4 FLAG 11    (L)(R12)
 0986                       0260       RNGEDATA =        176D             LR ALTITUDE          LR ALTITUDE MEASURE
 0987   REF   8  LAST  80   4750       RNGEDBIT =        BIT4             MEASUREMENT MADE     NOT MADE
A0988

A0989                                                    BIT 3 FLAG 11
 0990                       0261       NO511FLG =        177D             DO NOT TEST LR       TEST LR ANTENNA
 0991   REF  10  LAST  81   4751       NO511BIT =        BIT3             ANTENNA POS IN R12     POS IN R12
A0993

A0994                                                    BIT 2 FLAG 11    (L)(R12)
 0995                       0262       VFLSHFLG =        178D             LR VELOCITY FAIL     LR VEL FAIL LAMP
```

```
L          FLAGWORD ASSIGNMENTS                                                    USER'S PAGE NO. 25       EQ S4

 0996     REF  10  LAST   81     4752           VFLSHBIT =       BIT2             LAMP SHOULD BE       SHOULDN'T FLASH
A0997                                                                             FLASHING
A0998

A0999                                                           BIT 1  FLAG 11    (L)(R12)
 1000                            0263           HFLSHFLG =      179D              LR ALTITUDE FAIL     LR ALTITUDE FAIL
 1001     REF  10  LAST   81     4753           HFLSHBIT =      BIT1              LAMP SHOULD BE       LAMP SHOULD NOT BE
A1002                                                                             FLASHING             FLASHING
A1003

 1004     REF   1                0110         ( RADMODES EQUALS FLGWRD12          RADAR FLAG WORD )
A1005

 1006     REF  13  LAST   83     0110           FLGWRD12 =      STATE +12D        (180 - 194)     WAS RADMODES

A1007                                                                             (SET)                (RESET)

A1008                                                           BIT 15 FLAG 12
 1009                            0264           CDESFLAG =      180D              CONTINUOUS DESIG-    LGC CHECKS FOR LOCK-
 1010     REF  11  LAST   83     4735           CDESBIT  =      BIT15             NATE, LGC COMMANDS   ON WHEN ANTENNA
A1011                                                                             RR REGARDLESS OF     BEING DESIGNATED
A1012                                                                             LOCK-ON
A1013

A1014                                                           BIT 14 FLAG 12
 1015                            0265           REMODFLG =      181D              CHANGE IN ANTENNA    NO REMODE REQUESTED
 1016     REF  10  LAST   82     4736           REMODBIT =      BIT14             MODE BEEN REQUESTED  OR OCCURRING
A1017                                                                             I.E., REMODE
A1018

A1019                                                           BIT 13 FLAG 12
 1020                            0266           RCDU0FLG =      182D              RR CDU'S BEING       RR CDU'S NOT BEING
 1021     REF  13  LAST   82     4737           RCDU0BIT =      BIT13             ZEROED               ZEROED
A1022

A1023                                                           BIT 12 FLAG 12
 1024                            0267           ANTENFLG =      183D              RR ANTENNA MODE IS   RR ANTENNA IN MODE 1
 1025     REF  12  LAST   83     4740           ANTENBIT =      BIT12             MODE 2
A1026

A1027                                                           BIT 11 FLAG 12
 1028                            0270           REPOSMON =      184D              REPOSITION MONITOR.  NO REPOSITION TAKING
 1029     REF  11  LAST   84     4741           REPOSBIT =      BIT11             RR REPOSITION IS     PLACE
A1030                                                                             TAKING PLACE
A1031

A1032                                                           BIT 10 FLAG 12
 1033                            0271           DESIGFLG =      185D              RR DESIGNATE         RR DESIGNATE NOT
 1034     REF  11  LAST   84     4742           DESIGBIT =      BIT10             REQUESTED OR IN      REQUESTED OR IN
A1035                                                                             PROGRESS             PROGRESS
```

```
A1036

A1037                                                    BIT 9 FLAG 12
 1038                      0272          ALTSCALE =      186D            LR ALTITUDE READING LR ALTITUDE READING
 1039   REF  10  LAST  84  4743          ALTSCBIT =      BIT9            IS ON HIGH SCALE    IS ON LOW SCALE
A1040

A1041                                                    BIT 8 FLAG 12
 1042                      0273          LRVELFLG =      187D            LR VELOCITY DATA    NO LR VELOCITY DATA
 1043   REF  12  LAST  84  4744          LRVELBIT =      BIT8            FAIL                FAIL
A1044

A1045                                                    BIT 7 FLAG 12
 1046                      0274          RCDUFAIL =      188D            RR CDU FAIL HAS     RR CDU FAIL OCCURRED
 1047   REF  13  LAST  84  4745          RCDUFBIT =      BIT7            NOT OCCURRED
A1048

A1049                                                    BIT 6 FLAG 12
 1050                      0275          LRPOSFLG =      189D            LANDING RADAR       LR POSITION 1
 1051   REF  12  LAST  84  4746          LRPOSBIT =      BIT6            POSITION 2
A1052

A1053                                                    BIT 5 FLAG 12
 1054                      0276          LRALTFLG =      190D            LR ALTITUDE DATA    NO LR ALTITUDE DATA
 1055   REF  11  LAST  84  4747          LRALTBIT =      BIT5            FAIL. COULD NOT BE  FAIL
A1056                                                                    READ SUCCESSFULLY.
A1057

A1058                                                    BIT 4 FLAG 12
 1059                      0277          RRDATAFL =      191D            RR DATA FAIL.       NO RR DATA FAIL.
 1060   REF   9  LAST  84  4750          RRDATABT =      BIT4            DATA COULD NOT BE
A1061                                                                    READ SUCCESSFULLY
A1062

A1063                                                    BIT 3 FLAG 12
 1064                      0300          RRRSFLAG =      192D            RR RANGE READING    RR RANGE READING ON
 1065   REF  11  LAST  84  4751          RRRSBIT  =      BIT3            ON THE HIGH SCALE   THE LOW SCALE
A1066

A1067                                                    BIT 2 FLAG 12
 1068                      0301          AUTOMODE =      193D            RR NOT IN AUTO MODE. RR IN AUTO MODE
 1069   REF  11  LAST  85  4752          AUTOMBIT =      BIT2            AUTO MODE DISCRETE
A1070                                                                    IS NOT PRESENT
A1071

A1072                                                    BIT 1 FLAG 12
 1073                      0302          TURNONFL =      194D            RR TURN-ON SEQUENCE NO RR TURN-ON
 1074   REF  11  LAST  85  4753          TURNONBT =      BIT1            IN PROGRESS. (ZERO  SEQUENCE IN PROGRESS
A1075                                                                    CDU'S, FIX ANTENNA
A1076                                                                    MODE)
```

```
A1077

 1078    REF   1                0111          DAPBOOLS EQUALS FLGWRD13      DIGITAL AUTOPILOT FLAGWORD
A1079

 1080    REF  14   LAST   85    0111          FLGWRD13 =      STATE +13D    (195 - 209)      WAS DAPBOOLS

A1081                                                                       (SET)                (RESET)

A1082                                                         BIT 15 FLAG 13
 1083                           0303          PULSEFLG =      195D          MINIMUM IMPULSE      NOT IN MINIMUM
 1084    REF  12   LAST   85    4735          PULSES   =      BIT15         COMMAND MODE IN      IMPULSE COMMAND MODE
A1085                                                                       "ATT HOLD" (V76)     (V77)
A1086

A1087                                                         BIT 14 FLAG 13
 1088                           0304          USEQRFLG =      196D          GIMBAL UNUSABLE.     TRIM GIMBAL MAY BE
 1089    REF  11   LAST   85    4736          USEQRJTS =      BIT14         USE JETS ONLY.       USED.
A1090

A1091                                                         BIT 13 FLAG 13
 1092                           0305          CSMDKFLG =      197D          CSM DOCKED. USE      CSM NOT DOCKED TO LM
 1093    REF  14   LAST   85    4737          CSMDOCKD =      BIT13         BACKUP DAP
A1094

A1095                                                         BIT 12 FLAG 13
 1096                           0306          OURRCFLG =      198D          CURRENT DAP PASS     CURRENT DAP PASS IS
 1097    REF  13   LAST   85    4740          OURRCBIT =      BIT12         IS RATE COMMAND      NOT RATE COMMAND
A1098

A1099                                                         BIT 11 FLAG 13
 1100                           0307          ACC4-2FL =      199D          4 JET X-AXIS TRANS-  2 JET X-AXIS TRANS-
 1101    REF  12   LAST   85    4741          ACC4OR2X =      BIT11         LATION REQUESTED     LATION REQUESTED
A1102

A1103                                                         BIT 10 FLAG 13
 1104                           0310          AORBTFLG =      200D          B SYSTEM FOR X-      A SYSTEM FOR X-
 1105    REF  12   LAST   85    4742          AORBTRAN =      BIT10         TRANSLATION          TRANSLATION PREFER'D
A1106

A1107                                                         BIT 9 FLAG 13
 1108                           0311          XOVINFLG =      201D          X-AXIS OVERRIDE      X-AXIS OVERRIDE OKAY
 1109    REF  11   LAST   86    4743          XOVINHIB =      BIT9          LOCKED OUT
A1110

A1111                                                         BIT 8 FLAG 13
 1112                           0312          DRIFTDFL =      202D          ASSUME 0 OFFSET      USE OFFSET ACCELERA-
 1113    REF  13   LAST   86    4744          DRIFTBIT =      BIT8          DRIFTING FLIGHT.     TION ESTIMATE
A1114
```

```
A1115                                                    BIT 7 FLAG 13
 1116                      0313          RHCSCFLG =      203D            NORMAL RHC SCALING   FINE RHC SCALING
 1117   REF  14  LAST   86 4745          RHCSCALE =      BIT7            REQUESTED            REQUESTED
A1118

A1119                                                    BIT 6 FLAG 13
 1120                      0314          ULLAGFLG =      204D            ULLAGE REQUEST BY    NO INTERNAL ULLAGE
 1121   REF  13  LAST   86 4746          ULLAGER  =      BIT6            MISSION PROGRAM      REQUEST
A1122

A1123                                                    BIT 5 FLAG 13
 1124                      0315          DBSL2FLG =      205D            5 DEG DEADBAND       1 OR .3 DEG DEADBAND
 1125   REF  12  LAST   86 4747          DBSLECT2 =      BIT5            SELECTED BY CREW     SELECTED BY CREW
A1125.1                                                                                       (SEE BIT4 DAPBOOLS)
A1126

A1127                                                    BIT 4 FLAG 13
 1128                      0316          DBSELFLG =      206D            1 DEG DEADBAND       MIN DB SELECTED BY
 1129   REF  10  LAST   86 4750          DBSELECT =      BIT4            SELECTED BY CREW     CREW (0.3 DEG)
A1130

A1131                                                    BIT 3 FLAG 13
 1132                      0317          ACCOKFLG =      207D            CONTROL AUTHORITY    RESTART OR FRESH ST.
 1133   REF  12  LAST   86 4751          ACCSOKAY =      BIT3            VALUES FROM 1/ACCS   SINCE LAST 1/ACCS;
A1134                                                                    USABLE               OUTPUTS SUSPECT.
A1135

A1136                                                    BIT 2 FLAG 13
 1137                      0320          AUTR2FLG =      208D            THESE FLAGS ARE USED TOGETHER TO INDICAT
 1138   REF  12  LAST   86 4752          AUTRATE2 =      BIT2            ASTRONAUT-CHOSEN KALCMANU MANEUVER RATES
A1139                                                                    (0,0)=(BIT2,BIT1)= 0.2 DEG/SEC
A1140                                                                    (0,1)=  0.5 DEG/SEC
A1141                                                    BIT 1 FLAG 13
 1142                      0321          AUTR1FLG =      209D            (1,0)=  2.0 DEG/SEC
 1143   REF  12  LAST   86 4753          AUTRATE1 =      BIT1            (1,1)= 10.0 DEG/SEC
A1144
```

```
L        SUBROUTINE CALLS                                                          USER'S PAGE NO.   1        EO S4

 0001   *                         0000                    SUBRO  LUMERASE  134
 0002   *                         0000                    SUBRO  LEMONAID  104
 0003   *                         0000                    SUBRO  LEMP20S   145
 0004   *                         0000                    SUBRO  LEMP30S   105
 0005   *                         0000                    SUBRO  KISSING   055
 0006   *                         0000                    SUBRO  FLY       153
 0007   *                         0000                    SUBRO  LEMP50S   119
 0008   *                         0000                    SUBRO  SKIPPER   101
 0009   *                         0000                    SUBRO  LMDAP     025


*** END OF MAIN PROGRAM ***
```

```
R0001   CONVENTIONS AND NOTATIONS UTILIZED FOR ERASABLE ASSIGNMENTS.

R0002             EQUALS IS USED IN TWO WAYS.  IT IS OFTEN USED TO CHAIN A GROUP
R0003                    OF ASSIGNMENTS SO THAT THE GROUP MAY BE MOVED WITH THE
R0004                    CHANGING OF ONLY ONE CARD.   EXAMPLE.

A0005                                           X         EQUALS START
A0006                                           Y         EQUALS X          +SIZE.X
A0007                                           Z         EQUALS Y          +SIZE.Y

R0008                    (X, Y, AND Z ARE CONSECUTIVE AND BEGIN AT START.        )
R0009                    (SIZE.X AND SIZE.Y ARE THE RESPECTIVE SIZES OF X AND Y,
R0010                     USUALLY NUMERIC,  IE. 1, 2, 6, 18D ETC.                )

R0011             EQUALS OFTEN IMPLIES THE SHARING OF REGISTERS (DIFFERENT NAMES
R0012                    AND DIFFERENT DATA).  EXAMPLE.

A0013                                           X         EQUALS Y

R0014             = MEANS THAT MULTIPLE NAMES HAVE BEEN GIVEN TO THE SAME DATA.
R0015                    (THIS IS LOGICAL EQUIVALENCE, NOT SHARING)  EXAMPLE.

A0016                                           X         =         Y

R0017             THE SIZE AND UTILIZATION OF AN ERASABLE ARE OFTEN INCLUDED IN
R0018             THE COMMENTS IN THE FOLLOWING FORM.  M(SIZE)N.

R0019                    M REFERS TO THE MOBILITY OF THE ASSIGNMENT.
R0020                         B    MEANS THAT THE SYMBOL IS REFERENCED BY BASIC
R0021                              INSTRUCTIONS AND THUS IS E-BANK SENSITIVE.
R0022                         I    MEANS THAT THE SYMBOL IS REFERENCED ONLY BY
R0023                              INTERPRETIVE INSTRUCTIONS, AND IS THUS E-BANK
R0024                              INSENSITIVE AND MAY APPEAR IN ANY E-BANK.

R0025                    SIZE IS THE NUMBER OF REGISTERS INCLUDED BY THE SYMBOL.

R0026                    N INDICATES THE NATURE OR PERMANENCE OF THE CONTENTS.
R0027                         PL   MEANS THAT THE CONTENTS ARE PAD LOADED.
R0028                         DSP  MEANS THAT THE REGISTER IS USED FOR A DISPLAY.
R0029                         PRM  MEANS THAT THE REGISTER IS PERMANENT, IE. IT
R0030                              IS USED DURING THE ENTIRE MISSION FOR ONE
R0031                              PURPOSE AND CANNOT BE SHARED.
R0032                         TMP  MEANS THAT THE REGISTER IS USED TEMPORARILY OR
R0033                              IS A SCRATCH REGISTER FOR THE ROUTINE TO WHICH
R0034                              IT IS ASSIGNED.  THAT IS, IT NEED NOT BE SET
R0035                              PRIOR TO INVOCATION OF THE ROUTINE NOR DOES IT
R0036                              CONTAIN USEFUL OUTPUT TO ANOTHER ROUTINE.  THUS
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R0037                            ' IT MAY BE SHARED WITH ANY OTHER ROUTINE WHICH
R0038                              IS NOT ACTIVE IN PARALLEL.
R0039                          IN  MEANS INPUT TO THE ROUTINE AND IT IS PROBABLY
R0040                              TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
R0041                          OUT MEANS OUTPUT FROM THE ROUTINE, PROBABLY
R0042                              TEMPORARY FOR A HIGHER-LEVEL ROUTINE/PROGRAM.
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P0043            SPECIAL REGISTERS.

 0044                       0000           A          EQUALS 0
 0045                       0001           L          EQUALS 1           L AND Q ARE BOTH CHANNELS AND REGISTERS.
 0046                       0002           Q          EQUALS 2
 0047                       0003           EBANK      EQUALS 3
 0048                       0004           FBANK      EQUALS 4
 0049                       0005           Z          EQUALS 5           ADJACENT TO FBANK AND BBANK FOR DXCH Z
 0050                       0006           BBANK      EQUALS 6           (DTCB) AND DXCH FBANK (DTCF).
A0051                                                                     REGISTER 7 IS A ZERO-SOURCE, USED BY ZL.

 0052                       0010           ARUPT      EQUALS 10          INTERRUPT STORAGE.
 0053                       0011           LRUPT      EQUALS 11
 0054                       0012           QRUPT      EQUALS 12
 0055                       0013           SAMPTIME   EQUALS 13          SAMPLED TIME 1 & 2.
 0056                       0015           ZRUPT      EQUALS 15          (13 AND 14 ARE SPARES.)
 0057                       0016           BANKRUPT   EQUALS 16          USUALLY HOLDS FBANK OR BBANK.
 0058                       0017           BRUPT      EQUALS 17          RESUME ADDRESS AS WELL.

 0059                       0020           CYR        EQUALS 20
 0060                       0021           SR         EQUALS 21
 0061                       0022           CYL        EQUALS 22
 0062                       0023           EDOP       EQUALS 23          EDITS INTERPRETIVE OPERATION CODE PAIRS.


 0063                       0024           TIME2      EQUALS 24
 0064                       0025           TIME1      EQUALS 25
 0065                       0026           TIME3      EQUALS 26
 0066                       0027           TIME4      EQUALS 27
 0067                       0030           TIME5      EQUALS 30
 0068                       0031           TIME6      EQUALS 31
 0069                       0032           CDUX       EQUALS 32
 0070                       0033           CDUY       EQUALS 33
 0071                       0034           CDUZ       EQUALS 34
 0072                       0035           CDUT       EQUALS 35          REND RADAR TRUNNION CDU
 0073                       0036           CDUS       EQUALS 36          REND RADAR SHAFT CDU
 0074                       0037           PIPAX      EQUALS 37
 0075                       0040           PIPAY      EQUALS 40
 0076                       0041           PIPAZ      EQUALS 41
 0077                       0042           Q-RHCCTR   EQUALS 42          RHC COUNTER REGISTERS
 0078                       0043           P-RHCCTR   EQUALS 43
 0079                       0044           R-RHCCTR   EQUALS 44
 0080                       0045           INLINK     EQUALS 45
 0081                       0046           RNRAD      EQUALS 46
 0082                       0047           GYROCMD    EQUALS 47
 0083                       0050           CDUXCMD    EQUALS 50
 0084                       0051           CDUYCMD    EQUALS 51
 0085                       0052           CDUZCMD    EQUALS 52
 0086                       0053           CDUTCMD    EQUALS 53          RADAR TRUNNION COMMAND
 0087                       0054           CDUSCMD    EQUALS 54          RADAR SHAFT COMMAND
 0088                     0055        THRUST   EQUALS 55
 0089                     0056        LEMONM   EQUALS 56
 0090                     0057        OUTLINK  EQUALS 57
 0091                     0060        ALTM     EQUALS 60

R0092           INTERPRETIVE REGISTERS ADDRESSED RELATIVE TO VAC AREA.

 0093                     0042        LVSQUARE EQUALS 34D         SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
 0094                     0044        LV       EQUALS 36D         LENGTH OF VECTOR INPUT TO UNIT.
 0095                     0046        X1       EQUALS 38D         INTERPRETIVE SPECIAL REGISTERS RELATIVE
 0096                     0047        X2       EQUALS 39D         TO THE WORK AREA.
 0097                     0050        S1       EQUALS 40D
 0098                     0051        S2       EQUALS 41D
 0099                     0052        QPRET    EQUALS 42D

R0100   INPUT/OUTPUT CHANNELS

A0101                                   *** CHANNEL ZERO IS TO BE USED IN AN INDEXED OPERATION ONLY. ***
 0102   REF   1           0001        LCHAN    EQUALS L
 0103   REF   1           0002        QCHAN    EQUALS Q
 0104                     0003        HISCALAR EQUALS 3
 0105                     0004        LOSCALAR EQUALS 4
 0106                     0005        CHAN5    EQUALS 5
 0107                     0006        CHAN6    EQUALS 6
 0108                     0007        SUPERBNK EQUALS 7           SUPER-BANK.
 0109                     0010        OUT0     EQUALS 10
 0110                     0011        DSALMOUT EQUALS 11
 0111                     0012        CHAN12   EQUALS 12
 0112                     0013        CHAN13   EQUALS 13
 0113                     0014        CHAN14   EQUALS 14
 0114                     0015        MNKEYIN  EQUALS 15
 0115                     0016        NAVKEYIN EQUALS 16
 0116                     0030        CHAN30   EQUALS 30
 0117                     0031        CHAN31   EQUALS 31
 0118                     0032        CHAN32   EQUALS 32
 0119                     0033        CHAN33   EQUALS 33
 0120                     0034        DNTM1    EQUALS 34
 0121                     0035        DNTM2    EQUALS 35
R0122   END OF CHANNEL ASSIGNMENTS
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P0123   INTERPRETIVE SWITCH BIT ASSIGNMENTS
A0124

R0125                 **  FLAGWCRDS AND BITS NOW ASSIGNEC AND DEFINED IN THEIR OWN LOG SECTION.  **
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L        ERASABLE ASSIGNMENTS                                                                     USER'S PAGE NO.   6      EO S4

P0127    GENERAL ERASABLE ASSIGNMENTS.

 0128                                 0061                  SETLOC 61
R0129              INTERRUPT TEMPORARY STORAGE POOL.                                        (11D)

R0131                (ITEMP1 THROUGH RUPTREG4)

R0132              ANY OF THESE MAY BE USED AS TEMPORARIES DURING INTERRUPT OR WITH INTERRUPT INHIBITED. THE ITEMP SERIES
P0134    IS USED DURING CALLS TO THE EXECUTIVE AND WAITLIST - THE RUPTREGS ARE NOT.

 0136                                 0061      0061     ITEMP1    ERASE
 0137    REF   1                      0061               WAITEXIT  EQUALS  ITEMP1
 0138    REF   2  LAST    95          0061               EXECTEM1  EQUALS  ITEMP1

 0139                                 0062      0062     ITEMP2    ERASE
 0140    REF   1                      0062               WAITBANK  EQUALS  ITEMP2
 0141    REF   2  LAST    95          0062               EXECTEM2  EQUALS  ITEMP2

 0142                                 0063      0063     ITEMP3    ERASE
 0143    REF   1                      0063               RUPTSTOR  EQUALS  ITEMP3
 0144    REF   2  LAST    95          0063               WAITADR   EQUALS  ITEMP3
 0145    REF   3  LAST    95          0063               NEWPRIO   EQUALS  ITEMP3

 0146                                 0064      0064     ITEMP4    ERASE
 0147    REF   1                      0064               LOCCTR    EQUALS  ITEMP4
 0148    REF   2  LAST    95          0064               WAITTEMP  EQUALS  ITEMP4

 0149                                 0065      0065     ITEMP5    ERASE
 0150    REF   1                      0065               NEWLOC    EQUALS  ITEMP5

 0151                                 0066      0066     ITEMP6    ERASE
A0152                                                    NEWLOC+1  EQUALS  ITEMP6          DP ADDRESS.

 0153                                 0067                         SETLOC 67
 0154                                 0067      0067     NEWJOB    ERASE                   MUST BE AT LOC 67 DUE TO WIRING.


 0155                                 0070      0070     RUPTREG1  ERASE
 0156                                 0071      0071     RUPTREG2  ERASE
 0157                                 0072      0072     RUPTREG3  ERASE
 0158                                 0073      0073     RUPTREG4  ERASE
 0159    REF   1                      0073               KEYTEMP1  EQUALS  RUPTREG4
 0160    REF   2  LAST    95          0073               DSRUPTEM  EQUALS  RUPTREG4

R0161              FLAGWORD RESERVATIONS.                                                   (16D)

 0163                                 0074      0113     STATE     ERASE           +15D     FLAGWORD REGISTERS.
A0164

R0165              P25 RADAR STORAGE.  (MAY BE UNSHARED IN E7)  (TEMP OVERLAY)    (2D)    OVERLAYS FLGWRD 14 & 15
```

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 0167  REF 15  LAST  87    0112              LASTYCMD EQUALS STATE     +14D   B(1)PRM   THESE ARE CALLED BY T4RUPT
 0168  REF  1              0113              LASTXCMD EQUALS LASTYCMD  +1     B(1)PRM   THEY MUST BE CONTIGUOUS,Y FIRST
A0169


R0170              EXEC TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOBS.  (32D) (INTB15+ THROUGH RUPTMXTM)
 0172                      0114     0114     INTB15+  ERASE                     REFLECTS 15TH BIT OF INDEXABLE ADDRESSES
 0173  REF  1              0114              DSEXIT   =      INTB15+            RETURN FOR DSPIN
 0174  REF  2  LAST  96    0114              EXITEM   =      INTB15+            RETURN FOR SCALE FACTOR ROUTINE SELECT
 0175  REF  3  LAST  96    0114              BLANKRET =      INTB15+            RETURN FOR 2BLANK

 0176                      0115     0115     INTBIT15 ERASE                     SIMILAR TO ABOVE.
 0177  REF  1              0115              WRDRET   =      INTBIT15           RETURN FOR 5BLANK
 0178  REF  2  LAST  96    0115              WDRET    =      INTBIT15           RETURN FOR DSPWD
 0179  REF  3  LAST  96    0115              DECRET   =      INTBIT15           RETURN FOR PUTCOM(DEC LOAD)
 0180  REF  4  LAST  96    0115              21/22REG =      INTBIT15           TEMP FOR CHARIN

R0181              THE REGISTERS BETWEEN ADDRWD AND PRIORITY MUST STAY IN THE FOLLOWING ORDER FOR INTERPRETIVE TRACE.

 0183                      0116     0116     ADDRWD   ERASE                     12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.
 0184                      0117     0117     POLISH   ERASE                     HOLDS CADR MADE FROM POLISH ADDRESS.
 0185  REF  1              0117              UPDATRET =      POLISH             RETURN FOR UPDATNN, UPDATVB
 0186  REF  2  LAST  96    0117              CHAR     =      POLISH             TEMP FOR CHARIN
 0187  REF  3  LAST  96    0117              ERCNT    =      POLISH             COUNTER FOR ERROR LIGHT RESET
 0188  REF  4  LAST  96    0117              DECOUNT  =      POLISH             COUNTER FOR SCALING AND DISPLAY (DEC)

 0189                      0120     0120     FIXLOC   ERASE                     WORK AREA ADDRESS.
 0190                      0121     0121     OVFIND   ERASE                     SET NON-ZERO ON OVERFLOW.

 0191                      0122     0127     VBUF     ERASE  +5                 TEMPORARY STORAGE USED FOR VECTORS.
 0192  REF  1              0122              SGNON    =      VBUF               TEMP FOR +,- ON
 0193  REF  2  LAST  96    0122              NOUNTEM  =      VBUF               COUNTER FOR MIXNOUN FETCH
 0194  REF  3  LAST  96    0122              DISTEM   =      VBUF               COUNTER FOR OCTAL DISPLAY VERBS
 0195  REF  4  LAST  96    0122              DECTEM   =      VBUF               COUNTER FOR FETCH (DEC DISPLAY VERBS)

 0196  REF  5  LAST  96    0123              SGNOFF   =      VBUF      +1       TEMP FOR +,- ON
 0197  REF  6  LAST  96    0123              NVTEMP   =      VBUF      +1       TEMP FOR NVSUB
 0198  REF  7  LAST  96    0123              SFTEMP1  =      VBUF      +1       STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
 0199  REF  8  LAST  96    0123              HITEMIN  =      VBUF      +1       TEMP FOR LOAD OF HRS, MIN, SEC
A0200                                                                                   MUST = LOTEMIN-1.
 0201  REF  9  LAST  96    0124              CODE     =      VBUF      +2       FOR DSPIN
 0202  REF 10  LAST  96    0124              SFTEMP2  =      VBUF      +2       STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
 0203  REF 11  LAST  96    0124              LOTEMIN  =      VBUF      +2       TEMP FOR LOAD OF HRS, MIN, SEC
A0204                                                                                   MUST = HITEMIN+1.
 0205  REF 12  LAST  96    0125              MIXTEMP  =      VBUF      +3       FOR MIXNOUN DATA
 0206  REF 13  LAST  96    0125              SIGNRET  =      VBUF      +3       RETURN FOR +,- ON

R0207  ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

 0208                      0130     0132     BUF      ERASE  +2                 TEMPORARY SCALAR STORAGE.
```

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L         ERASABLE ASSIGNMENTS                                                              USER'S PAGE NO.   8       EO S4

 0209                                 0133      0134    BUF2      ERASE  +1
 0210     REF    1                    0130              INDEXLOC  EQUALS BUF           CONTAINS ADDRESS OF SPECIFIED INDEX.
 0211     REF    2   LAST     97      0130              SWWORD    EQUALS BUF           ADDRESS OF SWITCH WORD.
 0212     REF    3   LAST     97      0131              SWBIT     EQUALS BUF +1        SWITCH BIT WITHIN SWITCH WORD.
 0213                                 0135      0135    MPTEMP    ERASE                TEMPORARY USED IN MULTIPLY AND SHIFT.
 0214     REF    1                    0135              DMPNTEMP  =      MPTEMP        DMPSUB TEMPORARY
 0215                                 0136      0136    DOTINC    ERASE                COMPONENT INCREMENT FOR DOT SUBROUTINE.
 0216     REF    1                    0136              DVSIGN    EQUALS DOTINC        DETERMINES SIGN OF DDV RESULT.
 0217     REF    2   LAST     97      0136              ESCAPE    EQUALS DOTINC        USED IN ARCSIN/ARCCOS.
 0218     REF    3   LAST     97      0136              ENTRET    =      DOTINC        EXIT FROM ENTER

 0219                                 0137      0137    DOTRET    ERASE                RETURN FROM DOT SUBROUTINE.
 0220     REF    1                    0137              DVNORMCT  EQUALS DOTRET        DIVIDEND NORMALIZATION COUNT IN DDV.
 0221     REF    2   LAST     97      0137              ESCAPE2   EQUALS DOTRET        ALTERNATE ARCSIN/ARCCOS SWITCH.
 0222     REF    3   LAST     97      0137              WDCNT     =      DOTRET        CHAR COUNTER FOR DSPWD
 0223     REF    4   LAST     97      0137              INREL     =      DOTRET        INPUT BUFFER SELECTOR ( X,Y,Z, REG )

 0224                                 0140      0140    MATINC    ERASE                VECTOR INCREMENT IN MXV AND VXM.
 0225     REF    1                    0140              MAXDVSW   EQUALS MATINC        +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
 0226     REF    2   LAST     97      0140              POLYCNT   EQUALS MATINC        POLYNOMIAL LOOP COUNTER
 0227     REF    3   LAST     97      0140              DSPMMTEM  =      MATINC        DSPCOUNT SAVE FOR DSPMM
 0228     REF    4   LAST     97      0140              MIXBR     =      MATINC        INDICATOR FOR MIXED OR NORMAL NOUN

 0229                                 0141      0141    TEM1      ERASE                EXEC TEMP
 0230     REF    1                    0141              POLYRET   =      TEM1
 0231     REF    2   LAST     97      0141              DSREL     =      TEM1          REL ADDRESS FOR DSPIN

 0232                                 0142      0142    TEM2      ERASE                EXEC TEMP
 0233     REF    1                    0142              DSMAG     =      TEM2          MAGNITUDE STORE FOR DSPIN
 0234     REF    2   LAST     97      0142              IDADDTEM  =      TEM2          MIXNOUN INDIRECT ADDRESS STORAGE

 0235                                 0143      0143    TEM3      ERASE                EXEC TEMP
 0236     REF    1                    0143              COUNT     =      TEM3          FOR DSPIN

 0237                                 0144      0144    TEM4      ERASE                EXEC TEMP
 0238     REF    1                    0144              LSTPTR    =      TEM4          LIST POINTER FOR GRABUSY
 0239     REF    2   LAST     97      0144              RELRET    =      TEM4          RETURN FOR RELDSP
 0240     REF    3   LAST     97      0144              FREERET   =      TEM4          RETURN FOR FREEDSP
 0241     REF    4   LAST     97      0144              DSPWDRET  =      TEM4          RETURN FOR DSPSIGN
 0242     REF    5   LAST     97      0144              SEPSCRET  =      TEM4          RETURN FOR SEPSEC
 0243     REF    6   LAST     97      0144              SEPMNRET  =      TEM4          RETURN FOR SEPMIN

 0244                                 0145      0145    TEM5      ERASE                EXEC TEMP
 0245     REF    1                    0145              NOUNADD   =      TEM5          TEMP STORAGE FOR NOUN ADDRESS

 0246                                 0146      0146    NNADTEM   ERASE                TEMP FOR NOUN ADDRESS TABLE ENTRY
 0247                                 0147      0147    NNTYPTEM  ERASE                TEMP FOR NOUN TYPE TABLE ENTRY
 0248                                 0150      0150    IDAD1TEM  ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0249                                                                                  MUST = IDAD2TEM-1 , = IDAD3TEM-2.
 0250                                 0151      0151    IDAD2TEM  ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
```

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L        ERASABLE ASSIGNMENTS                                                                      USER'S PAGE NO.   9       EO S4

A0251                                                                               MUST = IDAD1TEM+1 , = IDAD3TEM-1.
 0252                                0152     0152    IDAD3TEM ERASE                TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0253                                                                               MUST = IDAD1TEM+2, = IDAD2TEM+1.
 0254                                0153     0153    RUTMXTEM ERASE                TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)

R0255              AX*SR*T STORAGE.                                                 (6D)

 0257   REF   3  LAST   97           0142             DEXDEX   EQUALS TEM2          B(1)TMP
 0258   REF   2  LAST   97           0143             DEX1     EQUALS TEM3          B(1)TMP
 0259   REF   7  LAST   97           0144             DEX2     EQUALS TEM4          B(1)TMP
 0260   REF   2  LAST   97           0145             PTNSAVER EQUALS TEM5          B(1)TMP
 0261   REF   1                      0157             TERMITMP EQUALS MPAC +3       B(2)TMP

 0262   REF   1                      0143             DEXI     =      DEX1

R0263              THE FOLLOWING 10 REGISTERS ARE USED FOR TEMPORARY STORAGE OF THE DERIVATIVE COEFFICIENT TABLE OF
R0265   SUBROUTINE ROOTPSRS.   THEY MUST REMAIN WITHOUT INTERFERENCE WITH ITS SUBROUTINES WHICH ARE POWRSERS (POLY),
R0267   DMPSUB, DMPNSUB, SHORTMP, DDV/BDDV, ABS, AND USPRCADR.

 0268   REF   2  LAST   98           0142             DERCOF-8 =        MPAC    -12     ROOTPSRS DER COF N-4 HI ORDER
 0269   REF   3  LAST   98           0143             DERCOF-7 =        MPAC    -11     ROOTPSRS DER COF N-4 LO ORDER
 0270   REF   4  LAST   98           0144             DERCOF-6 =        MPAC    -10     ROOTPSRS DER COF N-3 HI ORDER
 0271   REF   5  LAST   98           0145             DERCOF-5 =        MPAC    -7      ROOTPSRS DER COF N-3 LO ORDER
 0272   REF   6  LAST   98           0146             DERCOF-4 =        MPAC    -6      ROOTPSRS DER COF N-2 HI ORDER
 0273   REF   7  LAST   98           0147             DERCOF-3 =        MPAC    -5      ROOTPSRS DER COF N-2 LO ORDER
 0274   REF   8  LAST   98           0150             DERCOF-2 =        MPAC    -4      ROOTPSRS DER COF N-1 HI ORDER
 0275   REF   9  LAST   98           0151             DERCOF-1 =        MPAC    -3      ROOTPSRS DER COF N-1 LO ORDER
 0276   REF  10  LAST   98           0152             DERCOFN  =        MPAC    -2      ROOTPSRS DER COF N HI ORDER
 0277   REF  11  LAST   98           0153             DERCOF+1 =        MPAC    -1      ROOTPSRS DER COF N LO ORDER

 0278   REF   5  LAST   96           0117             PWRPTR   =        POLISH          ROOTPSRS POWER TABLE POINTER
 0279   REF  14  LAST   96           0124             DXCRIT   =        VBUF    +2      ROOTPSRS CRITERION FOR ENDING ITERS HI
 0280   REF  15  LAST   98           0125             DXCRIT+1 =        VBUF    +3      ROOTPSRS CRITERION FOR ENDING ITERS LO
 0281   REF  16  LAST   98           0126             ROOTPS   =        VBUF    +4      ROOTPSRS ROOT HI ORDER
 0282   REF  17  LAST   98           0127             ROOTPS+1 =        VBUF    +5      ROOTPSRS ROOT LO ORDER
 0283   REF   4  LAST   97           0132             RETROOT  =        BUF     +2      ROOTPSRS RETURN ADDRESS OF USER
 0284   REF   5  LAST   97           0140             PWRCNT   =        MATINC          ROOTPSRS DER TABLE LOOP COUNTER
 0285   REF   3  LAST   97           0141             DERPTR   =        TEM1            ROOTPSRS DER TABLE POINTER
A0286
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P0287              DYNAMICALLY ALLOCATED CORE SETS FOR JOBS.                               (84D)

 0289                                  0154     0162   MPAC      ERASE  +6               MULTI-PURPOSE ACCUMULATOR.
 0290                                  0163     0163   MODE      ERASE                   +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
 0291                                  0164     0164   LOC       ERASE                   LOCATION ASSOCIATED WITH JOB.
 0292                                  0165     0165   BANKSET   ERASE                   USUALLY CONTAINS BBANK SETTING.
 0293                                  0166     0166   PUSHLOC   ERASE                   WORD OF PACKED INTERPRETIVE PARAMETERS.
 0294                                  0167     0167   PRIORITY  ERASE                   PRIORITY OF PRESENT JOB AND WORK AREA.

 0295                                  0170     0313             ERASE  +83D             EIGHT SETS OF  12 REGISTERS EACH
A0296

R0297   INCORP STORAGE: R22 (N29)    (SHARES WITH FOLLOWING SECTION)                       (4D)

 0299   REF   1                        0314            R22DISP   EQUALS TIME2SAV         I(4) N49 DISPLAY OF DELTA R AND DELTA V
A0300

R0301   STANDBY VERB ERASABLES.  REDOCTR BEFORE THETADS.                                    (14D)

 0303                                  0314     0315   TIME2SAV  ERASE  +1
 0304                                  0316     0317   SCALSAVE  ERASE  +1
 0305                                  0320     0320   REDOCTR   ERASE                   CONTAINS NUMBER OF RESTARTS
 0306                                  0321     0323   THETAD    ERASE  +2
 0307   REF   1                        0321            CPHI      =      THETAD           D   DESIRED GIMBAL ANGLES
 0308   REF   2  LAST    99            0322            CTHETA    =      THETAD +1        I   FOR
 0309   REF   3  LAST    99            0323            CPSI      =      THETAD +2        M   MANEUVER.
 0310                                  0324     0331   DELV      ERASE  +5
 0311   REF   1                        0324            DELVX     =      DELV
 0312   REF   2  LAST    99            0326            DELVY     =      DELV  +2
 0313   REF   3  LAST    99            0330            DELVZ     =      DELV  +4
A0314

R0315              WAITLIST REPEAT FLAG                                                     (1D)

 0317                                  0332     0332   RUPTAGN   ERASE
 0318   REF   1                        0332            KEYTEMP2 =       RUPTAGN          TEMP FOR KEYRUPT, UPRUPT
A0319

R0320              DOWNLINK STORAGE.                                                        (27D)

 0322   REF   1                        0333            DNLSTADR  EQUALS DNLSTCOD

 0323                                  0333     0333   DNLSTCOD  ERASE                   B(1)PRM DOWNLIINK LIST CODE
 0324                                  0334     0365   LDATALST  ERASE            +25D   (26D)
 0325   REF   1                        0335            DNTMGOTO  EQUALS LDATALST +1      B(1)
 0326   REF   1                        0336            TMINDEX   EQUALS DNTMGOTO +1      B(1)
 0327   REF   1                        0336            DUMPLOC   EQUALS TMINDEX          CONTAINS ECADR OF AGC DP WORD BEING DUMP
A0328                                                                                    ED AND COUNT OF COMPLETE DUMPS ALREADY S
A0329                                                                                    ENT.
 0330   REF   2  LAST    99            0337            DNQ       EQUALS TMINDEX  +1      B(1)
 0331   REF   1                0340       DNTMBUFF EQUALS DNQ       +1     B(22)PRM DOWNLINK SNAPSHOT BUFFER

R0332            UNSWITCHED FOR DISPLAY INTERFACE ROUTINES.                    (10D) FIVE MORE IN EBANK 2

 0334                          0366    0366   RESTREG  ERASE                    B(1)PRM FOR DISPLAY RESTARTS
 0335                          0367    0367   NVWORD   ERASE
 0336                          0370    0370   MARKNV   ERASE
 0337                          0371    0371   NVSAVE   ERASE
R0338                   (RETAIN THE ORDER OF CADRFLSH TO FAILREG +2 FOR DOWNLINK PURPOSES)
 0340                          0372    0372   CADRFLSH ERASE
 0341                          0373    0373   CADRMARK ERASE
 0342                          0374    0374   TEMPFLSH ERASE
 0343                          0375    0377   FAILREG  ERASE            +2     B(3)PRM  3 ALARM CODE REGISTERS

R0344            VAC AREAS. -BE CAREFUL OF PLACEMENT-                          (220D)

 0346                          0400    0400   VAC1USE  ERASE
 0347                          0401    0453   VAC1     ERASE   +42D
 0348                          0454    0454   VAC2USE  ERASE
 0349                          0455    0527   VAC2     ERASE   +42D
 0350                          0530    0530   VAC3USE  ERASE
 0351                          0531    0603   VAC3     ERASE   +42D
 0352                          0604    0604   VAC4USE  ERASE
 0353                          0605    0657   VAC4     ERASE   +42D
 0354                          0660    0660   VAC5USE  ERASE
 0355                          0661    0733   VAC5     ERASE   +42D

R0356            STARALIGN ERASABLES.                                          (13D)

 0358                          0734    0734   STARCODE ERASE                    (1)
 0359   REF   1                0734           AOTCODE  =       STARCODE
 0360                          0735    0750   STARALGN ERASE   +11D
 0361   REF   1                0735           SINCDU   =       STARALGN
 0362   REF   2  LAST   100    0743           COSCDU   =       STARALGN +6

 0363   REF   1                0741           SINCDUX  =       SINCDU   +4
 0364   REF   2  LAST   100    0735           SINCDUY  =       SINCDU
 0365   REF   3  LAST   100    0737           SINCDUZ  =       SINCDU   +2
 0366   REF   1                0747           COSCDUX  =       COSCDU   +4
 0367   REF   2  LAST   100    0743           COSCDUY  =       COSCDU
 0368   REF   3  LAST   100    0745           COSCDUZ  =       COSCDU   +2

R0369            PHASE TABLE AND RESTART COUNTERS.                             (12D)

 0371                          0751    0751   -PHASE1  ERASE
 0372                          0752    0752   PHASE1   ERASE
 0373                          0753    0753   -PHASE2  ERASE
 0374                           0754    0754    PHASE2    ERASE
 0375                           0755    0755    -PHASE3   ERASE
 0376                           0756    0756    PHASE3    ERASE
 0377                           0757    0757    -PHASE4   ERASE
 0378                           0760    0760    PHASE4    ERASE
 0379                           0761    0761    -PHASE5   ERASE
 0380                           0762    0762    PHASE5    ERASE
 0381                           0763    0763    -PHASE6   ERASE
 0382                           0764    0764    PHASE6    ERASE


R0383              A**SR*T STORAGE.                                           (6D)

 0385                           0765    0772    CDUSPOT   ERASE  +5           B(6)

 0386   REF   1                 0765            CDUSPOTY =       CDUSPOT
 0387   REF   2  LAST   101     0767            CDUSPOTZ =       CDUSPOT  +2
 0388   REF   3  LAST   101     0771            CDUSPOTX =       CDUSPOT  +4


R0389              VERB 37 STORAGE.                                           (2D)

 0391                           0773    0773    MINDEX    ERASE               B(1) TMP INDEX FOR MAJOR MODE
 0392                           0774    0774    MMNUMBER  ERASE               B(1) TMP MAJOR MODE REQUESTED BY V37


R0393              PINBALL INTERRUPT ACTION.                                  (1D)

 0395                           0775    0775    DSPCNT    ERASE               B(1)PRM COUNTER FOR DSPOUT.


R0396              PINBALL EXECUTIVE ACTION                                   (44D)

 0398                           0776    0776    DSPCOUNT  ERASE               DISPLAY POSITION INDICATOR.
 0399                           0777    0777    DECBRNCH  ERASE               +DEC, - DEC, OCT INDICATOR
 0400                           1000    1000    VERBREG   ERASE               VERB CODE
 0401                           1001    1001    NOUNREG   ERASE               NOUN CODE
 0402                           1002    1002    XREG      ERASE               R1 INPUT BUFFER
 0403                           1003    1003    YREG      ERASE               R2 INPUT BUFFER
 0404                           1004    1004    ZREG      ERASE               R3 INPUT BUFFER
 0405                           1005    1005    XREGLP    ERASE               LO PART OF XREG (FOR DEC CONV ONLY)
 0406                           1006    1006    YREGLP    ERASE               LO PART OF YREG (FOR DEC CONV ONLY)
 0407   REF   1                 1006            HITEMOUT =        YREGLP      TEMP FOR DISPLAY OF HRS, MIN, SEC
A0408                                                                                  MUST = LOTEMOUT-1.
 0409                           1007    1007    ZREGLP    ERASE               LO PART OF ZREG (FOR DEC CONV ONLY)
 0410   REF   1                 1007            LOTEMOUT =        ZREGLP      TEMP FOR DISPLAY OF HRS, MIN, SEC
A0411                                                                                  MUST = HITEMOUT+1.
 0412                           1010    1010    MODREG    ERASE               MODE CODE
 0413                           1011    1011    DSPLOCK   ERASE               KEYBOARD/SUBROUTINE CALL INTERLOCK
 0414                           1012    1012    REQRET    ERASE               RETURN REGISTER FOR LOAD
 0415                        1013    1013    LOADSTAT ERASE                     STATUS INDICATOR FOR LOADTST
 0416                        1014    1014    CLPASS   ERASE                     PASS INDICATOR CLEAR
 0417                        1015    1015    NOUT     ERASE                     ACTIVITY COUNTER FOR DSPTAB
 0418                        1016    1016    NOUNCADR ERASE                     MACHINE CADR FOR NOUN
 0419                        1017    1017    MONSAVE  ERASE                     N/V CODE FOR MONITOR. (= MONSAVE1-1)
 0420                        1020    1020    MONSAVE1 ERASE                     NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
 0421                        1021    1021    MONSAVE2 ERASE                     NVMONOPT OPTIONS
 0422                        1022    1035    DSPTAB   ERASE  +11D               0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
 0423                        1036    1036    NVQTEM   ERASE                     NVSUB STORAGE FOR CALLING ADDRESS
A0424                                                                           MUST = NVBNKTEM-1
 0425                        1037    1037    NVBNKTEM ERASE                     NVSUB STORAGE FOR CALLING BANK
A0426                                                                           MUST = NVQTEM+1
 0427                        1040    1040    VERBSAVE ERASE                     NEEDED FOR RECYCLE
 0428                        1041    1041    CADRSTOR ERASE                     ENDIDLE STORAGE
 0429                        1042    1042    DSPLIST  ERASE                     WAITING REG FOR DSP SYST INTERNAL USE
 0430                        1043    1043    EXTVBACT ERASE                     EXTENDED VERB ACTIVITY INTERLOCK
 0431                        1044    1046    DSPTEM1  ERASE           +2        BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
 0432                        1047    1051    DSPTEM2  ERASE           +2        BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)


 0433  REF    1              1050            DSPTEMX  EQUALS DSPTEM2  +1        B(2) S-S DISPLAY BUFFER FOR EXT. VERBS
 0434  REF    1              1044            NORMTEM1 EQUALS DSPTEM1            B(3)DSP NORMAL DISPLAY REGISTERS.
A0435


R0436              DISPLAY FOR EXTENDED VERBS (V82, R04(V62), V41(N72) )        (2D)

 0438  REF    1              1050            OPTIONX  EQUALS DSPTEMX            (2) EXTENDED VERB OPTION CODE
A0439

R0440              TBASES AND PHSPRDT S.                                        (12D)

 0442                        1052    1052    TBASE1   ERASE
 0443                        1053    1053    PHSPRDT1 ERASE
 0444                        1054    1054    TBASE2   ERASE
 0445                        1055    1055    PHSPRDT2 ERASE
 0446                        1056    1056    TBASE3   ERASE
 0447                        1057    1057    PHSPRDT3 ERASE
 0448                        1060    1060    TBASE4   ERASE
 0449                        1061    1061    PHSPRDT4 ERASE
 0450                        1062    1062    TBASE5   ERASE
 0451                        1063    1063    PHSPRDT5 ERASE
 0452                        1064    1064    TBASE6   ERASE
 0453                        1065    1065    PHSPRDT6 ERASE


R0454              UNSWITCHED FOR DISPLAY INTERFACE ROUTINES.                   (6D)

 0456                        1066    1066    NVWORD1  ERASE                     B(1)PROBABLY FOR DISPLAY DURING SERVICER
 0457                        1067    1067    EBANKSAV ERASE
 0458                     1070   1070   MARKEBAN ERASE
 0459                     1071   1071   EBANKTEM ERASE
 0460                     1072   1072   MARK2PAC ERASE
 0461                     1073   1073   R1SAVE   ERASE

R0462          IMU COMPENSATION UNSWITCHED ERASABLE.                    (10)

 0464                     1074   1074   1/PIPADT ERASE
A0465

R0466          SINGLE PRECISION SUBROUTINE TEMPORARIES.                 (20)

 0468                     1075   1075   TEMK     ERASE                  (1)
 0469                     1076   1076   SQ       ERASE                  (1)
A0470

R0471          UNSWITCHED RADAR ERASABLE                                (130)

 0473                     1077   1077   SAMPLIM  ERASE
 0474                     1100   1103   SAMPLSUM ERASE  +3
 0475                     1104   1105   TIMEHOLD ERASE  +1
 0476  REF   1            1100          RRTARGET EQUALS SAMPLSUM        HALF U IT VECTOR IN SM OR NB AXES.
 0477                     1106   1107   TANG     ERASE  +1              DESIRE  TRUNNION AND SHAFT ANGLES.
 0478  REF   1            1106          MODEA    EQUALS TANG
 0479                     1110   1111   MODEB    ERASE  +1              DOES  LOBBERS TANG +2.
 0480  REF   1            1110          NSAMP    EQUALS MODEB
 0481                     1112   1112   DESRET   ERASE
 0482  REF   1            1112          OLDATAGO EQUALS DESRET          USED I  DATA READING ROUTINES.
 0483                     1113   1113   DESCOUNT ERASE

R0484          ******  P22    ******                                    (6D)

 0486  REF   1            1100          RSUBC    EQUALS RRTARGET        I(6)S-S  CSM POSITION VECTOR
A0487
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P0488               UNSWITCHED FOR ORBIT INTEGRATION.                         (21D)

 0490                           1114    1140    TDEC     ERASE  +20D              I(2)
 0491    REF   1                1116            COLREG   EQUALS TDEC      +2      I(1)
 0492    REF   1                1117            LAT      EQUALS COLREG    +1      I(2)
 0493    REF   1                1121            LONG     EQUALS LAT       +2      I(2)
 0494    REF   1                1123            ALT      EQUALS LONG      +2      I(2)
 0495    REF   1                1125            YV       EQUALS ALT       +2      I(6)
 0496    REF   1                1133            ZV       EQUALS YV        +6      I(6)
A0497

R0498               MISCELLANEOUS UNSWITCHED.                                 (20D)

 0500                           1141    1141    P40/RET  ERASE                    (WILL BE PUT IN E6 WHEN THERE IS ROOM)
 0501                           1142    1142    GENRET   ERASE                    B(1)  R61 RETURN CADR.
 0502                           1143    1143    OPTION1  ERASE                    B(1)   NOUN 06 USES THIS
 0503                           1144    1144    OPTION2  ERASE                    B(1)   NOUN 06 USES THIS
 0504                           1145    1145    OPTION3  ERASE                    B(1)  NOUN 06 USES THIS
 0505                           1146    1147    LONGCADR ERASE  +1                B(2)  LONGCALL REGISTER
 0506                           1150    1151    LONGBASE ERASE  +1
 0507                           1152    1153    LONGTIME ERASE  +1                B(2)     LONGCALL REGISTER
 0508                           1154    1154    CDUTEMPX ERASE                    B(1)TMP
 0509                           1155    1155    CDUTEMPY ERASE                    B(1)TMP
 0510                           1156    1156    CDUTEMPZ ERASE                    B(1)TMP
 0511                           1157    1157    PIPATMPX ERASE                    B(1)TMP
 0512                           1160    1160    PIPATMPY ERASE                    B(1)TMP
 0513                           1161    1161    PIPATMPZ ERASE                    B(1)TMP

 0514                           1162    1162    DISPDEX  ERASE                    B(1)
 0515                           1163    1163    TEMPR60  ERASE                    B(1)
 0516                           1164    1164    PRIOTIME ERASE                    B(1)


R0517   P27  (UPDATE PROGRAM ) STORAGE.                                       (26D)

 0519                           1165    1165    UPVERBSV ERASE                    B(1) UPDATE VERB ATTEMPTED.
 0520                           1166    1216    UPTEMP   ERASE  +24D              B(1)TMP SCRATCH
 0521   REF   1                 1166            INTWAK1Q EQUALS UPTEMP                (BORROWS UPTEMP REGISTERS)
R0522   RETAIN THE ORDER OF COMPNUMB THRU UPBUFF +19D FOR DOWNLINK PURPOSES.
 0523   REF   2  LAST  104      1167            COMPNUMB EQUALS UPTEMP +1         B(1)TMP NUMBER OF ITEMS TO BE UPLINKED
 0524   REF   1                 1170            UPOLDMOD EQUALS COMPNUMB +1       B(1)TMP INTERRUPTED PROGRAM MM
 0525   REF   1                 1171            UPVERB   EQUALS UPOLDMOD +1       B(1)TMP VERB NUMBER
 0526   REF   1                 1172            UPCOUNT  EQUALS UPVERB    +1      B(1)TMP UPBUFF INDEX
 0527   REF   1                 1173            UPBUFF   EQUALS UPCOUNT   +1      B(20D)
A0528

R0529               SPECIAL DEFINITION FOR SYSTEM TEST ERASABLE PGMS.         (2D)

 0531   REF   3  LAST  104      1166            EBUF2    EQUALS UPTEMP            B(2) FOR EXCLUSIVE USE OF SYSTEM TEST
A0532
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R0533            PERM STATE VECTORS FOR BOOST AND DOWNLINK-WHOLE MISSION-         (14D)

 0535                               1217     1224    RN        ERASE   +5               B(6)PRM
 0536                               1225     1232    VN        ERASE   +5               B(6)PRM
 0537                               1233     1234    PIPTIME   ERASE              +1    B(2)PRM   (MUST BE FOLLOWED BY GDT/2)

R0538            SERVICER   -MUST FOLLOW PIPTIME-                                 (18D)

 0540                               1235     1256    GDT/2     ERASE   +17D             B(6)TMP   ** MUST FOLLOW PIPTIME **
 0541   REF   1                     1243             MASS      EQUALS GDT/2       +6    B(2)
 0542   REF   1                     1243             WEIGHT/G  =      MASS
 0543   REF   2  LAST   105         1245             ABDELV    EQUALS MASS        +2    ALCMANU STORAGE)
 0545   REF   1                     1246             PGUIDE    EQUALS ABDELV      +1    (2)
 0546   REF   1                     1250             DVTHRUSH  EQUALS PGUIDE      +2    (1)
 0547   REF   1                     1251             AVEGEXIT  EQUALS DVTHRUSH +1        (2)
 0548   REF   1                     1251             AVGEXIT   =      AVEGEXIT
 0549   REF   2  LAST   105         1253             TEMX      EQUALS AVEGEXIT +2        (1)
 0550   REF   1                     1254             TEMY      EQUALS TEMX        +1     (1)
 0551   REF   1                     1255             TEMZ      EQUALS TEMY        +1     (1)
 0552   REF   1                     1256             PIPAGE    EQUALS TEMZ +1           B(1)
A0553

R0554            PERMANENT LEM DAP STORAGE.                                       (6D)

 0556                               1257     1257    CH5MASK   ERASE                    B(1)PRM
 0557                               1260     1260    CH6MASK   ERASE                    B(1)PRM JET FAILURE MASK.
 0558                               1261     1261    SPNDX     ERASE                    B(1)
 0559                               1262     1262    RCSFLAGS  ERASE                    AUTOPILOT FLAG WORD
A0560                                                                                   BIT ASSIGNMENTS:
A0561                                                                                    1) ALTERYZ SWITCH   (ZEROOR1)
A0562                                                                                    2) NEEDLER SWITCH
A0563                                                                                    3) NEEDLER SWITCH
A0564                                                                                    4) NEEDLER SWITCH
A0565                                                                                    5) NEEDLER SWITCH
A0566                                                                                    9) JUST-IN-DETENT SWITCH
A0567                                                                                   10) PBIT - MANUAL CONTROL SWITCH
A0568                                                                                   11) QRBIT - MANUAL CONTROL SWITCH
A0569                                                                                   12) PSKIP CONTROL (PJUMPADR)
A0570                                                                                   13) 1/ACCJOB CONTROL (ACCSET)
 0571                               1263     1264    T5ADR     ERASE    +1              GENADR OF NEXT LM CAP T5RUPT. * 2CADR *
A0572                                                                                   BBCON  OF NEXT LM CAP T5RUPT.   2CADR

R0573            ERASABLES FOR RADAR READ PROTECTION (C13STALL)                   (4D)

 0575                               1265     1265    C13QSAV   ERASE                    B(1) QSAVE FOR C13STALL USERS.
 0576                               1266     1266    C13FSAV   ERASE                    B(1) FBANK SAVE FOR C13STALL.
 0577                               1267     1267    RADTIME   ERASE                    B(1) NEG. TIME OF SCALAR READ.
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L          ERASABLE ASSIGNMENTS                                                                  USER'S PAGE NO.  17       EQ S4

 0578                               1270      1270    RADDEL    ERASE                          B(1) DELTA TIME FROM SCALAR READ TO T5.
A0579

R0580                 RADAREAD STORAGE                                                         (2D)

 0582                               1271      1272    TTCTIG    ERASE  +1                      B(2) LATEST ESTIMATE OF TIME TO IGNITION
A0583

R0584                 RCS FAILURE MONITOR STORAGE                                              (1)
 0586                               1273      1273    PVALVEST  ERASE                          B(1) PRM


R0587                 KALCMANU/DAP INTERFACE.                                                  (3D)

 0589                               1274      1274    DELPEROR  ERASE                          B(1)PRM COMMAND LAGS.
 0590                               1275      1275    DELQEROR  ERASE                          B(1)PRM
 0591                               1276      1276    DELREROR  ERASE                          B(1)PRM


R0592                 MODE SWITCHING ERASABLE.                                                 (9D)

R0594           RETAIN THE ORDER OF IMODES30 AND IMODES33 FOR DOWNLINK PURPOSES.
 0595                               1277      1277    IMODES30  ERASE                          B(1)
 0596                               1300      1300    IMODES33  ERASE
 0597                               1301      1303    MODECADR  ERASE  +2                      B(3)PRM
 0598        REF   1                1301              IMUCADR   EQUALS MODECADR
 0599        REF   2  LAST   106    1302              OPTCADR   EQUALS MODECADR +1
 0600        REF   3  LAST   106    1303              RADCADR   EQUALS MODECADR +2
 0601                               1304      1306    ATTCADR   ERASE  +2                      B(3)PRM
 0602        REF   1                1306              ATTPRID   =      ATTCADR  +2
 0603                               1307      1307    MARKSTAT  ERASE

R0604                 T4RUPT ERASABLE.                                                         (2D)

 0606                               1310      1310    DSRUPTSW  ERASE
 0607                               1311      1311    LGYRO     ERASE                          (1)

R0608                 RENDEZVOUS RADAR TASK STORAGE                                            (3D)

 0610                               1312      1314    RRRET     ERASE             +2D          B(1)TMP  P20'S, PERHAPS R29 & R12
 0611        REF   1                1313              RDES      EQUALS RRRET      +1           B(1)TMP
 0612        REF   1                1314              RRINDEX   EQUALS RDES       +1           B(1)TMP
A0613


R0614                 MEASINC                                                                  (4D)

 0616                               1315      1315    WIXA      ERASE                          B(1)
 0617                               1316      1316    WIXB      ERASE                          B(1)
 0618                               1317      1317    ZIXA      ERASE                          B(1)
 0619                            1320     1320   ZIXB      ERASE                      B(1)

R0620            AGS DUMMY ID WORD.                                                   (1D)

 0622                            1321     1321   AGSWORD   ERASE


R0623            SOME MISCELLANEOUS UNSWITCHED.                                       (6D)

 0625                            1322     1322   RATEINDX  ERASE                       (1)    USED BY KALCMANU
 0626                            1323     1325   DELAYLOC  ERASE   +2
 0627                            1326     1326   LEMMASS   ERASE                      KEEP CONTIGUOUS W. CSMMASS  (1)EACH
 0628                            1327     1327   CSMMASS   ERASE
R0629   LESS IS MORE.

R0630            RENDEZVOUS AND LANDING RADAR DOWNLINK STORAGE.                       (7D)

R0632                  (NORMALLY USED DURING P20, BUT MAY ALSO)
R0633                  (BE REQUIRED FOR THE V62 SPURIOUS TEST.)

R0634                                  (PLEASE KEEP IN THIS ORDER)

 0635                            1330     1336   DNRRANGE  ERASE            +6        B(1) TMP
 0636   REF    1                 1331            DNRRDOT   EQUALS DNRRANGE  +1        B(1)TMP
 0637   REF    1                 1332            DNINDEX   EQUALS DNRRDOT   +1        B(1)TMP
 0638   REF    1                 1333            DNLRVELX  EQUALS DNINDEX   +1        B(1)TMP
 0639   REF    1                 1334            DNLRVELY  EQUALS DNLRVELX  +1        B(1)TMP
 0640   REF    1                 1335            DNLRVELZ  EQUALS DNLRVELY  +1        B(1)TMP
 0641   REF    1                 1336            DNLRALT   EQUALS DNLRVELZ  +1        B(1) TMP

R0642            INCORPORATION UNSWITCHED.                                            (2D)

 0644   REF    1                 1256            W.IND     EQUALS PIPAGE              B(1)
 0645   REF    1                 1257            W.IND1    EQUALS W.IND     +1        I(1)


R0646            SUBROUTINE BALLANGS OF P60.                                          (1D)

 0648                            1337     1337   BALLEXIT  ERASE                      B(1)SAVE LOCATION FOR BALLINGS SUBR EXIT


R0649            SOME LEM DAP STORAGE.                                                (4D)

 0651                            1340     1340   DAPDATR1  ERASE                      B(1)DSP   DAP CONFIG.
 0652                            1341     1342   TEVENT    ERASE            +1        B(2)DSP
 0653                            1343     1343   DB        ERASE                      B(1)TMP   DEAD BAND.
A0654


R0655            NOUN 87                                                              (2D)
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 0657                         1344     1345   AZ       ERASE      +1D      B(1)  AZ AND EL MUST BE CONTIGUOUS
 0658  REF   1                1345            EL       EQUALS AZ  +1D      B(1)
A0659

R0660               P63, P64, R65, R66, AND R67.                           (1D)
 0662                         1346     1346   WCHPHASE ERASE               B(1)
A0663

R0664               PADLOADS FOR R2 LUNAR POTENTIAL MODEL.                 (2D)

 0666                         1347     1347   E3J22R2M ERASE               I(1)
 0667                         1350     1350   E32C31RM ERASE               I(1)
A0668

R0669               PADLOADS FOR R12 DOPPLER COMPENSATION                  (3D)

 0671                         1351     1352   RADSKAL  ERASE   +1          LR ALT DOPPLER BIAS : 2T/LAMBDA SCALED
A0672                                                                          AT 1/(2(7) M/CS)
 0673                         1353     1353   SKALSKAL ERASE               LR ALT SCALE FACTOR RATIO :  .2 NOM

A0674

R0675               ERASABLES FOR TRUNNION AND SHAFT COMMANDS              (2D)

 0677                         1354     1354   TRUNNCMD ERASE               *** THESE TWO ERASABLES ***
 0678                         1355     1355   SHAFTCMD ERASE               *** MUST BE IN ORDER ***
A0679

R06792              ERASABLE FOR REGISTER 3 OF NOUN 49                     (1D)

 06796                        1356     1356   WHCHREAD ERASE               B(1)TMR MEASUREMENT BEING PROCESSED.
A06798

R0680               LANDING PADLOAD                                        (1D)

 06802 REF   1                1356            ELBIAS   EQUALS WHCHREAD     B(1) PL LPD ELEVATION BIAS,  RI RADIANS.

 06803                        1377            END-UE   EQUALS 1377

R0681               SELF-CHECK ASSIGNMENTS.                                (17D)

R0683                                    (DO NOT MOVE, S-C IS ADDRESS SENSITIVE)

 0684                         1357     1377   SELFERAS ERASE  1357 - 1377  *** MUST NOT BE MOVED ***
 0685  REF   1                1357            SFAIL    EQUALS SELFERAS     B(1)
 0686  REF   1                1360            ERESTORE EQUALS SFAIL    +1  B(1)
 0687  REF   1                1361            SELFRET  EQUALS ERESTORE +1  B(1)    RETURN
 0688  REF   1                1362            SMODE    EQUALS SELFRET  +1  B(1)
 0689  REF   1                1363            ALMCADR  EQUALS SMODE    +1  B(2)   ALARM-ABORT USER'S 2CADR
 0690  REF   1                1365            ERCCUNT  EQUALS ALMCADR  +2  B(1)
 0691   REF    1               1366          SCOUNT   EQUALS ERCOUNT  +1      B(3)
 0692   REF    1               1371          SKEEP1   EQUALS SCOUNT   +3      B(1)
 0693   REF    1               1372          SKEEP2   EQUALS SKEEP1   +1      B(1)
 0694   REF    1               1373          SKEEP3   EQUALS SKEEP2   +1      B(1)
 0695   REF    1               1374          SKEEP4   EQUALS SKEEP3   +1      B(1)
 0696   REF    1               1375          SKEEP5   EQUALS SKEEP4   +1      B(1)
 0697   REF    1               1376          SKEEP6   EQUALS SKEEP5   +1      B(1)
 0698   REF    1               1377          SKEEP7   EQUALS SKEEP6   +1      B(1)
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P0699                    EBANK-3 ASSIGNMENTS

 0700                            E3,1400                 SETLOC 1400

R0701              WAITLIST TASK LISTS.                                          (26D)

 0703                            E3,1400  E3,1407   LST1     ERASE  +7          B(8D)PRM  DELTA T S.
 0704                            E3,1410  E3,1431   LST2     ERASE  +17D        B(18D)PRM TASK 2CADR ADDRESSES.

R0705              RESTART STORAGE.                                              (2D)

 0707                            E3,1432  E3,1433   RSBBQ    ERASE  +1          B(2)PRM  SAVE BB AND Q FOR RESTARTS.

R0708              MORE LONGCALL STORAGE.(MUST BE IN LST1 S BANK.                (2D)

 0710                            E3,1434  E3,1435   LONGEXIT ERASE  +1          B(2)TMP  MAY BE SELDOM OVERLAYED.

R0711              PHASE-CHANGE LISTS PART II.                                   (12D)

 0713                            E3,1436  E3,1436   PHSNAME1 ERASE              B(1)PRM
 0714                            E3,1437  E3,1437   PHSBB1   ERASE              B(1)PRM
 0715                            E3,1440  E3,1440   PHSNAME2 ERASE              B(1)PRM
 0716                            E3,1441  E3,1441   PHSBB2   ERASE              B(1)PRM
 0717                            E3,1442  E3,1442   PHSNAME3 ERASE              B(1)PRM
 0718                            E3,1443  E3,1443   PHSBB3   ERASE              B(1)PRM
 0719                            E3,1444  E3,1444   PHSNAME4 ERASE              B(1)PRM
 0720                            E3,1445  E3,1445   PHSBB4   ERASE              B(1)PRM
 0721                            E3,1446  E3,1446   PHSNAME5 ERASE              B(1)PRM
 0722                            E3,1447  E3,1447   PHSBB5   ERASE              B(1)PRM
 0723                            E3,1450  E3,1450   PHSNAME6 ERASE              B(1)PRM
 0724                            E3,1451  E3,1451   PHSBB6   ERASE              B(1)PRM

R0725              IMU COMPENSATION PARAMETERS.                                  (22D)

 0727                            E3,1452  E3,1452   PBIASX   ERASE              B(1)    PIPA BIAS, PIPA SCALE FACTR TERMS
 0728   REF    1                 E3,1452            PIPABIAS =       PBIASX         INTERMIXED.
 0729                            E3,1453  E3,1453   PIPASCFX ERASE
 0730   REF    1                 E3,1453            PIPASCF  =       PIPASCFX
 0731                            E3,1454  E3,1454   PBIASY   ERASE
 0732                            E3,1455  E3,1455   PIPASCFY ERASE
 0733                            E3,1456  E3,1456   PBIASZ   ERASE
 0734                            E3,1457  E3,1457   PIPASCFZ ERASE

 0735                            E3,1460  E3,1460   NBDX     ERASE              GYRO BIAS DRIFTS
 0736                            E3,1461  E3,1461   NBDY     ERASE
 0737                            E3,1462  E3,1462   NBDZ     ERASE
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L        ERASABLE ASSIGNMENTS                                                      USER'S PAGE NO. 22       EC S4

 0738                         E3,1463  E3,1463   ADIAX     ERASE                   ACCELERATION SENSITIVE DRIFT ALONG THE
 0739                         E3,1464  E3,1464   ADIAY     ERASE                       INPUT AXIS
 0740                         E3,1465  E3,1465   ADIAZ     ERASE

 0741                         E3,1466  E3,1466   ADSRAX    ERASE                   ACCELERATION SENSITIVE DRIFT ALONG THE
 0742                         E3,1467  E3,1467   ADSRAY    ERASE                       SPIN REFERENCE AXIS
 0743                         E3,1470  E3,1470   ADSRAZ    ERASE

 0744                         E3,1471  E3,1476   GCOMP     ERASE   +5              CONTAINS COMPENSATING TORQUES

 0745   REF   1               E3,1471            COMMAND   EQUALS GCOMP
 0746   REF   2  LAST  111    E3,1474            CDUIND    EQUALS GCOMP     +3


 0747                         E3,1477  E3,1477   GCOMPSW   ERASE
A0748


R0749             STATE VECTORS FOR ORBIT INTEGRATION.                             (44D)

R0751                                    (DIFEQCNT THRU XKEP MUST BE IN SAME
R0752                                      EBANK AS RRECTCSM, RRECTLEM ETC
R0753                                      BECAUSE THE COPY-CYCLES (ATOPCSM,
R0754                                      PTOACSM ETC) ARE EXECUTED IN BASIC.
R0755                                        ALL OTHER REFERENCES TO THIS GROUP
R0756                                      ARE BY INTERPRETIVE INSTRUCTIONS.)

 0757                         E3,1500  E3,1553   DIFEQCNT  ERASE   +43D            B(1)
R0758                                    (UPSVFLAG...XKEP MUST BE KEPT IN ORDER)

 0759   REF   1               E3,1501            UPSVFLAG  EQUALS DIFEQCNT +1      B(1)
 0760   REF   1               E3,1502            RRECT     EQUALS UPSVFLAG +1      B(6)
 0761   REF   1               E3,1510            VRECT     EQUALS RRECT    +6      B(6)
 0762   REF   1               E3,1516            TET       EQUALS VRECT    +6      B(2)
 0763   REF   1               E3,1520            TDELTAV   EQUALS TET      +2      B(6)
 0764   REF   1               E3,1526            TNUV      EQUALS TDELTAV  +6      B(6)
 0765   REF   1               E3,1534            RCV       EQUALS TNUV     +6      B(6)
 0766   REF   1               E3,1542            VCV       EQUALS RCV      +6      B(6)
 0767   REF   1               E3,1550            TC        EQUALS VCV      +6      B(2)
 0768   REF   1               E3,1552            XKEP      EQUALS TC       +2      B(2)

R0769             PERMANENT STATE VECTORS AND TIMES.                               (99D)

R0771             (DO NOT OVERLAY WITH ANYTHING AFTER BOOST)

R0772             (RRECTCSM ...XKEPCSM MUST BE KEPT IN THIS ORDER)

 0773                         E3,1554  E3,1561   RRECTCSM  ERASE   +5              B(6)PRM CSM VARIABLES.
 0774   REF   1               E3,1554            RRECTOTH  =       RRECTCSM
 0775                         E3,1562  E3,1567   VRECTCSM  ERASE   +5              B(6)PRM
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0776                        E3,1570  E3,1571   TETCSM   ERASE  +1             B(2)PRM
0777    REF   1             E3,1570            TETOTHER =      TETCSM
0778                        E3,1572  E3,1577   DELTACSM ERASE  +5             B(6)PRM
0779                        E3,1600  E3,1605   NUVCSM   ERASE  +5             B(6)PRM
0780                        E3,1606  E3,1613   RCVCSM   ERASE  +5             B(6)PRM
0781                        E3,1614  E3,1621   VCVCSM   ERASE  +5             B(6)PRM
0782                        E3,1622  E3,1623   TCCSM    ERASE  +1             B(2)PRM
0783                        E3,1624  E3,1625   XKEPCSM  ERASE  +1             B(2)PRM

R0784           (RRECTLEM ...XKEPLEM MUST BE KEPT IN THIS ORDER)

0785                        E3,1626  E3,1633   RRECTLEM ERASE  +5             B(6)PRM LEM VARIABLES
0786    REF   1             E3,1626            RRECTHIS =      RRECTLEM
0787                        E3,1634  E3,1641   VRECTLEM ERASE  +5             B(6)PRM
0788                        E3,1642  E3,1643   TETLEM   ERASE  +1             B(2)PRM
0789    REF   1             E3,1642            TETTHIS  =      TETLEM
0790                        E3,1644  E3,1651   DELTALEM ERASE  +5             B(6)PRM
0791                        E3,1652  E3,1657   NUVLEM   ERASE  +5             B(6)PRM
0792                        E3,1660  E3,1665   RCVLEM   ERASE  +5             B(6)PRM
0793                        E3,1666  E3,1673   VCVLEM   ERASE  +5             B(6)PRM
0794                        E3,1674  E3,1675   TCLEM    ERASE  +1             B(2)PRM
0795                        E3,1676  E3,1677   XKEPLEM  ERASE  +1             B(2)PRM

0796                        E3,1700  E3,1705   X789     ERASE  +5
0797                        E3,1706  E3,1710   TEPHEM   ERASE  +2
0798                        E3,1711  E3,1712   AZO      ERASE  +1
0799                        E3,1713  E3,1714   -AYO     ERASE           +1
0800                        E3,1715  E3,1716   AXO      ERASE           +1
A0801


R0802           STATE VECTORS FOR DOWNLINK.                                   (12D)

0804                        E3,1717  E3,1724   R-OTHER  ERASE  +5             B(6)PRM POS VECT (OTHER VECH) FOR DNLINK
0805                        E3,1725  E3,1732   V-OTHER  ERASE  +5             B(6)PRM VEL VECT (OTHER VECH) FOR DNLINK

0806    REF   2 LAST  112   E3,1570            T-OTHER  =      TETCSM                     TIME (OTHER VECH) FOR DNLINK

R0807           REFSMMAT.                                                     (18D)

0809                        E3,1733  E3,1754   REFSMMAT ERASE  +17D           I(18D)PRM

R0810           ACTIVE VEHICLE CENTANG.  MUST BE DISPLAYED ANYTIME (ALMOST.)  (2D)

0812                        E3,1755  E3,1756   ACTCENT  ERASE           +1    I(2) S-S CENTRAL ANGLE BETWEEN ACTIVE
A0813                                                                          VEHICLE AT TPI TIG AND TARGET VECTOR.

R0814        **** USED IN CONICSEX (PLAN INERT ORIENT) ****
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 0815   REF   1          E3,1706             TIMSUBO  EQUALS TEPHEM          CSEC B-42 (TRIPLE PRECISION)
A0816

R0817            LPS20.1 STORAGE    -ALL ARE PRM -                           (9D)

 0819                    E3,1757  E3,1757    LS21X    ERASE                  I(1)
 0820                    E3,1760  E3,1765    LOSVEL   ERASE  +5              I(6)
 0821                    E3,1766  E3,1767    MLOSV    ERASE  +1              I(2) MAGNITUDE OF LOS, METERS B-29
A0822

R0823        ***** P22  *****  (OVERLAYS LPS 20.1 STORAGE)                   (6D)
 0825   REF   1          E3,1760             VSUBC    EQUALS LOSVEL          I(6)S-S  CSM VELOCITY VECTOR
A0826

R0827            PADLOADED ERASABLES FOR P20/P22                             (6D)

 0829                    E3,1770  E3,1771    RANGEVAR ERASE  +1              I(2) RR RANGE ERROR VARIANCE
 0830                    E3,1772  E3,1773    RATEVAR  ERASE  +1              I(2) RR RANGE-RATE ERROR VARIANCE
 0831                    E3,1774  E3,1774    RVARMIN  ERASE                  I(1) MINIMUM RANGE ERROR VARIANCE
 0832                    E3,1775  E3,1775    VVARMIN  ERASE                  I(1) MINIMUM RANGE-RATE ERROR VARIANCE
A0833

R0834            P32-P33 STORAGE                                             (2D)

 0836                    E3,1776  E3,1777    TCDH     ERASE  +1              I(2) T2 CDH TIME IN CS. (ALSO DOWNLINKED
A0837

 0838                    E3,1777             END-E3   EQUALS 1777            ** LAST LOCATION USED IN E3 **
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P0839                     EBANK-4 ASSIGNMENTS

 0840                          E4,1400                    SETLOC 2000

R0841    E4 IS, FOR THE MOST PART RESERVED FOR RAD LOADED AND UNSHARABLE ERASE.

 0842                          E4,1400            AMEMORY   EQUALS

R0843            P20 STORAGE. -RAD LOADED-                                      (6D)

 0845                          E4,1400  E4,1400   WRENDPOS ERASE                8(1)PL                           KM*2(-7)
 0846                          E4,1401  E4,1401   WRENDVEL ERASE                8(1)PL                    KM(-1/2)*2(11)
 0847                          E4,1402  E4,1402   WSHAFT   ERASE                8(1)PL                           KM*2(-7)
 0848                          E4,1403  E4,1403   WTRUN    ERASE                8(1)PL                           KM*2(-7)
 0849                          E4,1404  E4,1404   RMAX     ERASE                8(1)PL                      METERS*2(-19)
 0850                          E4,1405  E4,1405   VMAX     ERASE                8(1)PL                       M/CSEC*2(-7)

R0851            LUNAR SURFACE NAVIGATION                                       (2D)

 0853                          E4,1406  E4,1406   WSURFPOS ERASE                8(1)PL
 0854                          E4,1407  E4,1407   WSURFVEL ERASE                8(1)PL
A0855

R0856            P22 STORAGE. -RAD LOADED-                                      (2D)

 0858                          E4,1410  E4,1410   SHAFTVAR ERASE                8(1)PL                        RAD SQ*2(12)
 0859                          E4,1411  E4,1411   TRUNVAR  ERASE                8(1)RL                        RAD SQ*2(10)

R0860            CONISEX STORAGE.-RAD LOADED-                                   (6D)

 0862                          E4,1412  E4,1417   504LM    ERASE          +5    I(6)MOON LIBRATION VECTOR
A0863

R0864            V47(R47) AGS INITIALIZATION STORAGE. -RAD LOADED-              (2D)

 0866                          E4,1420  E4,1421   AGSK     ERASE          +1

R0867            LUNAR LANDING STORAGE. -RAD LOADED-                            (6D)

 0869                          E4,1422  E4,1427   RLS      ERASE          +5    I(6) LANDING SITE VECTOR -MOON REF
A0870

R0871            INTEGRATION STORAGE.                                           (102D)

 0873                          E4,1430  E4,1575   PBODY    ERASE          +101D I(1)
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L         ERASABLE ASSIGNMENTS                                                               USER'S PAGE NO.  26       EO S4

 0874   REF   1              E4,1431          ALPHAV    EQUALS PBODY    +1     I(6)
 0875   REF   1              E4,1437          BETAV     EQUALS ALPHAV   +6     I(6)
 0876   REF   1              E4,1445          PHIV      EQUALS BETAV    +6     I(6)
 0877   REF   1              E4,1453          PSIV      EQUALS PHIV     +6     I(6)
 0878   REF   1              E4,1461          FV        EQUALS PSIV     +6     I(6)     PERTURBING ACCELERATIONS
 0879   REF   1              E4,1467          ALPHAM    EQUALS FV       +6     I(2)
 0880   REF   1              E4,1471          BETAM     EQUALS ALPHAM   +2     I(2)
 0881   REF   1              E4,1473          TAU.      EQUALS BETAM    +2     I(2)
 0882   REF   1              E4,1475          DT/2      EQUALS TAU.     +2     I(2)
 0883   REF   1              E4,1477          H         EQUALS DT/2     +2     I(2)
 0884   REF   1              E4,1501          GMODE     EQUALS H        +2     I(1)
 0885   REF   1              E4,1502          IRETURN   EQUALS GMODE    +1     I(1)
 0886   REF   1              E4,1503          NORMGAM   EQUALS IRETURN  +1     I(1)
 0887   REF   1              E4,1504          RPQV      EQUALS NORMGAM  +1
 0888   REF   1              E4,1512          ORIGEX    EQUALS RPQV     +6     I(1)
 0889   REF   1              E4,1512          KEPRTN    EQUALS ORIGEX          I(1)
 0890   REF   2  LAST   115  E4,1513          RQVV      EQUALS ORIGEX   +1     I(6)
 0891   REF   1              E4,1521          RPSV      EQUALS RQVV     +6     I(6)
 0892   REF   1              E4,1527          XKEPNEW   EQUALS RPSV     +6     I(2)
 0893   REF   1              E4,1531          VECTAB    EQUALS XKEPNEW  +2     I(360)
 0894   REF   1              E4,1574          VECTABND  EQUALS VECTAB   +350   END MARK
A0895


R0896            THESE PROBABLY CAN SHARE MID-COURSE VARIABLES.                  (6D)

 0898   REF   2  LAST   115  E4,1537          VACX      EQUALS VECTAB   +6     I(2)
 0899   REF   1              E4,1541          VACY      EQUALS VACX     +2     I(2)
 0900   REF   1              E4,1543          VACZ      EQUALS VACY     +2     I(2)

R0901            SERVICER STORAGE  (USED BY ALL POWERED FLIGHT PROGS.)           (180)

 0903   REF   3  LAST   115  E4,1545          XNBPIP    EQUALS VECTAB   +120   I(6)
 0904   REF   1              E4,1553          YNBPIP    EQUALS XNBPIP   +6     I(6)
 0905   REF   1              E4,1561          ZNBPIP    EQUALS YNBPIP   +6     I(6)
A0906

R0907            SOME VERB 82 STORAGE                                            (40)

 0909   REF   2  LAST   115  E4,1517          HAPOX     EQUALS RQVV     +4     I(2)
 0910   REF   1              E4,1521          HPERX     EQUALS HAPOX    +2     I(2)
A0911

R0912            V82 STORAGE                                                     (6D)

 0914   REF   4  LAST   115  E4,1567          VONE'     EQUALS VECTAB   +300   I(6)TMP  NORMAL VELOCITY VONE /SQRT. MU
A0915

R0916            R31(V83) STORAGE. -SHARES WITH INTEGRATION STORAGE-             (28D)
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 0918   REF   2  LAST  115   E4,1504             BASETHV  EQUALS RQVV              I(6)     BASE VEL VECTOR THIS VEH
A0919

 0920   REF   3  LAST  115   E4,1513             BASETIME EQUALS RQVV              I(2)     TIME ASSOC WITH BASE VECS
 0921   REF   4  LAST  116   E4,1515             ORIG     EQUALS RQVV      +2      I(1)     =0 FOR EARTH =2 FOR MOON
 0922   REF   5  LAST  116   E4,1516             STATEXIT EQUALS RQVV      +3      I(1)     STQ ADDRESS FOR STATEXTP
 0923   REF   6  LAST  116   E4,1517             BASEOTV  EQUALS RQVV      +4      I(6)     BASE VEL VECTOR OTHER VEH
A0924

 0925   REF   5  LAST  115   E4,1537             BASEOTP  EQUALS VECTAB    +6      I(6)     BASE POS VECTOR OTHER VEH
A0926

 0927   REF   6  LAST  116   E4,1567             BASETHP  EQUALS VECTAB    +30D    I(6)     BASE POS VECTOR THIS VEH
A0928

R0929               KEPLER STORAGE. (KEPLER IS CALLED BY PRECISION INTEGRATION AND (2D)
R0931               CONICS)

 0932                        E4,1576  E4,1577    EPSILONT ERASE  +1                I(2)
A0933

R0934               VERB 83 STORAGE.                                               (18D)

 0936                        E4,1600  E4,1621    RANGE    ERASE            +17D    I(2)DSP NOUN 54 DISTANCE TO OPTICAL SUBJ
 0937   REF   1              E4,1602             RRATE    EQUALS RANGE     +2      I(2)DSP NOUN 54 RATE OF APPROACH.
 0938   REF   1              E4,1604             RTHETA   EQUALS RRATE     +2      I(2)DSP NOUN 54.
 0939   REF   1              E4,1606             RONE     EQUALS RTHETA    +2      I(6)TMP VECTOR STORAGE.  (SCRATCH)
 0940   REF   1              E4,1614             VONE     EQUALS RONE      +6      I(6)TMP VECTOR STORAGE.  (SCRATCH)

R0941               VERB 67 STORAGE

 0942   REF   2  LAST  116   E4,1600             WWPOS    =       RANGE            NOUN 99 (V67)
 0943   REF   2  LAST  116   E4,1602             WWVEL    =       RRATE            NOUN 99 (V67)
 0944   REF   2  LAST  116   E4,1604             WWBIAS   =       RTHETA           NOUN 99 (V67)
R0945               V82 STORAGE. (CANNOT OVERLAY RONE OR VONE)                     (11D) TWO SEPARATE LOCATIONS

 0947   REF   7  LAST  116   E4,1537             V82FLAGS EQUALS VECTAB    +6       (1) FOR V82 BITS.
 0948   REF   1              E4,1540             TFF      EQUALS V82FLAGS  +1      I(2)
 0949   REF   1              E4,1542             -TPER    EQUALS TFF       +2      I(2)
A0950

 0951   REF   3  LAST  116   E4,1600             HPERMIN  EQUALS RANGE             I(2) SET TO 300KFT OR 35KFT FOR SR30.1
 0952   REF   1              E4,1602             RPADTEM  EQUALS HPERMIN   +2      I(2) PAD OR LANDING RADIUS FOR SR30.1
 0953   REF   1              E4,1604             TSTART82 EQUALS RPADTEM   +2      I(2) TEMP TIME STORAGE FOR V82.
A0954

R0955               VARIOUS DISPLAY REGISTERS                                      (6D)     NOUN 84; P76
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 0957                     E4,1622  E4,1627   DELVOV    ERASE          +5D      (6)
A0958


R0959            ALIGNMENT PLANETARY-INERTIAL TRANSFORMATION STORAGE.            (18D)

R0961                   UNSHARED WHILE LM ON LUNAR SURFACE.

 0962                     E4,1630  E4,1651   GSAV      ERASE          +17D     I(6)
 0963      REF   1        E4,1636            YNBSAV    EQUALS GSAV    +6       I(6)
 0964      REF   1        E4,1644            ZNBSAV    EQUALS YNBSAV  +6       I(6)
A0965


R0966            KALCMANU STORAGE. CAN OVERLAY GSAV.                             (18D)

 0968      REF   2  LAST  117   E4,1630      MFS       EQUALS GSAV             I(18)
 0969      REF   1              E4,1630      MFI       EQUALS MFS              I
 0970      REF   2  LAST  117   E4,1630      KEL       EQUALS MFS              I(18)
 0971      REF   3  LAST  117   E4,1630      E01       EQUALS MFS              I(6)
 0972      REF   1              E4,1636      E02       EQUALS E01     +6       I(6)


R0973            LR VEL BEAM VECTORS.                                            (26D)
A0975
R0976            CAN OVERLAY GSAV WITH CARE, USED DURING POWERED DESCENT ONLY.

 0977      REF   3  LAST  117   E4,1630      VZBEAMNB EQUALS GSAV              I(6) LR VELOCITY BEAMS IN NB COORDS.
 0978      REF   1              E4,1636      VYBEAMNB EQUALS VZBEAMNB +6       I(6)
 0979      REF   1              E4,1644      VXBEAMNB EQUALS VYBEAMNB +6       I(6) PRESERVE Z,Y,X ORDER.


 0980      REF   1              E4,1652      LRVTIME    =      VXBEAMNB +6     B(2)      LR
 0981      REF   1              E4,1654      LRXCDU     =      LRVTIME  +2     B(1)      LR
 0982      REF   1              E4,1655      LRYCDU     =      LRXCDU   +1     B(1)      LR
 0983      REF   1              E4,1656      LRZCDU     =      LRYCDU   +1     B(1)      LR
 0984      REF   1              E4,1657      PIPTEM     =      LRZCDU   +1     B(3)      LR
A0985


R0986            R32-P35, R72-R75 STORAGE.                                       (40D)

 0988                     E4,1652  E4,1653   T1TOT2    ERASE          +1       (2)       TIME FROM CSI  TO CDH
 0989                     E4,1654  E4,1655   T2TOT3    ERASE          +1       (2)
 0990                     E4,1656  E4,1657   ELEV      ERASE          +1       (2)
 0991                     E4,1660  E4,1665   UR1       ERASE          +5       (6)
 0992                     E4,1666  E4,1673   DELVEET1  ERASE          +5       I(6)      DV CSI IN REF
 0993                     E4,1674  E4,1701   DELVEET2  ERASE          +5       I(6)      DV CSH IN REF
 0994                     E4,1702  E4,1707   RACT1     ERASE          +5       (6)       POS VEC OF ACTIVE AT CSI TIME
 0995                     E4,1710  E4,1715   RACT2     ERASE          +5       (6)       ROS VEC OF ACTIVE AT CDH TIME
 0996                        E4,1716  E4,1717   RTSR1/MU ERASE           +1      (2)      SQ ROOT 1/MU STORAGE
 0997                        E4,1720  E4,1721   RTMU     ERASE           +1      (2)      MU STORAGE
R0998

R0999               (THE FOLLOWING ERASABLES OVERLAY PORTIONS OF THE PREVIOUS SECTION)

 1001    REF   1             E4,1652            +MGA     EQUALS T1TOT2           (2) S-S + MID GIM ANGL TO DELVEET3
A1002

 1003    REF   1             E4,1660            UNRM     EQUALS UP1             I(6) S-S
A1004

 1005    REF   1             E4,1702            DVLOS    EQUALS RACT1           I(6) S-S DELTA VELOCITY,LOS COORD-DISPLA
 1006    REF   1             E4,1710            ULOS     EQUALS RACT2           I(6) S-S UNIT LINE OF SIGHT VECTOR
A1007

 1008    REF   1             E4,1716            NOMTPI   EQUALS RTSR1/MU         (2) S-S NOMINAL TPI TIME FOR RECYCLE

R1009               SOME P30 STORAGE.                                           (4D)

 1011    REF   2  LAST  118  E4,1716            HAPO     EQUALS RTSR1/MU        I(2)
 1012    REF   1             E4,1720            HPER     EQUALS HAPO     +2     I(2)
A1013

R1014               THE FOLLOWING ARE ERASABLE LOADS DURING A PERFORMANCE TEST.

 1015    REF   1             E4,1400            TRANSM1  =      WRENDPOS          E4,1400
 1016    REF   1             E4,1422            ALFDK    =      TRANSM1  +18D

R1017    ******* THE FOLLOWING SECTIONS OVERLAY V83 AND DISPLAY STORAGE *******

R1018               V47(R47)AGS INITIALIZATION PROGRAM STORAGE. (OVERLAYS V83)  (14D)

 1020    REF   4  LAST  116  E4,1600            AGSBUFF  EQUALS RANGE           B(14D)
 1021    REF   1             E4,1615            AGSBUFFE EQUALS AGSBUFF  +13D   ENDMARK

R1022               R36 OUT-OF-PLANE RENDEZVOUS DISPLAY STORAGE. (OVERLAYS V83)  (12D)

 1024    REF   2  LAST  116  E4,1606            RPASS36  EQUALS RONE            I(6) S-S
 1025    REF   1             E4,1614            UNP36    EQUALS RPASS36  +6     I(6) S-S

R1026               S-BAND ANTENNA GIMBAL ANGLES. DISPLAYED BY R05(V64).(OVERLAYS V83)  (10D)
R1028                      (OPERATES DURING P00 ONLY)
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L       ERASABLE ASSIGNMENTS                                                          USER'S PAGE NO.  30       EC S4

 1029   REF   5  LAST  118    E4,1600               ALPHASB   EQUALS RANGE                 B(2) DSP NOUN 51. PITCH ANGLE.
 1030   REF   1               E4,1602               BETASB    EQUALS ALPHASB   +2          B(2) DSP NOUN 51. YAW ANGLE.
 1031   REF   1               E4,1604               RLM       EQUALS BETASB    +2          I(6) S     S/C POSITION VECTOR.

R1032             **** USED IN S-BAND ANTENNA FOR LM ****

 1033   REF   2  LAST  119    E4,1602               YAWANG    EQUALS BETASB
 1034   REF   2  LAST  119    E4,1600               PITCHANG  EQUALS ALPHASB


R1035   NOUN 56 DATA - COMPUTED AND DISPLAYED BY VERB 85.                                  (4)

 1037   REF   1               E4,1600               RR-AZ     EQUALS PITCHANG              I(2) ANGLE BETWEEN LOS AND X-Z PLANE.
 1038   REF   1               E4,1602               RR-ELEV   EQUALS RR-AZ     +2          I(2) ANGLE BETWEEN LOS AND Y-Z PLANE.

R1039             R04(V62) RADAR TEST STORAGE.                                             (8D)
R1041             R04 IS RESTRICTED TO P00.

 1042   REF   6  LAST  119    E4,1600               RSTACK    EQUALS RANGE                 B(8)  BUFFER FOR R04 NOUNS.
A1043


R1044             INITVEL STORAGE.  ALSO USED BY P31,P34,P35,P74,P75,P10,P11,MIDGIM,S40.1 AND S40.9. (18D)

R1046                         (POSSIBLY RINIT & VINIT CAN OVERLAY DELVEET1 & 2 ABOVE)
 1047                         E4,1722  E4,1727   RINIT     ERASE            +5          I(6) ACTIVE VEHICLE POSITION
 1048                         E4,1730  E4,1735   VINIT     ERASE            +5          I(6) ACTIVE VEHICLE VELOCITY
 1049                         E4,1736  E4,1743   VIPRIME   ERASE            +5          I(6) NEW VEL REQUIRED AT INITIAL RADIUS.

R1050             VARIOUS DISPLAY REGISTERS.  BALLANGS                                     (3D)

 1052                         E4,1744  E4,1744   FDAIX     ERASE                        I(1)
 1053                         E4,1745  E4,1745   FDAIY     ERASE                        I(1)
 1054                         E4,1746  E4,1746   FDAIZ     ERASE                        I(1)
A1055

R1056             P34-P35 STORAGE.  DOWNLINKED.                                            (2D)

 1058                         E4,1747  E4,1750   DELVTPF   ERASE            +1          I(2) DELTA V FOR TPF
A1059

R1060             LPS20.1 STORAGE.  CALLED BY R65.                                         (12D)

 1062                         E4,1751  E4,1756   LMPOS     ERASE            +5          I(6) TEMP. STORAGE FOR LM POS. VECTOR.
 1063                         E4,1757  E4,1764   LMVEL     ERASE            +5          I(6) TEMP. STORAGE FOR LM VEL. VECTOR.
A1064
R1065   INITVEL STORAGE.  ALSO USED BY P31,34,35,74,75,S40.1 AND DOWNLINKED.               (6D)

 1067                         E4,1765  E4,1772   DELVEET3 ERASE             +5          I(6) DELTA V IN INERTIAL COORDINATES.
A1068
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L        ERASABLE ASSIGNMENTS                                                       USER'S PAGE NO.  31       FC S4

R1069              SOME R04(V63)-R77 STORAGE.                                      (60)

 1071                          E4,1773  E4,1773   RTSTDEX  ERASE                    B(1)
 1072                          E4,1774  E4,1774   RTSTMAX  ERASE                    B(1)
 1073                          E4,1775  E4,1775   RTSTBASE ERASE                    B(1)
 1074                          E4,1776  E4,1776   RTSTLOC  ERASE                    B(1)
 1075                          E4,1777  E4,1777   RSAMPDT  ERASE                    B(1)
 1076     REF   2  LAST  115   E4,1575            RFAILCNT EQUALS PBODY     +101D   B(1)
A1077

 1078                          E5,1400            END-E4   EQUALS                   FIRST UNUSED LOCATION IN E4

R1079              SECOND DPS GUIDANCE (LUNAR LANDING)  (OVERLAY P32-35,INITVEL)   (12D)

 1082     REF   1              E4,1664            ANGTERM  EQUALS PIPTEM +5         I(6)    GUIDANCE
 1083     REF   1              E4,1672            HBEAMNB  EQUALS ANGTERM  +6       I(6) LANDING RADAR
A1084

R1085              R12 DOWNLINK QUANTITIES                                         (5D)

 1087     REF   1              E4,1734            LRXCDUDL EQUALS /LAND/    +2      B(1) LANDING RADAR DOWNLINK
 1088     REF   1              E4,1735            LRYCDUDL EQUALS LRXCDUDL +1       B(1) LANDING RADAR DOWNLINK
 1089     REF   1              E4,1736            LRZCDUDL EQUALS LRYCDUDL +1       B(1) LANDING RADAR DOWNLINK
 1090     REF   1              E4,1737            LRVTIMDL EQUALS LRZCDUDL +1       B(2) LANDING RADAR DOWNLINK


A1091

R1092              ASCENT GUIDANCE FOR LUNAR LANDING                               (54D)

 1094     REF   2  LAST  120   E4,1662            AT       EQUALS PIPTEM    +3      I(2)TMP  ENGINE DATA -- THRUST ACC*2(9)
 1095     REF   1              E4,1664            VE       EQUALS AT        +2      I(2)TMP  EXHAUST VELOCITY * 2(7)M/CS.
 1096     REF   1              E4,1666            TTO      EQUALS VE        +2      I(2)TMP  TAILOFF TIME * 2(17)CS.
 1097     REF   1              E4,1670            TBUP     EQUALS TTO       +2      I(2)TMP  (M/MDOT) * 2(17)CS.
 1098     REF   1              E4,1672            RDOTD    EQUALS TBUP      +2      I(2)TMP  TARGET VELOCITY COMPONENTS
 1099     REF   1              E4,1674            YDOTD    EQUALS RDOTD     +2      I(2)TMP SCALING IS 2(7)M/CS.
 1100     REF   1              E4,1676            ZDOTD    EQUALS YDOTD     +2      I(2)TMP

 1101     REF   1              E4,1700            /R/MAG   EQUALS ZDOTD     +2      I(2)TMP
 1102     REF   1              E4,1702            LAXIS    EQUALS /R/MAG    +2      I(6)TMP
 1103     REF   1              E7,1725            ZAXIS1   =      UHZP
 1104     REF   1              E7,1473            RDOT     =      HDOTDISP
 1105     REF   1              E4,1710            YDOT     =      LAXIS     +6      I(2)TMP VEL. NORMAL TO REF. PLANE*2(-7)
 1106     REF   1              E4,1712            ZDOT     EQUALS YDOT      +2      I(2)TMP  DOWN RANGE VEL *2(-7).
 1107     REF   1              E4,1714            GEFF     EQUALS ZDOT      +2      I(2)TMP  EFFECTIVE GRAVITY

R1108         THESE TWO GROUPS OF ASCENT GUIDANCE ARE SPLIT BY THE ASCENT-DESCENT  SERVICER SECTION FOLLOWING THIS SECTION

 1110     REF   2  LAST  120   E4,1734            Y        EQUALS /LAND/    +2      I(2)TMP  OUT-OF-PLANE DIST *2(24)M
 1111     REF   1              E4,1736            DRDOT    EQUALS Y         +2      I(2)TMP  RDOTD - RDOT
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L       ERASABLE ASSIGNMENTS                                                                  USER'S PAGE NO.  32      EQ S4

 1112  REF   1                 E4,1740           DYDOT     EQUALS DXDOT     +2       I(2)TMP  YDOTD - YDOT
 1113  REF   1                 E4,1742           DZDOT     EQUALS DYDOT     +2       I(2)TMP  ZDOTD - ZDOT
 1114  REF   1                 E4,1744           PCONS     EQUALS DZDOT     +2       I(2)TMP  CONSTANT IN ATP EQUATION
 1115  REF   1                 E4,1746           YCONS     EQUALS PCONS     +2       I(2)TMP  CONSTANT IN ATY EQUATION
 1116  REF   1                 E4,1750           PRATE     EQUALS YCONS     +2       I(2)TMP  RATE COEFF. IN ATR EQUATION
 1117  REF   1                 E4,1752           YRATE     EQUALS PRATE     +2       I(2)TMP  RATE COEFF. IN ATY EQUATION
 1118  REF   1                 E4,1754           ATY       EQUALS YRATE     +2       I(2)TMP  OUT-OF-PLANE THRUST COMP.*2(9)
 1119  REF   1                 E4,1756           ATR       EQUALS ATY       +2       I(2)TMP  RADIAL THRUST COMP.*2(9)
 1120  REF   1                 E4,1760           ATP       EQUALS ATR       +2       I(2)TMP  DOWN-RANGE THRUST COMP
 1121  REF   1                 E4,1762           YAW       EQUALS ATP       +2       I(2)TMP
 1122  REF   1                 E4,1764           PITCH     EQUALS YAW       +2       I(2)TMP
A1123

R1124              SERVICER FOR LUNAR ASCENT AND DESCENT                             (14D)

 1126  REF   1                 E4,1716           G(CSM)    EQUALS GEFF      +2       I(6) FOR UPDATE OF COMMAND MODULE STATE
 1127  REF   1                 E3,1717           R(CSM)    EQUALS R-OTHER                 VECTORS BY LEM; ANALOGS OF GDT/2,
 1128  REF   1                 E3,1725           V(CSM)    EQUALS V-OTHER                 R, AND V, RESPECTIVELY OF THE CSM
 1129  REF   1                 E4,1724           WM        EQUALS G(CSM)    +6       I(6) TMP - LUNAR ROTATION VECTOR (SM)
 1130  REF   1                 E4,1732           /LAND/    EQUALS WM        +6       B(2) LUNAR RADIUS AT LANDING SITE
A1131
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P1132               EBANK-5 ASSIGNMENTS

 1133                          E5,1400               SETLOC 2400

R1134               W-MATRIX. ESSENTIALLY UNSHARABLE.                          (162D)

 1136                          E5,1400  E5,1641   W        ERASE              +161D
 1137    REF    1              E5,1642            ENDW     EQUALS W           +162D

A1138

R1139    *******    OVERLAY NUMBER 1 IN EBANK 5   *******

R1140               W-MATRIX PADLOADS                                          (124D)

R1142     PLEASE RETAIN THE ORDER OF TLAND THRU JAPFG

 1143    REF    2  LAST  122   E5,1400            TLAND    EQUALS W                I(2)  NOMINAL TIME OF LANDING
 1144    REF    1              E5,1402            RBRFG    EQUALS TLAND       +2   I(6) BRAKING
 1145    REF    1              E5,1410            VBRFG    EQUALS RBRFG       +6   I(6)      PHASE
 1146    REF    1              E5,1416            ABRFG    EQUALS VBRFG       +6   I(6)         TARGET
 1147    REF    1              E5,1424            VBRFG*   EQUALS ABRFG       +6   I(2)            PARAMETERS:
 1148    REF    1              E5,1426            ABRFG*   EQUALS VBRFG*      +2   I(2)               HIGH
 1149    REF    1              E5,1430            JBRFG*   EQUALS ABRFG*      +2   I(2)                  GATE
 1150    REF    1              E5,1432            GAINBRAK EQUALS JBRFG*      +2   B(2)
 1151    REF    1              E5,1434            TCGFBRAK EQUALS GAINBRAK    +2   B(1)
 1152    REF    1              E5,1435            TCGIBRAK EQUALS TCGFBRAK    +1   B(1)
 1153    REF    1              E5,1436            RAPFG    EQUALS TCGIBRAK    +1   I(6) APPROACH
 1154    REF    1              E5,1444            VAPFG    EQUALS RAPFG       +6   I(6)      PHASE
 1155    REF    1              E5,1452            AAPFG    EQUALS VAPFG       +6   I(6)         TARGET
 1156    REF    1              E5,1460            VAPFG*   EQUALS AAPFG       +6   I(2)            PARAMETERS:
 1157    REF    1              E5,1462            AAPFG*   EQUALS VAPFG*      +2   I(2)               LOW
 1158    REF    1              E5,1464            JAPFG*   EQUALS AAPFG*      +2   I(2)                  GATE
 1159    REF    1              E5,1466            GAINAPPR EQUALS JAPFG*      +2   B(2)
 1160    REF    1              E5,1470            TCGFAPPR EQUALS GAINAPPR    +2   B(1)
 1161    REF    1              E5,1471            TCGIAPPR EQUALS TCGFAPPR    +1   B(1)
 1162    REF    1              E5,1472            VIGN     EQUALS TCGIAPPR    +1   I(2)  DESIRED SPEED FOR IGNITION
 1163    REF    1              E5,1474            RIGNX    EQUALS VIGN        +2   I(2)  DESIRED 'ALTITUDE' FOR IGNITION
 1164    REF    1              E5,1476            RIGNZ    EQUALS RIGNX       +2   I(2)  DESIRED GROUND RANGE FOR IGNITION
 1165    REF    1              E5,1500            KIGNX/B4 EQUALS RIGNZ       +2   I(2)
 1166    REF    1              E5,1502            KIGNY/B8 EQUALS KIGNX/B4    +2   I(2)
 1167    REF    1              E5,1504            KIGNV/B4 EQUALS KIGNY/B8    +2   I(2)
 1168    REF    1              E5,1506            LOWCRIT  EQUALS KIGNV/B4    +2   B(1) (HIGHCRIT MUST FOLLOW LOWCRIT)
 1169    REF    1              E5,1507            HIGHCRIT EQUALS LOWCRIT     +1   B(1)
 1170    REF    1              E5,1510            V2FG     EQUALS HIGHCRIT    +1   I(6) DESIRED VELOCITY FOR P65.
 1171    REF    1              E5,1516            TAUVERT  EQUALS V2FG        +6   I(2) TIME CONSTANT FOR P65 VEL. NULLING.
 1172    REF    1              E5,1520            DELQFIX  EQUALS TAUVERT     +2   I(2) LR ALTITUDE DATA REASONABLE PARM.
 1173    REF    1             /E5,1522            LRALPHA  EQUALS DELQFIX     +2   B(1)   POS1 X ROTATION      * MUST *
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L        ERASABLE ASSIGNMENTS                                                                       USER'S PAGE NO. 34      EC S4

 1174    REF   1                 E5,1523            LRBETA1   EQUALS LRALPHA  +1     B(1)    POS1 Y ROTATION      *  BE  *
 1175    REF   1                 E5,1524            LRALPHA2  EQUALS LRBETA1  +1     B(1)    POS2 X ROTATION      *  IN  *
 1176    REF   1                 E5,1525            LRBETA2   EQUALS LRALPHA2 +1     B(1)    POS2 Y ROTATION      *ORDER*
 1177    REF   1                 E5,1526            LRVMAX    EQUALS LRBETA2  +1     B(1)    LR VEL WEIGHTING FUNCTIONS
 1178    REF   1                 E5,1527            LRVF      EQUALS LRVMAX   +1     B(1)    LR VEL WEIGHTING FUNCTIONS
 1179    REF   1                 E5,1530            LRWVZ     EQUALS LRVF     +1     B(1)    LR VEL WEIGH ING FUNCTIONS
 1180    REF   1                 E5,1531            LRWVY     EQUALS LRWVZ    +1     B(1)    LR VEL WEIGH ING FUNCTIONS
 1181    REF   1                 E5,1532            LRWVX     EQUALS LRWVY    +1     B(1)    LR VEL WEIGH ING FUNCTIONS
 1182    REF   1                 E5,1533            LRWVFZ    EQUALS LRWVX    +1     B(1)    LR VEL WEIGH ING FUNCTIONS
 1183    REF   1                 E5,1534            LRWVFY    EQUALS LRWVFZ   +1     B(1)    LR VEL WEIG  ING FUNC IONS
 1184    REF   1                 E5,1535            LRWVFX    EQUALS LRWVFY   +1     B(1)    LR VEL WEIG  ING FUNC IONS
 1185    REF   1                 E5,1536            LRWVFF    EQUALS LRWVFX   +1     B(1)    LR VEL WEIG  ING FUNC IONS

 1186    REF   5  LAST   98        0130             ABVEL*    EQUALS BUF             B(1)    LR TEMP
 1187    REF   6  LAST  123        0131             VSELECT*  EQUALS BUF +1          B(1)    LR TEMP

 1188    REF   1                 E5,1537            RODSCALE  EQUALS LRWVFF   +1     I(1) CLICK SCALE FACTOR FOR ROD
 1189    REF   1                 E5,1540            TAUROD    EQUALS RODSCALE +1     I(2) TIME CONSTANT FOR P.O.D.
 1190    REF   1                 E5,1542            LAG/TAU   EQUALS TAUROD   +2     I(2) LAG TIME DIVIDED BY TAUROD (P66)
 1191    REF   1                 E5,1544            MINFORCE  EQUALS LAG/TAU  +2     I(2) MINIMUM FORCE P66 WILL COMMAND.
 1192    REF   1                 E5,1546            MAXFORCE  EQUALS MINFORCE +2     I(2) MAXIMUM FORCE P66 WILL COMMAND.
 1193    REF   1                 E5,1550            J1PARM    EQUALS MAXFORCE +2     I(2) PARAMETER SET # 1:
 1194    REF   1                 E5,1552            K1PARM    EQUALS J1PARM   +2     I(2)    ABORT ORBIT SEMI-MAJOR AXIS COMP
 1195    REF   1                 E5,1554            J2PARM    EQUALS K1PARM   +2     I(2) PARAMETER SET # 2:
 1196    REF   1                 E5,1556            K2PARM    EQUALS J2PARM   +2     I(2)    ABORT ORBIT SEMI-MAJOR AXIS COMP
 1197    REF   1                 E5,1560            THETCRIT  EQUALS K2PARM   +2     I(2) CENTRAL ANGLE SWITCHING CRITERION.
 1198    REF   1                 E5,1562            RAMIN     EQUALS THETCRIT +2     I(2) MINIMUM ALLOWABLE APOLUNE.
 1199    REF   1                 E5,1564            YLIM      EQUALS RAMIN    +2     I(2) MAXIMUM CROSS-RANGE DIST. IN ABORTS
 1200    REF   1                 E5,1566            ABTRDOT   EQUALS YLIM     +2     I(2) DESIRED RADIAL VEL. FOR ABORTS.
 1201    REF   1                 E5,1570            COSTHET1  EQUALS ABTRDOT  +2     I(2) COS OF CONE 1 ANGLE FOR ABORTS
 1202    REF   1                 E5,1572            COSTHET2  EQUALS COSTHET1 +2     I(2) COS OF CONE 2 ANGLE FOR ABORTS.
A1203

R1210             SOME VARIABLES FOR SECOND DPS GUIDANCE                                 (3BD)

 1212    REF   1                 E5,1574            CG        EQUALS COSTHET2 +2     I(18D) GUIDANCE
 1213    REF   1                 E5,1616            RANGEDSP  EQUALS CG       +18D   B(2) DISPLAY
 1214    REF   1                 E5,1616            OUTOFPLN  EQUALS RANGEDSP         *** OUTOFPLN CAN OVERLAY RANGEDSP ***
 1215    REF   1                 E5,1620            R60VSAVE  EQUALS OUTOFPLN +2     I(6)TMP SAVES VALUE OF POINTVSM THRU R51
 1216    REF   1                 E5,1626            RGU       EQUALS R60VSAVE +6     I(6) UNSHAPED FOR DOWNLINK
 12162   REF   1                 E5,1634            DLAND     EQUALS RGU      +6     I(6)    LANDING SITE CORRECTION SM FRAME
 12164   REF   1                 E5,1634            DLANDX    EQUALS DLAND
 12166   REF   2  LAST  123      E5,1636            DLANDY    EQUALS DLAND    +2
 12168   REF   3  LAST  123      E5,1640            DLANDZ    EQUALS DLAND    +4
 1217    REF   2  LAST  123      E5,1620            VBIAS     EQUALS R60VSAVE        I(6) PIPA BIAS EQUIV. VELOCITY VECTOR
 12172   REF   3  LAST  123      E5,1620            JPARM     EQUALS R60VSAVE        I(2) JPARM WILL EQUAL J1PARM OR J2PARM.
 12174   REF   1                 E5,1622            KPARM     EQUALS JPARM    +2     I(2) KPARM WILL EQUAL K1PARM OR K2PARM
 12176   REF   1                 E5,1624            RP        EQUALS KPARM    +2     I(2) PREDICTED BURNOUT RADIUS-M*2(-24)
 1218    REF   7  LAST  123        0130             L*WCR*T   =      BUF
 1219    REF   8  LAST  123        0131             H*GHCR*T  =      BUF +1
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A1220

R1221               ALIGNMENT/SYSTEST/CALCSMSC COMMON STORAGE.                          (36D)

 1223   REF    1                E5,1642           XSM       EQUALS ENDW                  B(6)
 1224   REF    1                E5,1650           YSM       EQUALS XSM          +6       B(6)
 1225   REF    1                E5,1656           ZSM       EQUALS YSM          +6       B(6)

 1226   REF    1                E5,1664           XDC       EQUALS ZSM          +6       B(6)
 1227   REF    1                E5,1672           YDC       EQUALS XDC          +6       B(6)
 1228   REF    1                E5,1700           ZDC       EQUALS YDC          +6       B(6)

 1229   REF    2  LAST   124    E5,1664           XNB       =      XDC
 1230   REF    2  LAST   124    E5,1672           YNB       =      YDC
 1231   REF    1                E5,1700           ZNB       =      ZDC


R1232               OVERLAYS WITHIN ALIGNMENT/SYSTEST/CALCSMSC COMMON STORAGE.          (4D)

 1234   REF    2  LAST   124    E5,1644           -COSB     EQUALS XSM          +2        (2)TMP
 1235   REF    1                E5,1646           SINB      EQUALS -COSB        +2        (2)TMP


R1236               MORE OVERLAYS TO ALIGNMENT /SYSTEST  (THESE ARE P52)                (6D)

 1238   REF    1                E5,1706           LANDLAT   EQUALS STARAD                (2) LATITUDE, LONGITUDE
 1239   REF    1                E5,1710           LANDLONG  EQUALS LANDLAT      +2       (2)      AND ALTITUDE
 1240   REF    1                E5,1712           LANDALT   EQUALS LANDLONG     +2       (2)      OF LANDING SITE
A1241

R1242               ALIGNMENT/SYSTEST COMMON STORAGE.                                   (31D)

 1244   REF    2  LAST   124    E5,1706           STARAD    EQUALS ZDC          +6       I(18D)TMP
 1245   REF    2  LAST   124    E5,1730           STAR      EQUALS STARAD       +18D     I(6)
 1246   REF    1                E5,1736           GCTR      EQUALS STAR         +6       B(1)
 1247   REF    1                E5,1737           OGC       EQUALS GCTR         +1       I(2)
 1248   REF    1                E5,1741           IGC       EQUALS OGC          +2       I(2)
 1249   REF    1                E5,1743           MGC       EQUALS IGC          +2       I(2)

R1250               P57 ALIGNMENT (OVERLAY OF ALIGNMENT/SYSTEST COMMON STORAGE)         (12D)

 1252   REF    3  LAST   124    E5,1706           GACC      =      STARAD                (6) SS
 1253   REF    4  LAST   124    E5,1714           GOUT      =      STARAD       +6       (6) SS
A1254

R1255               OVERLAYS WITHIN ALIGNMENT/SYSTEST COMMON STORAGE                    (24D)

 1257   REF    5  LAST   124    E5,1706           VEARTH    EQUALS STARAD                 (6)TMP
 1258   REF    1                E5,1714           VSUN      EQUALS VEARTH       +6        (6)TMP
 1259   REF    1                E5,1722           VMOON     EQUALS VSUN         +6        (6)TMP
 1260   REF    1              E5,1730             SAX       EQUALS VMOON      +6      (6)TMP

 R1261              P50'S,R50'S Q STORES.                                          (2D)

 1263   REF    1              E5,1745             QMIN      EQUALS MGC        +2      B(1)TMP
 1264   REF    1              E5,1746             QMAJ      EQUALS QMIN       +1      B(1)TMP
 R1265

 R1266           **** USED IN P50S ****    (SCATTERED OVERLAYS)
 1267   REF    6  LAST  124   E5,1706             XSCI      EQUALS STARAD
 1268   REF    1              E5,1714             YSCI      EQUALS XSCI +6
 1269   REF    1              E5,1714             ZSCI      EQUALS YSCI
 1270   REF    2  LAST  124   E5,1706             CULTRIX   EQUALS VEARTH             VEARTH, VSUN, VMOON
 A1271


 R1272              ALIGNMENT STORAGE.                                             (23D)

 1274   REF    1              E5,1747             OGCT      EQUALS QMAJ       +1      I(6)
 1275   REF    1              E5,1755             BESTI     EQUALS OGCT       +6      I(1)
 1276   REF    1              E5,1756             BESTJ     EQUALS BESTI +1
 1277   REF    1              E5,1757             STARIND   EQUALS BESTJ +1
 R1278       RETAIN THE ORDER OF STARSAV1 TO STARSAV2 +5 FOR DOWNLINK PURPOSES.
 1279   REF    1              E5,1760             STARSAV1  EQUALS STARIND    +1      I(6)
 1280   REF    1              E5,1766             STARSAV2  EQUALS STARSAV1   +6      I(6)
 1281   REF    1              E5,1774             TALIGN    EQUALS STARSAV2   +6      B(2) TIME OF IMU ALIGNMENT  (DOWNLINKED)
 A1282

 R1283              P32-35 + SERVICER                                              (2D)

 1285   REF    1              E5,1776             RTX1      EQUALS TALIGN     +2      I(1) X1   -2 EARTH, -10 MOON
 1286   REF    1              E5,1777             RTX2      EQUALS RTX1       +1      I(1) X2   0 EARTH, 2 MOON
 A1287

 1288                            0026             ZPRIME    =         22D
 1289                            0026             PDA       =         22D
 1290                            0020             COSTH     =         16D
 1291                            0022             SINTH     =         18D
 1292                            0024             THETA     =         20D
 1293                            0040             STARM     =         32D
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P1294   *******  OVERLAY NUMBER 2 IN EBANK 5  *******


R1295              CONICS ROUTINE STORAGE.                                     (85D)

 1297   REF   2  LAST  124   E5,1642        DELX      EQUALS ENDW               I(2)TMP
 1298   REF   1              E5,1644        DELT      EQUALS DELX       +2      I(2)TMP
 1299   REF   1              E5,1646        URRECT    EQUALS DELT       +2      I(6)TMP
 1300                           0042        RCNORM    EQUALS 34D                I(2) TMP
 1301   REF   1              E3,1552        XPREV     EQUALS XKEP               I(2)TMP
 1302   REF   1              E5,1654        R1VEC     EQUALS URRECT    +6       I(6) TMP
 1303   REF   1              E5,1662        R2VEC     EQUALS R1VEC      +6      I(6)TMP
 1304   REF   1              E5,1670        TDESIRED  EQUALS R2VEC      +6      I(2)TMP
 1305   REF   1              E5,1672        GEOMSGN   EQUALS TDESIRED   +2      I(1)TMP
 1306   REF   1              E5,1673        UN        EQUALS GEOMSGN    +1      I(6)TMP
 1307   REF   1              E5,1701        VTARGTAG  EQUALS UN         +6      I(1)TMP
 1308   REF   1              E5,1702        VTARGET   EQUALS VTARGTAG   +1      I(6)TMP
 1309   REF   1              E5,1710        RTNLAMB   EQUALS VTARGET    +6      I(1)TMP
 1310   REF   1              E5,1711        U2        EQUALS RTNLAMB    +1      I(6)TMP
 1311   REF   1              E5,1717        MAGVEC2   EQUALS U2         +6      I(2)TMP
 1312   REF   1              E5,1721        UR1       EQUALS MAGVEC2    +2      I(6)TMP
 1313   REF   1              E5,1727        SNTH      EQUALS UR1        +6      I(2)TMP
 1314   REF   1              E5,1731        CSTH      EQUALS SNTH       +2      I(2)TMP
 1315   REF   1              E5,1733        1-CSTH    EQUALS CSTH       +2      I(2)TMP
 1316   REF   1              E5,1735        CSTH-RHO  EQUALS 1-CSTH     +2      I(2)TMP
 1317   REF   1              E5,1737        P         EQUALS CSTH-RHO   +2      I(2)TMP
 1318   REF   1              E5,1741        R1A       EQUALS P          +2      I(2)TMP
 1319   REF   2  LAST  126   E5,1654        RVEC      EQUALS R1VEC              I(6)TMP
 1320   REF   1              E5,1743        VVEC      EQUALS R1A        +2      I(6)TMP
 1321   REF   2  LAST  126   E5,1710        RTNTT     EQUALS RTNLAMB            I(1)TMP
 1322   REF   1              E5,1751        ECC       EQUALS VVEC       +6      I(2)TMP
 1323   REF   3  LAST  126   E5,1710        RTNTR     EQUALS RTNLAMB            I(1)TMP
 1324   REF   4  LAST  126   E5,1710        RTNAPSE   EQUALS RTNLAMB            I(1)TMP
 1325   REF   2  LAST  126   E5,1717        R2        EQUALS MAGVEC2            I(2)TMP
 1326   REF   1              E5,1753        RTNPRM    EQUALS ECC        +2      I(1)TMP
 1327   REF   1              E5,1754        SGNRDOT   EQUALS RTNPRM     +1      I(1)TMP
 1328   REF   1              E5,1755        RDESIRED  EQUALS SGNRDOT    +1      I(2)TMP
 1329   REF   1              E5,1757        DELDEP    EQUALS RDESIRED   +2      I(2)TMP
 1330   REF   1              E5,1761        DEPREV    EQUALS DELDEP     +2      I(2)TMP
 1331   REF   2  LAST  126   E5,1757        TERRLAMB  EQUALS DELDEP             I(2)TMP
 1332   REF   1              E5,1761        TPREV     EQUALS DEPREV             I(2)TMP
 1333   REF   2  LAST  126   E5,1763        EPSILONL  EQUALS DEPREV     +2      I(2)TMP
 1334   REF   1              E5,1765        COGA      EQUALS EPSILONL   +2      I(2) COTAN OF INITIAL FLIGHT PATH ANGLE.
 1335   REF   1              E5,1765        INDEP     EQUALS COGA                    USED BY SUBROUTINE'ITERATOR'.
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P1336   *******  OVERLAY NUMBER 3 IN EBANK 5  *******

R1337             INCORP STORAGE.                                                         (18D)

 1339   REF   3   LAST  126   E5,1642          ZI        EQUALS ENDW                      I(18)TMP

R1340             INCORP/LSR22.3 STORAGE.                                                 (21D)

 1342   REF   1               E5,1664          DELTAX    EQUALS ZI         +18D           I(18)
 1343   REF   1               E5,1706          VARIANCE  EQUALS DELTAX     +18D           I(3)

R1344             MEASUREMENT INCORPORATION -R22- STORAGE.                                (49D)

 1346   REF   1               E5,1711          GRP2SVQ   EQUALS VARIANCE   +3             I(1)TMP QSAVE FOR RESTARTS
 1347   REF   1               E5,1712          OMEGAM1   EQUALS GRP2SVQ    +1             I(6)
 1348   REF   1               E5,1720          OMEGAM2   EQUALS OMEGAM1    +6             I(6)
 1349   REF   1               E5,1726          OMEGAM3   EQUALS OMEGAM2    +6             I(6)
 1350   REF   1               E5,1734          HOLDW     EQUALS OMEGAM3    +6             I(18)
 1351   REF   1               E5,1756          TDPOS     EQUALS HOLDW      +18D           I(6)
 1352   REF   1               E5,1764          TDVEL     EQUALS TDPOS      +6             I(6)
A1353

 1354   REF   2   LAST  127   E5,1664          TRIPA     EQUALS DELTAX                    I(3)TMP
 1355   REF   1               E5,1667          TEMPVAR   EQUALS TRIPA      +3             I(3)TMP

A1356


R1357             INCORPORATION/INTEGRATION C STORAGE.                                    (1D)

 1359   REF   1               E5,1772          EGRESS    EQUALS TDVEL      +6             I(1)
A1360


R1361             P30/P31 STORAGE.                                                        (1D) AND ONE OVERLAY

 1363   REF   1               E5,1773          P30EXIT   EQUALS EGRESS     +1             B(1)TMP
A1364

 1365   REF   1               E5,1773          ORIGIN    EQUALS P30EXIT                   I(1)TMP  INDEX DURING INITVEL
A1366
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P1367             SYSTEM TEST ERASABLES.  CAN OVERLAY W MATRIX.                                (127D)

R1369   *******   OVERLAY NUMBER 0  IN  EBANK 5   *******


 1370   REF    3  LAST  122    E5,1400               AZIMUTH   EQUALS W                   2
 1371   REF    1               E5,1402               LATITUDE  EQUALS AZIMUTH   +2        2
 1372   REF    1               E5,1404               ERVECTOR  EQUALS LATITUDE  +2        6
 1373   REF    1               E5,1412               LENGTHOT  EQUALS ERVECTOR  +6        1
 1374   REF    1               E5,1413               LOSVEC    EQUALS LENGTHOT  +1        6
 1375   REF    1               E5,1414               NDXCTR    EQUALS LOSVEC    +1        1
 1376   REF    1               E5,1415               PIPINDEX  EQUALS NDXCTR    +1        1
 1377   REF    1               E5,1416               POSITON   EQUALS PIPINDEX  +1        1
 1378   REF    1               E5,1417               QPLACE    EQUALS POSITON   +1        1
 1379   REF    1               E5,1420               QPLACES   EQUALS QPLACE    +1        1
 1380   REF    1               E5,1421               SOUTHDR   EQUALS QPLACES   +1        7
 1381   REF    1               E5,1430               TEMPTIME  EQUALS SOUTHDR   +7        2
 1382   REF    1               E5,1432               TMARK     EQUALS TEMPTIME  +2        2
 1383   REF    1               E5,1434               GENPL     EQUALS TMARK     +2
 1384   REF    1               E5,1434               CDUTIMEI  =      GENPL
 1385   REF    2  LAST  128    E5,1436               CDUTIMEF  =      GENPL  +2
 1386   REF    3  LAST  128    E5,1440               CDUCANG   =      GENPL  +4
 1387   REF    4  LAST  128    E5,1441               CDUREADF  =      GENPL  +5
 1388   REF    5  LAST  128    E5,1442               CDUREADI  =      GENPL  +6
 1389   REF    6  LAST  128    E5,1443               CDULIMIT  =      GENPL  +7

 1390   REF    7  LAST  128    E5,1440               TEMPADD   =      GENPL  +4
 1391   REF    8  LAST  128    E5,1441               TEMP      =      GENPL  +5
 1392   REF    9  LAST  128    E5,1442               NOBITS    =      GENPL  +6
 1393   REF   10  LAST  128    E5,1443               CHAN      =      GENPL  +7

 1394   REF   11  LAST  128    E5,1444               LOS1      =      GENPL  +8D
 1395   REF   12  LAST  128    E5,1452               LOS2      =      GENPL  +14D

 1396   REF   13  LAST  128    E5,1460               CALCDIR   EQUALS GENPL  +20D
 1397   REF   14  LAST  128    E5,1461               CDUFLAG   EQUALS GENPL  +21D
 1398   REF   15  LAST  128    E5,1462               GYTOBETQ  EQUALS GENPL  +22D
 1399   REF   16  LAST  128    E5,1463               OPTNREG   EQUALS GENPL  +23D
 1400   REF   17  LAST  128    E5,1464               SAVE      EQUALS GENPL  +24D         THREE  ONSEC LOC
 1401   REF   18  LAST  128    E5,1467               SFCONST1  EQUALS GENPL  +27D
 1402   REF   19  LAST  128    E5,1470               TIMER     EQUALS GENPL  +28D

 1403   REF   20  LAST  128    E5,1472               DATAPL    EQUALS GENPL  +30D
 1404   REF   21  LAST  128    E5,1434               RDSP      EQUALS GENPL               FIX LATER   POSSIBLY KEEP1
 1405   REF   22  LAST  128    E5,1534               MASKREG   EQUALS GENPL  +64D
 1406   REF   23  LAST  128    E5,1536               CDUNDX    EQUALS GENPL  +66D
 1407   REF   24  LAST  128    E5,1537               RESULTCT  EQUALS GENPL  +67D
 1408   REF   25  LAST  128    E5,1542               CDUNTPL   EQUALS GENPL  +70D

 1409   REF   26  LAST  128    E5,1543               CDUANG    EQUALS GENPL  +71D
 1410   REF 27  LAST 128    E5,1434           AINLA    =      GENPL            110 DE  CR-156 CCT LOCATIONS

 1411   REF  1              E5,1434           WANGO    EQUALS AINLA            VERT E ATE
 1412   REF  2  LAST 129    E5,1436           WANGI    EQUALS AINLA +2D        HORIZO TAL EPATE
 1413   REF  3  LAST 129    E5,1440           WANGT    EQUALS AINLA +4D        T
 1414   REF  1              E5,1440           TORQNDX  =      WANGT
 1415   REF  4  LAST 129    E5,1442           DRIFTT   EQUALS AINLA +6D
 1416   REF  5  LAST 129    E5,1444           ALX1S    EQUALS AINLA +8D
 1417   REF  6  LAST 129    E5,1445           CMPX1    EQUALS AINLA +9D        IND
 1418   REF  7  LAST 129    E5,1446           ALK      EQUALS AINLA +10D       GAINS
 1419   REF  8  LAST 129    E5,1462           VLAUNS   EQUALS AINLA +22D
 1420   REF  9  LAST 129    E5,1464           WPLATO   EQUALS AINLA +24D
 1421   REF 10  LAST 129    E5,1470           INTY     EQUALS AINLA +28D       SOUTH  IP INTE
 1422   REF 11  LAST 129    E5,1472           ANGZ     EQUALS AINLA +30D       EAST A IS
 1423   REF 12  LAST 129    E5,1474           INTZ     EQUALS AINLA +32D       EAST P P I
 1424   REF 13  LAST 129    E5,1476           ANGY     EQUALS AINLA +34D       SOUTH
 1425   REF 14  LAST 129    E5,1500           ANGX     EQUALS AINLA +36D       VE
 1426   REF 15  LAST 129    E5,1502           DRIFTO   EQUALS AINLA +38D       VERT
 1427   REF 16  LAST 129    E5,1504           DRIFTI   EQUALS AINLA +40D       SOU
 1428   REF 17  LAST 129    E5,1510           VLAUN    EQUALS AINLA +44D
 1429   REF 18  LAST 129    E5,1512           ACCWD    EQUALS AINLA +46D
 1430   REF 19  LAST 129    E5,1520           POSNV    EQUALS AINLA +52D
 1431   REF 20  LAST 129    E5,1522           DPIPAY   EQUALS AINLA +54D       SOUTH
 1432   REF 21  LAST 129    E5,1526           DPIPAZ   EQUALS AINLA +58D       NORTH  IP INCREMENT
 1433   REF 22  LAST 129    E5,1530           ALTIM    EQUALS AINLA +60D
 1434   REF 23  LAST 129    E5,1531           ALTIMS   EQUALS AINLA +61D        INDEX
 1435   REF 24  LAST 129    E5,1532           ALDK     EQUALS AINLA +62D        TIME  ONSTAN
 1436   REF 25  LAST 129    E5,1550           DELM     EQUALS AINLA +76D
 1437   REF 26  LAST 129    E5,1560           WPLATI   EQUALS AINLA +84D
 1438   REF 27  LAST 129    E5,1562           GEOCOMPS EQUALS AINLA +86D
 1439   REF 28  LAST 129    E5,1563           ERCOMP   EQUALS AINLA +87D
 1440   REF 29  LAST 129    E5,1571           ZERONDX  EQUALS AINLA +93D


 1441   REF  1              E5,1452           THETAN   =      ALK +4
 1442   REF  1              E5,1460           FILDELV  EQUALS THETAN   +6        AGS ALIGNMENT STORAGE
 1443   REF  1              E5,1462           INTVEC   EQUALS FILDELV  +2
 1444   REF 30  LAST 129    E5,1572           1SECXT   =      AINLA +94D
 1445   REF 31  LAST 129    E5,1573           ASECXT   =      AINLA +95D
 1446   REF 32  LAST 129    E5,1574           PERFDLAY EQUALS AINLA      +96D  B(2) DELAY TIME BEF. START DRIFT MEASURE
 1447   REF 33  LAST 129    E5,1576           OVFLOWCK EQUALS AINLA      +98D  (1) SET MEANS OVERFLOW IN IMU PERF TEST
A1448                                                                               AND CAUSES TERMINATION
A1449

 1450   REF  2  LAST 125    E5,1774           END-E5   EQUALS STARSAV2 +6      *** FIRST FREE LOCATION IN E5***
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L        ERASABLE ASSIGNMENTS                                                                   USER'S PAGE NO.  41       EO S4

P1451             EBANK-6 ASSIGNMENTS.

 1452                        E6,1400                        SETLOC  3000

R1453             DAP   PAD-LOADED   DATA.                                         (10D)

R1455       ALL OF THE FOLLOWING EXCEPT PITTIME AND ROLLTIME ARE INITIALIZED IN FRESH START TO PERMIT IMMEDIATE USE OF DAP

 1457                        E6,1400  E6,1400   HIASCENT ERASE                     (1) MASS AFTER STAGING, SCALE AT B16 KG.
 1458                        E6,1401  E6,1401   ROLLTIME ERASE                     (1) TIME TO TRIM Z GIMBAL IN R03, CSEC.
 1459                        E6,1402  E6,1402   PITTIME  ERASE                     (1) TIME TO TRIM Y GIMBAL IN R03, CSEC.
 1460                        E6,1403  E6,1403   DKTRAP   ERASE                     (1) DAP STATE          (POSSIBLE 77001
 1461                        E6,1404  E6,1404   DKOMEGAN ERASE                     (1)   ESTIMATOR PARA-      (VALUES 00012
 1462                        E6,1405  E6,1405   DKKAOSN  ERASE                     (1)      METERS FOR THE             00074
 1463                        E6,1406  E6,1406   LMTRAP   ERASE                     (1)         DOCKED AND              77001
 1464                        E6,1407  E6,1407   LMOMEGAN ERASE                     (1)            LEM-ALONE CASES      00000
 1465                        E6,1410  E6,1410   LMKAOSN  ERASE                     (1)               RESPECTIVELY      00074
 1466                        E6,1411  E6,1411   DKDB     ERASE                     (1) WIDTH OF DEADBAND FOR DOCKED RCS
A1467                                                                                  AUTOPILOT (DB=1.4DEG IN FRESH START)
A1468                                                                                  DEADBAND = PI/DKDB RAD.

R1469    PADLOADS FOR INITIALIZATION OF DAP BIAS ACCELERATION (AT P12 IGNITION)    (2D)

 1471                        E6,1412  E6,1412   IGNAOSQ  ERASE                     B(1)PL
 1472                        E6,1413  E6,1413   IGNAOSR  ERASE                     B(1)PL
A1473

R1474    AXIS TRANSFORMATION MATRIX - GIMBAL TO PILOT AXES:                        (5D)

 1476                        E6,1414  E6,1414   M11      ERASE                     SCALED AT 1
 1477                        E6,1415  E6,1415   M21      ERASE                     SCALED AT 1
 1478                        E6,1416  E6,1416   M31      ERASE
 1479                        E6,1417  E6,1417   M22      ERASE                     SCALED AT 1.
 1480                        E6,1420  E6,1420   M32      ERASE                     SCALED AT 1.

R1481    ANGLE MEASUREMENTS.                                                       (31D)

 1483                        E6,1421  E6,1425   OMEGAP   ERASE   +4                BODY-AXIS ROT. RATES SCALED AT PI/4 AND
 1484    REF   1             E6,1422            OMEGAQ   EQUALS OMEGAP +1          BODY-AXIS ACCELERATIONS SCALED AT PI/8
 1485    REF   2  LAST  130  E6,1423            OMEGAR   EQUALS OMEGAP +2
R1486       RETAIN THE ORDER OF ALPHAQ AND ALPHAR FOR DOWNLINK PURPOSES.
 1487    REF   3  LAST  130  E6,1424            ALPHAQ   EQUALS OMEGAP +3
 1488    REF   4  LAST  130  E6,1425            ALPHAR   EQUALS OMEGAP +4
 1489                        E6,1426  E6,1427   OMEGAU   ERASE  +1
 1490    REF   1             E6,1427            OMEGAV   =       OMEGAU +1

 1491                        E6,1430  E6,1435   TRAPEDP  ERASE  +5
 1492    REF   1             E6,1431            TRAPEDQ  =       TRAPEDP +1
 1493    REF   2  LAST  130  E6,1432            TRAPEDR  =       TRAPEDP +2
 1494    REF   3  LAST  130  E6,1433            NPTRAPS  =       TRAPEDP +3
 1495  REF   4  LAST  130   E6,1434            NQTRAPS  =       TRAPEDP +4
 1496  REF   5  LAST  131   E6,1435            NRTRAPS  =       TRAPEDP +5
 1497  REF   1              E6,1427            EDOTP    =       EDOT
 1498                       E6,1436  E6,1437   EDOTQ    ERASE   +1
 1499  REF   1              E6,1437            EDOTR    =       EDOTQ +1           MANY SHARING NAMES
 1500  REF   2  LAST  131   E6,1436            QRATEDIF EQUALS EDOTQ              ALTERNATIVE NAMES:
 1501  REF   1              E6,1437            RRATEDIF EQUALS EDOTR              DELETE WHEN NO. OF REFERENCES = 0

 1502  REF   2  LAST  130   E6,1426            URATEDIF EQUALS OMEGAU
 1503  REF   1              E6,1427            VRATEDIF EQUALS OMEGAV
 1504                       E6,1440  E6,1442   OLDXFORP ERASE              +2     STORED CDU READINGS FOR STATE
 1505  REF   1              E6,1441            OLDYFORP EQUALS OLDXFORP +1        DERIVATIONS: SCALED AT PI RADIANS (2'S)
 1506  REF   2  LAST  131   E6,1442            OLDZFORQ EQUALS OLDXFORP +2
R1507  RATE-COMMAND AND MINIMUM IMPULSE MODES

 1508                       E6,1443  E6,1443   CH31TEMP ERASE
 1509                       E6,1444  E6,1444   STIKSENS ERASE
 1510                       E6,1445  E6,1445   TCP      ERASE
 1511                       E6,1446  E6,1453   DXERROR  ERASE   +5
 1512  REF   1              E6,1450            DYERROR  EQUALS DXERROR +2
 1513  REF   2  LAST  131   E6,1452            DZERROR  EQUALS DXERROR +4
 1514                       E6,1454  E6,1454   PLAST    ERASE
 1515                       E6,1455  E6,1455   QLAST    ERASE
 1516                       E6,1456  E6,1456   RLAST    ERASE
 1517                       E6,1457  E6,1457   TCQR     ERASE
R1518  OTHER VARIABLES.                                                            (5D)

 1520                       E6,1460  E6,1460   OLDPMIN  ERASE                      THESE THREE USED IN MIN IMPULSE MODE.
 1521                       E6,1461  E6,1461   OLDQRMIN ERASE
 1522  REF   1              E6,1736            TEMP31   EQUALS DAPTEMP1

 1523                       E6,1462  E6,1463   SAVEHAND ERASE   +1
 1524                       E6,1464  E6,1464   PERROR   ERASE
 1525  REF   1              E6,1450            QERROR   EQUALS DYERROR
 1526  REF   1              E6,1452            RERROR   EQUALS DZERROR
R1527  JET STATE CHANGE VARIABLES- TIME (TOFJTCHG),JET BITS WRITTEN NOW          (10D)
R1529    (JTSONNOW), AND JET BITS WRITTEN AT T6 RUPT (JTSATCHG).

 1530                       E6,1465  E6,1465   NXT6ADR  ERASE
 1531                       E6,1466  E6,1467   T6NEXT   ERASE   +1
 1532                       E6,1470  E6,1471   T6FURTHA ERASE   +1
 1533                       E6,1472  E6,1474   NEXTP    ERASE   +2
 1534  REF   1              E6,1473            NEXTU    =       NEXTP +1
 1535  REF   2  LAST  131   E6,1474            NEXTV    =       NEXTP +2
 1536                       E6,1475  E6,1476   -2JETLIM ERASE    +1                RATE COMMAND 4-JET RATE DIFFERENCE LIMIT
 1537  REF   1              E6,1476            -RATEDB  EQUALS -2JETLIM +1        AND RATE DEADBAND FOR ASCENT OR DESCENT

 1538  REF   1              E6,1476            TARGETDB EQUALS -RATEDB            MAN. CONTROL TARGET DB COMPLEMENT.

R1539        *** Q,R AXIS ERASABLES ***                                            (3)
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 1541  REF  13  LAST   87     4742             PBIT     EQUALS BIT10
 1542  REF  13  LAST   87     4741             QRBIT    EQUALS BIT11
 1543  REF   1             E6,1750             UERROR   EQUALS DAPTREG5       U,V-AXES ATT ERROR FOR RCS CONTROL LAWS
 1544  REF   1             E6,1751             VERROR   =      UERROR +1
 1545                      E6,1477  E6,1477    RETJADR  ERASE
 1546  REF   1             E6,1741             TEMPNUM  EQUALS DAPTEMP4
 1547  REF   1             E6,1742             NUMBERT  EQUALS DAPTEMP5
 1548  REF   1             E6,1743             ROTINDEX EQUALS DAPTEMP6
 1549  REF   2  LAST  131  E6,1736             ROTEMP1  EQUALS DAPTEMP1
 1550  REF   1             E6,1737             ROTEMP2  EQUALS DAPTEMP2
 1551  REF   1             E6,1740             POLYTEMP EQUALS DAPTEMP3
 1552                      E6,1500  E6,1500    SENSETYP ERASE
 1553  REF   3  LAST  132  E6,1736             ABSTJ    EQUALS DAPTEMP1       ABS VALUE OF JET-FIRING TIME
 1554  REF   4  LAST  132  E6,1736             ABSEDOTP EQUALS DAPTEMP1

 1555  REF   1             E6,1747             DPSBURN  EQUALS DAPTREG4       USED WITH SNUFFBIT. VERY TEMPORARY.
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P1556    TRIM GIMBAL CONTROL LAW ERASABLES:                                                   (11D)

 1558    REF   5  LAST  132    E6,1736              GTSTEMPS EQUALS DAPTEMP1                 GTS IS PART OF THE JASK.
 1559    REF   1               E6,1740              SHFTFLAG EQUALS GTSTEMPS +2              COUNT BITS FOR GTSQRT SHIFTING.
 1560    REF   2  LAST  133    E6,1743              ININDEX  EQUALS GTSTEMPS +5              INDEX FOR SHIFT LOOP IN GTSQRT.

 1561    REF   1               E6,1505              SAVESR   EQUALS AXISCTR                  CANNOT BE A DAPTEMP - GTS USES THEM ALL.

 1562    REF   3  LAST  133    E6,1745              SCRATCH  EQUALS GTSTEMPS +7              ROOTCYCL ERASABLE
 1563    REF   4  LAST  133    E6,1746              HALFARG  EQUALS GTSTEMPS +8D             ROOTCYCL ERASABLE.

 1564    REF   5  LAST  133    E6,1736              K2THETA  EQUALS GTSTEMPS                 D.P., K*ERROR,  NEGUSUM
 1565    REF   6  LAST  133    E6,1740              KCENTRAL EQUALS GTSTEMPS +2              S.P., K FROM KQ OR KRDAP, AT PI/2(8)
 1566    REF   7  LAST  133    E6,1741              K2CNTRAL EQUALS GTSTEMPS +3              D.P., GTS SCRATCH CELLS.
 1567    REF   8  LAST  133    E6,1742              WCENTRAL EQUALS GTSTEMPS +4              S.P., OMEGA, AT PI/4 RAD/SEC
 1568    REF   9  LAST  133    E6,1743              ACENTRAL EQUALS GTSTEMPS +5              S.P., ALPHA, AT PI/4 RAD/SEC(2)
 1569    REF  10  LAST  133    E6,1744              DEL      EQUALS GTSTEMPS +6              S.P., SGN FUNCTION VALUE.
 1570    REF  11  LAST  133    E6,1745              A2CNTRAL EQUALS GTSTEMPS +7              D.P., GTS SCRATCH CELLS.
 1571    REF  12  LAST  133    E6,1747              QRCNTR   EQUALS GTSTEMPS +9D             S.P.,INDEX FOR GTS LOOP THROUGH Q,R AXES
 1572    REF  13  LAST  133    E6,1750              FUNCTION EQUALS GTSTEMPS +10D            D.P.,ARGUMENT FOR GRSQRT,SCRATCH FOR GTS

 1573                          E6,1501   E6,1503    NEGUQ    ERASE    +2                     NEGATIVE OF Q-AXIS GIMBAL DRIVE
A1574                                                               NEGUQ +1                   DEFINED AND USED ELSEWHERE
 1575    REF   1               E6,1503              NEGUR    EQUALS NEGUQ +2                 NEGATIVE OF R-AXIS GIMBAL DRIVE

 1576                          E6,1504   E6,1506    KQ       ERASE    +2                     S.P.,JERK TERM FOR GTS, AT PI/2(8)
 1577    REF   1               E6,1505              AXISCTR  EQUALS KQ          +1
 1578    REF   2  LAST  133    E6,1506              KRDAP    EQUALS KQ          +2           .3 ACCDOTR SCALED AT PI/2(8)

 1579                          E6,1507   E6,1512    ACCDOTQ  ERASE    +3                     Q-JERK SCALED AT PI/2(7) UNSIGNED
 1580    REF   1               E6,1510              QACCDOT  EQUALS ACCDOTQ +1               Q-JERK SCALED AT PI/2(7) SIGNED
 1581    REF   2  LAST  133    E6,1511              ACCDOTR  EQUALS ACCDOTQ +2               P-JERK SCALED AT PI/2(7) UNSIGNED
 1582    REF   3  LAST  133    E6,1512              RACCDOT  EQUALS ACCDOTQ +3               R-JERK SCALED AT PI/2(7) SIGNED

 1583    REF   1               E6,1450              QDIFF    EQUALS QERROR                   ATTITUDE ERRORS:
 1584    REF   1               E6,1452              RDIFF    EQUALS RERROR                   SCALED AT PI RADIANS

A1585


R1586    TORQUE VECTOR RECONSTRUCTION VARIABLES:                                              (17D)

 1588    REF   1               E6,1744              JETRATE  EQUALS DAPTPEG1
 1589    REF   1               E6,1745              JETRATEQ EQUALS JETRATE +1               THE LAST CONTROL SAMPLE PERIOD OF 100 MS
 1590    REF   2  LAST  133    E6,1746              JETRATER EQUALS JETRATE +2               SCALED AT PI/4 RADIANS/SECOND

 1591                          E6,1513   E6,1520    DOWNTORK ERASE  +5                       ACCUMULATED JET TORQUE COMMANDED ABOUT
 1592    REF   1               E6,1513              POSTORKP EQUALS DOWNTORK                   +,-P, +,-U, +,-V RESPECTIVELY.
 1593    REF   2  LAST  133    E6,1514              NEGTORKP EQUALS DOWNTORK +1                EMPLOYED EXCLUSIVELY FOR DOWNLIST.
 1594    REF   3  LAST  133    E6,1515              POSTORKU EQUALS DOWNTORK +2                NOT INITIALIZED; PERMITTED TO OVERFLOW
 1595   REF   4  LAST  133   E6,1516              NEGTORKU EQUALS DOWNTORK +3      SCALED AT 32 JET-SEC, OR ABOUT 2.0 JET-
 1596   REF   5  LAST  134   E6,1517              POSTORKV EQUALS DOWNTORK +4          MSEC PER BIT.
 1597   REF   6  LAST  134   E6,1520              NEGTORKV EQUALS DOWNTORK +5

 1598                        E6,1521   E6,1523    NO.PJETS ERASE  +2
 1599   REF   1              E6,1522              NO.UJETS =      NO.PJETS +1
 1600   REF   1              E6,1523              NO.VJETS =      NO.UJETS +1
 1601                        E6,1524   E6,1526    TJP      ERASE  +2
 1602   REF   1              E6,1525              TJU      =      TJP +1
 1603   REF   2  LAST  134   E6,1526              TJV      =      TJP +2

 1604                        E6,1527   E6,1527    L,PVT-CG ERASE
 1605                        E6,1530   E6,1533    1JACC    ERASE  +3
 1606   REF   1              E6,1531              1JACCQ   EQUALS 1JACC +1          SCALED AT PI/4 RADIANS/SECOND
 1607   REF   2  LAST  134   E6,1532              1JACCR   EQUALS 1JACC +2
 1608   REF   3  LAST  134   E6,1533              1JACCU   EQUALS 1JACC +3          FOR U,V-AXES THE SCALE FACTOR IS  DIFF:
A1609                                                                              SCALED AT PI/2 RADIANS/SECOND (FOR ASC)
R1610   ASCENT VARIABLES:                                                          (10D)

A1612
 1613                        E6,1534   E6,1535    SKIPU    ERASE  +1
 1614   REF   1              E6,1535              SKIPV    =      SKIPU +1
R1615   THE FOLLOWING LM DAP ERASABLES ARE ZEROED IN THE STARTDAP SECTION OF THE DAPIDLER PROGRAM AND THE COASTASC
R1617   SECTION OF THE AOSTASK.  THE ORDER MUST BE PRESERVED FOR THE INDEXING METHODS WHICH ARE EMPLOYED IN THOSE
R1619   SECTIONS AND ELSEWHERE.

 1620                        E6,1536   E6,1543    AOSQ     ERASE  +5                OFFSET ACC. ESTIMATES, UPDATED IN D.P.,
 1621   REF   1              E6,1540              AOSR     EQUALS AOSQ +2           AND SCALED AT PI/2.
 1622   REF   2  LAST  134   E6,1542              AOSU     EQUALS AOSQ +4           UV-AXES OFFSET ACC. FORMED BY VECTOR
 1623   REF   3  LAST  134   E6,1543              AOSV     EQUALS AOSQ +5           ADDITION OF Q,R.  AT PI/2 RAD/SEC(2).

 1624                        E6,1544   E6,1545    AOSQTERM ERASE   +1               (.1-.05K)AOS
 1625   REF   1              E6,1545              AOSRTERM EQUALS AOSQTERM +1       SCALED AT PI/4 RADIANS/SECOND.

R1626   FOR TJET LAW SUBROUTINE:                                                   (TEMPS ONLY)

A1628                                             NUMBERT  EQUALS DAPTEMP5          DEFINED IN QRAXIS.
 1629   REF   6  LAST  133   E6,1736              EDOTSQ   EQUALS DAPTEMP1
 1630   REF   2  LAST  132   E6,1737              ROTSENSE EQUALS DAPTEMP2
 1631   REF   2  LAST  132   E6,1740              FIREFCT  EQUALS DAPTEMP3          LOOKED AT BY PAXIS.
 1632   REF   2  LAST  132   E6,1741              TTOAXIS  EQUALS DAPTEMP4
 1633   REF   2  LAST  132   E6,1743              ADRSDIF2 EQUALS DAPTEMP6
 1634   REF   2  LAST  133   E6,1744              HOLDQ    EQUALS DAPTREG1
 1635   REF   1              E6,1745              ADRSDIF1 EQUALS DAPTREG2
 1636   REF   1              E6,1746              HH       EQUALS DAPTREG3          DOUBLE PRECISION
A1637                                             HH  +1   EQUALS DAPTREG4
 1638   REF   1              E6,1751              E        EQUALS DAPTREG6          TIME SHARE WITH VERROR
 1639   REF   2  LAST  131   E6,1427              EDOT     EQUALS OMEGAV

R1640   INPUT TO TJET LAW (PERMANENT ERASABLES).                                   (48D)
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L        ERASABLE ASSIGNMENTS                                                                  USER'S PAGE NO.  46        EC S4

 1642   REF   1                E6,1525            TJETU     =        TJU                EQUATE NAMES.   INDEXED BY -1, 0, +1.
 1643                          E6,1546   E6,1625  BLOCKTOP  ERASE    +47D
 1644   REF   1                E6,1566            1/ANET1   =        BLOCKTOP +16D      THESE 8 PARAMETERS ARE SET UP BY 1/ACCS
 1645   REF   1                E6,1567            1/ANET2   =        1/ANET1 +1         FOR MINIMUM JETS ABOUT THE U-AXIS WHEN
 1646   REF   2  LAST  135     E6,1572            1/ACOAST  =        1/ANET1 +4         EDOT IS POSITIVE.  TJETLAW INDEXES BY
 1647   REF   3  LAST  135     E6,1574            ACCFCTZ1  =        1/ANET1 +6         ADRSDIFF FROM THESE REGISTERS TO PICK UP
 1648   REF   4  LAST  135     E6,1575            ACCFCTZ5  =        1/ANET1 +7         PARAMETERS FOR THE PROPER AXIS, NUMBER
 1649   REF   5  LAST  135     E6,1600            FIREDB    =        1/ANET1 +10D       OF JETS AND SIGN OF EDOT.  THERE ARE 48
 1650   REF   6  LAST  135     E6,1602            COASTDB   =        1/ANET1 +12D       REGISTERS IN ALL IN THIS BLOCK.
 1651   REF   7  LAST  135     E6,1604            AXISDIST  =        1/ANET1 +14D       FOUR NOT REFERENCED (P-AXIS) ARE FILLED
A1652                                                                                     IN BY THE FOLLOWING:
 1653   REF   2  LAST  135     E6,1546            ACCSWU    =        BLOCKTOP           SET BY 1/ACCS TO SHOW WHETHER MAXIMUM
 1654   REF   1                E6,1547            ACCSWV    =        ACCSWU +1          JETS ARE REQUIRED BECAUSE OF ADS.
 1655   REF   3  LAST  135     E6,1554            FLAT      =        BLOCKTOP +6        WIDTH OF MINIMUM IMPULSE ZONE.
 1656   REF   4  LAST  135     E6,1555            ZONE3LIM  =        BLOCKTOP +7        HEIGHT OF MINIMUM IMPULSE ZONE(AT 4 SEC)

 1657                          E6,1626   E6,1627  COEFFQ    ERASE    +1                 COEFFQ AND COEFFR ARE USED IN ROT-TOUV
 1658   REF   1                E6,1627            COEFFR    EQUALS   COEFFQ +1          TO RESOLVE Q,R COMPONENTS INTO U,V COMP.
A1659

R1660   VARIABLES FOR GTS-QRAXIS CONTROL EXCHANGE.                                      (4)

 1662   REF   2  LAST  133     E6,1502            ALLOWGTS  EQUALS   NEGUQ +1           INSERT INTO UNUSED LOCATION
 1663                          E6,1630   E6,1630  COTROLER  ERASE                       INDICATES WHICH CONTROL SYSTEM TO USE.
A1664                          E6,1631   E6,1633  QGIMTIMR  ERASE               +2      Q-GIMBAL DRIVE ITMER, DECISECONDS.
 1665   REF   1                E6,1632            INGTS     EQUALS   QGIMTIMR +1        INDICATOR OF CURRENT GTS CONTROL.
 1666   REF   2  LAST  135     E6,1633            RGIMTIMR  EQUALS   QGIMTIMR +2        R-GIMBAL DRIVE TIMER, DECISECONDS.

R1667   PLEASE RETAIN THE ORDER OF CDUXD THRU CDUZD FOR DOWNLINK PURPOSES.

R1668              KALCMANU:DAP INTERFACE.                                              (9D)

 1670                          E6,1634   E6,1636  CDUXD     ERASE    +2                 CDU DESIRED REGISTERS:
 1671   REF   1                E6,1635            CDUYD     EQUALS   CDUXD +1           SCALED AT PI RADIANS (180 DEGREES)
 1672   REF   2  LAST  135     E6,1636            CDUZD     EQUALS   CDUXD +2           (STORE IN 2S COMPLEMENT)

 1673                          E6,1637   E6,1641  DELCDUX   ERASE    +2                 NEGATIVE OF DESIRED 100MS CDU INCREMENT:
 1674   REF   1                E6,1640            DELCDUY   EQUALS   DELCDUX +1         SCALED AT PI RADIANS (180 DEGREES)
 1675   REF   2  LAST  135     E6,1641            DELCDUZ   EQUALS   DELCDUX +2         (STORE IN 2S COMPLEMENT)

R1676      RETAIN THE ORDER OF OMEGAPD TO OMEGARD FOR DOWNLINK PURPOSES.
 1677                          E6,1642   E6,1644  OMEGAPD   ERASE    +2                 ATTITUDE MANEUVER DESIRED RATES:
 1678   REF   1                E6,1643            OMEGAQD   EQUALS   OMEGAPD +1         (NOT EXPLICITLY REFERENCED IN GTS CNTRL)
 1679   REF   2  LAST  135     E6,1644            OMEGARD   EQUALS   OMEGAPD +2         SCALED AT PI/4 RADIANS/SECOND

R1680              KALCMANU STORAGE.                                                    (24D)

 1682                          E6,1645   E6,1674  MIS       ERASE               +23D    I(18D)
 1683   REF   1                E6,1667            COF       EQUALS   MIS        +18D    I(6)
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R1684            KALCMANU STORAGE.                                                         (33D)

 1686                           E6,1675  E6,1733   BCDU      ERASE              +30D    B(3)
 1687   REF    1                E6,1700            KSPNDX    EQUALS BCDU        +3      B(1)
 1688   REF    1                E6,1701            KDPNDX    EQUALS KSPNDX      +1      B(1)

 1689   REF    1                E6,1702            TMIS      EQUALS KDPNDX      +1      I(18) MUST BE IN SAME BANK AS RCS DAP
 1690   REF    1                E6,1724            COFSKEW   EQUALS TMIS        +18D    I(6)  MUST BE IN SAME BANK AS RCS DAP
 1691   REF    1                E6,1732            CAM       EQUALS COFSKEW     +6      I(2)  MUST BE IN SAME BANK AS RCS DAP


 1692                           E6,1734  E6,1735   AM        ERASE              +1      I(2) THIS WAS ONCE IN E5 OVERLAYING OGC
A1693

R1694   FIRST-ORDER OVERLAYS IN KALCMANU                                                   (25D)

 1696   REF    2  LAST  136     E6,1702            KV1       EQUALS TMIS                I(6)
 1697   REF    3  LAST  136     E6,1702            MFISYM    EQUALS TMIS                I
 1698   REF    4  LAST  136     E6,1702            TMFI      EQUALS TMIS                I
 1699   REF    5  LAST  136     E6,1702            NCDU      EQUALS TMIS                B
 1700   REF    6  LAST  136     E6,1705            NEXTIME   EQUALS TMIS        +3      B
 1701   REF    7  LAST  136     E6,1706            TTEMP     EQUALS TMIS        +4      B
 1702   REF    8  LAST  136     E6,1710            KV2       EQUALS TMIS        +6      I(6)
 1703   REF    9  LAST  136     E6,1710            BIASTEMP  EQUALS TMIS        +6      B
 1704   REF   10  LAST  136     E6,1716            KV3       EQUALS TMIS        +12D    I(6)
 1705   REF   11  LAST  136     E6,1716            OGF       EQUALS TMIS        +12D    I

 1706   REF    2  LAST  136     E6,1724            BRATE     EQUALS COFSKEW             B
 1707   REF    3  LAST  136     E6,1724            IG        EQUALS COFSKEW             I

 1708   REF    1                E6,1732            TM        EQUALS CAM                 B

R1709   SECOND-ORDER OVERLAYS IN KALCMANU                                                  (24D)

 1711   REF    1                E6,1702            K1        =      KV1
 1712   REF    1                E6,1710            K2        =      KV2
 1713   REF    1                E6,1716            K3        =      KV3
 1714   REF    2  LAST  136     E6,1702            P21       EQUALS KV1                 I(2)
 1715   REF    3  LAST  136     E6,1704            C21       EQUALS KV1         +2      I(2)
 1716   REF    4  LAST  136     E6,1706            G21       EQUALS KV1         +4      I(2)
 1717   REF    2  LAST  136     E6,1710            C2SQP     EQUALS KV2                 I(2)
 1718   REF    3  LAST  136     E6,1712            C2SQM     EQUALS KV2         +2      I(2)
 1719   REF    4  LAST  136     E6,1714            C2PP      EQUALS KV2         +4      I(2)
 1720   REF    2  LAST  136     E6,1716            C2MP      EQUALS KV3                 I(2)
 1721   REF    3  LAST  136     E6,1720            C1PP      EQUALS KV3         +2      I(2)
 1722   REF    4  LAST  136     E6,1722            C1MP      EQUALS KV3         +4      I(2)


 1723   REF    4  LAST  136     E6,1724            VECQTEMP  =      COFSKEW
 1724   REF   3  LAST  135   E6,1634        DCDU     =        CDUXD
 1725   REF   3  LAST  135   E6,1637        DELDCDU  =        DELCDUX
 1726   REF   1              E6,1640        DELDCDU1 =        DELCDUY
 1727   REF   1              E6,1641        DELDCDU2 =        DELCDUZ


R1728   *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *

R1729   STORAGE FOR FINDCDUW

R1730            OVERLAYING KALCMANU STORAGE:                                    (27D)

 1732   REF   2  LAST  135   E6,1645        ECDUW    EQUALS MIS
 1733   REF   1              E6,1645        ECDUWUSR EQUALS ECDUW                B(1)TMP
 1734   REF   1              E6,1646        QCDUWUSR EQUALS ECDUWUSR +1          I(1)TMP
 1735   REF   1              E6,1647        NDXCDUW  EQUALS QCDUWUSR +1          B(1)TMP
 1736   REF   1              E6,1650        FLAGOODW EQUALS NDXCDUW  +1          B(1)TMP
 1737   REF   1              E6,1651        FLPAUTNO EQUALS FLAGOODW +1          B(1)TMP
 1738   REF   1              E6,1652        UNFC/2   EQUALS FLPAUTNO +1          I(6)IN
 1739   REF   1              E6,1660        UNWC/2   EQUALS UNFC/2   +6          I(6)IN
 1740   REF   1              E6,1666        UNFV/2   EQUALS UNWC/2   +6          I(6)S-S
 1741   REF   1              E6,1666        UNFVX/2  =      UNFV/2
 1742   REF   2  LAST  137   E6,1670        UNFVY/2  =      UNFV/2   +2
 1743   REF   3  LAST  137   E6,1672        UNFVZ/2  =      UNFV/2   +4
 1744   REF   4  LAST  137   E6,1674        -DELGMB  EQUALS UNFV/2   +6          B(3)TMP
 17441  REF   1              E6,1677        OGABIAS  EQUALS -DELGMB  +3          B(1)IN
R1745
R1746            DEFINED IN THE WORK AREA:                                       (18D)

 1748                           0000        UNX/2    =        0
 1749                           0006        UNY/2    =        6
 1750                           0014        UNZ/2    =        14
R1751
R1752   END OF FINDCDUW ERASABLES

R1753   *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *

R1754   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

R1755   STORAGE FOR P57

R1756            OVERLAYING KALCMANU AND FINDCDUW STORAGE:                       (12D)

 1758   REF   3  LAST  137   E6,1645        VEC1     EQUALS MIS                  I(6)TMP
 1759   REF   1              E6,1653        VEC2     EQUALS VEC1     +6          I(6)TMP
R1760
R1761   END OF P57 ERASABLES

R1762   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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R1763   THE FOLLOWING ARE THE DAP REPLACEMENTS FOR THE ITEMPS AND RUPTREGS,NEEDED BECAUSF DAR IS NOW A TOB,JASK,JA8,TOSK
R1765   ...ANYWAY, THE DAP CAN NOW 8E INTERRUPTED.                                                       (18D)

 1767                              E6,1736  E6,1757   CAPTEMR1 ERASE  +17D
 1768   REF   7  LAST  134   E6,1737            DARTEMR2 EQUALS DAPTEMP1  +1
 1769   REF   8  LAST  138   E6,1740            DAPTEMR3 EQUALS DAPTEMR1  +2
 1770   REF   9  LAST  138   E6,1741            CAPTEMP4 EQUALS CAPTEMP1  +3
 1771   REF  10  LAST  138   E6,1742            DARTEMP5 EQUALS DAPTEMP1  +4
 1772   REF  11  LAST  138   E6,1743            CAPTEMP6 EQUALS DAPTEMP1  +5
 1773   REF  12  LAST  138   E6,1744            DARTREG1 EQUALS DAPTEMR1  +6
 1774   REF  13  LAST  138   E6,1745            DAPTREG2 EQUALS DAPTEMR1  +7
 1775   REF  14  LAST  138   E6,1746            DAPTREG3 EQUALS DAPTEMP1  +8D
 1776   PEF  15  LAST  138   E6,1747            DARTREG4 EQUALS DAPTEMP1  +9D
 1777   REF  16  LAST  138   E6,1750            DAPTREG5 EQUALS DAPTEMP1  +10D
-1778   REF  17  LAST  138   E6,1751            DAPTREG6 EQUALS DAPTEMP1  +11D

 1779   REF  18  LAST  138   E6,1752            DAPARUPT EQUALS DAPTEMR1  +12D
 1780   REF   1              E6,1753            CAPLRUPT EQUALS DAPARUPT  +1
 1781   REF   2  LAST  138   E6,1754            DAP8QRPT EQUALS DAPARUPT  +2
 1782   REF   3  LAST  138   E6,1756            DAPZRUPT EQUALS DAPARUPT  +4

A1783                                                                    (DAPZRURT IS ALSO JASK-IN-PROGRESS FLAG)
A1784


R1785                 NEEDLER(ATTITUDE ERROR EIGHT BALL DISPLAY) STORAGE.                (6D)

 1787   REF   3  LAST   95      0061            T5TEMR   EQUALS ITEMR1
 1788   REF   4  LAST   95      0063            DINDX    EQUALS ITEMR3
 1789                        E6,1760  E6,1762   AK       ERASE  +2           NEEDLER ATTITUDE INPUTS, SCALED AT 180
 1790   REF   1              E6,1761            AK1      EQUALS AK +1        DEGREES.  P,Q,R AXES IN AK,AK1,AK2.
 1791   REF   2  LAST  138   E6,1762            AK2      EQUALS AK +2

 1792                        E6,1763  E6,1765   EDRIVEX  ERASE  +2           NEEDLER DISPLAY REGS AT 1800 DEGREES,
 1793   REF   1              E6,1764            EDRIVEY  EQUALS EDRIVEX +1   SO THAT 384 8ITS REPRESENT 42 3/16 DEG.
 1794   REF   2  LAST  138   E6,1765            ECRIVEZ  EQUALS EDRIVEX  +2


R1795                 COCKED JET INHIBITION COUNTERS                                     (3D)

 1797                        E6,1766  F6,1770   PJETCTR  ERASE  +2
 1798   REF   1              E6,1767            UJETCTR  EQUALS PJETCTR +1
 1799   REF   2  LAST  138   E6,1770            VJETCTR  EQUALS PJETCTR +2

R1800                 LANDING RADLCADS                                                   (3D)

 18003                       E6,1771  E6,1772   VELBIAS  ERASE  +1           B(2) PL BIAS VALUE FOR VELOCITY
A18004 *                                                                     REASONABILITY TEST, 2(6) M/CS.
 18005                       E6,1773  E6,1773   AZBIAS   ERASE               8(1) PL LPD AZIMUTH BIAS, UNITS - RI RAD
 18006  REF   1               E6,1774          END-E6   EQUALS AZBIAS +1      NEXT AVAILABLE E6 LOCATION
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P1801                EBANK-7 ASSIGNMENTS

 1802                     E7,1400               SETLOC 3400


R1803           P35 CONSTANTS.        -PAD LOADED-                        (4D)

 1805                     E7,1400  E7,1401    ATIGINC  ERASE  +1          B(2)PL   *MUST BE AT 1400 FOR SYSTEMSTEST
 1806                     E7,1402  E7,1403    PTIGINC  ERASE  +1          B(2)PL


R1807           AOTMARK STORAGE. .    -PAD LOADED-                        (12D)

 1809                     E7,1404  E7,1411    AOTAZ    ERASE  +5          B(6)PL
 1810                     E7,1412  E7,1417    AOTEL    ERASE  +5          B(6)PL

R1811           LANDING RADAR.        -PAD LOADED-                        (2D)

 1813                     E7,1420  E7,1420    LRHMAX   ERASE              B(1)
 1814                     E7,1421  E7,1421    LRWH     ERASE              B(1)
A1815


R1816           THROTTLE STORAGE.     -PAD LOADED-                        (1D)

 1818                     E7,1422  E7,1422    ZOOMTIME ERASE              B(1)PL TIME OF DPS THROTTLE-UP COMMAND

R1819           P63 AND P64 CONSTANTS.    -PAD LOADED-                    (4D)

 1821                     E7,1423  E7,1423    TENDBRAK ERASE              B(1) LANDING PHASE SWITCHING CRITERION
 1822                     E7,1424  E7,1424    TENDAPPR ERASE              B(1) LANDING PHASE SWITCHING CRITERION
 1823                     E7,1425  E7,1425    DELTTFAP ERASE              B(1) INCREMENT ADDED TO TTF/8 WHEN
A1824                                                                           SWITCHING FROM P63 TO P64
 1825                     E7,1426  E7,1426    LEADTIME ERASE              B(1)  TIME INCREMENT SPECIFYING HOW MUCH
A1826                                                                           GUIDANCE IS PROJECTED FORWARD.
A1827

R1828           LANDING RADAR      -PAD LOADED-                           (2D)

 1830                     E7,1427  E7,1427    RPCRTIME ERASE              B(1) REPOSITIONING CRITERION  (TIME)
 1831                     E7,1430  E7,1430    RPCRTQSW ERASE              B(1) REPOSITIONING CRITERION (ANGLE)
A1832

R1833           ASTEER    -PAD LOADED-                                    (2D)

 1835                     E7,1431  E7,1432    TNEWA    ERASE  +1          I(2)PL   LAMBERT CYCLE PERIOD
A1836

R1837           P22 STORAGE  - OVERLAYS LANDING PADLOADS -                (5D)
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 1839   REF   1           E7,1423              REPOSCNT  EQUALS TENDBRAK        B(1)TMP   COUNTS NUMBER OF PASSES THROUGH
A1840                                                                                     REPOSITION ROUTINE.
 1841   REF   1           E7,1424              REPOSTM   EQUALS REPOSCNT +1     I(2)TMP   PRESENT TIME PLUS INCREMENTS OF
A1842                                                                                     TEN SECONDS.
 1843   REF   1           E7,1426              DELTATM   EQUALS REPOSTM  +2     I(2)TMP   TIME INTERVAL FOR RUNNING
A1844                                                                                     DESIGNATE TASK.
A1845

R1846   *** RETAIN THE ORDER OF DELVSLV, TIG, RTARG, DELLT4 FOR UPDATE. ***


R1847             P32-35  P72-75 STORAGE.                                       (6D)

 1849                     E7,1433  E7,1440     DELVLVC   ERASE            +5    I(6) DELTA VELOCITY - LOCAL VERTICAL COO
 1850   REF   1           E7,1433              DELVSLV   =       DELVLVC        (TEMP STORAGE OF SAME VECTOR)   -RDINATE
A1851


R1852             P30-P40 INTERFACE UNSHARED.                                   (2D)

 1854                     E7,1441  E7,1442     TIG       ERASE            +1    B(2)
A1855

R1856             INITVEL STORAGE. ALSO USED BY P34,35,74,75,10,11 OTHERS       (8D)

 1858                     E7,1443  E7,1450     RTARG     ERASE            +5    I(6) TARGET VECTOR
 1859                     E7,1451  E7,1452     DELLT4    ERASE            +1    I(2) TIME DIFFERENCE
A1860

R1861             P30-P40 INTERFACE UNSHARED.                                   (3D)

 1863                     E7,1453  E7,1454     TTOGD     ERASE            +1    B(2)
 1864   REF   1           E7,1453              TFI       EQUALS TTOGD
 1865                     E7,1455  E7,1455     WHICH     ERASE                  B(1)
A1866

R1867             ***  R21  ***                                                 (1D)

 1869                     E7,1456  E7,1456     LOSCOUNT ERASE                   B(1)
A1870

R1871             LSR22.3 (RENDEZVOUS NAVIGATION) STORAGE.                      (4D)

R1873         RETAIN THE ORDER OF AIG TO TRKMKCNT FOR DOWNLINK PURPOSES.
 1874                     E7,1457  E7,1457     AIG       ERASE                  B(1)OUT   GIMBAL ANGLES
 1875                     E7,1460  E7,1460     AMG       ERASE                  B(1)OUT   (MUST BE
 1876                     E7,1461  E7,1461     AOG       ERASE                  B(1)OUT    CONSECUTIVE)

 1877                     E7,1462  E7,1462     TRKMKCNT ERASE                   B(1)TMP   TEMPORARY MARK STORAGE.
 1878   REF   1           E7,1462              MARKCTR   =       TRKMKCNT
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R1879             P32-P35, P72-P75 STORAGE.  -PERMANENT-                             (6)

 1881                        E7,1463  E7,1463   NORMEX    ERASE                      8(1) PRM SAVE FOR Q
 1882                        E7,1464  E7,1464   QSAVED    ERASE                      8(1) PRM SAVE FOR Q
 1883                        E7,1465  E7,1465   RTRN      ERASE                      8(1) PRM SAVE FOR Q
 1884                        E7,1466  E7,1467   NN        ERASE            +1        8(2)
 1885                        E7,1470  E7,1470   SUBEXIT   ERASE                      8(1) PRM SAVE Q


 1886                        E7,1471            E7OVERLA EQUALS                      START OF E7 OVERLAYS.
 1887   REF    1             E7,1471            WHOCARES EQUALS E7OVERLA             DUMMY FOR EBANK INSENSITIVE 2CADRS

R1888             LUNAR LANDING OVERLAYS                                             (6D)

 1890   REF    1             E7,1463            /AFC/     EQUALS NORMEX              B(2)TMP    THROTTLE
 1891   REF    1             E7,1465            FCODD     EQUALS /AFC/     +2        B(2)TMP    THROTTLE
 1892   REF    1             E7,1467            FP        EQUALS FCODD     +2        B(2)TMP    THROTTLE
A1893

R1894          ERASABLES FOR P64: OVERLAY OF RTARG                                   (4D)

 1896   REF    1             E7,1443            ZERLINA   EQUALS RTARG               8(1)   P64
 1897   REF    1             E7,1444            ELVIRA    EQUALS ZERLINA   +1        8(1)   P64
 1898   REF    1             E7,1445            AZINCR1   EQUALS ELVIRA    +1        8(1)   P64
 1899   REF    1             E7,1446            ELINCR1   EQUALS AZINCR1   +1        8(1)   P64
A1900
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P1901    *******   OVERLAY NUMBER 0 IN EBANK 7   *******
A1902


P1903    RENDEZVOUS GUIDANCE STORAGE -P32.....P35-                            (89D)

 1905    REF   1               E7,1611             TSTRT     EQUALS  DELDV              MIDCOURSE START TIME
 1906    REF   1               E7,1573             TDEC2     EQUALS  DELVCSI            TEMP STORAGE FOR INTEGRATION TIME INPUT
 1907    REF   1               E7,1575             KT        EQUALS  DELVTPI            TEMP STORAGE FOR MIDCOURSE DELTA TIME
 1908                          E7,1471   E7,1476   VACT1     ERASE   +5D                VELOCITY VECTOR OF ACTIVE  AT CSI TIME
 1909                          E7,1477   E7,1504   RPASS1    ERASE   +5D                POSITION VECTOR OF PASSIVE AT CSI TIME
 1910                          E7,1505   E7,1512   VPASS1    ERASE   +5D                VELOCITY VECTOR OF PASSIVE AT CSI TIME
 1911                          E7,1513   E7,1520   VACT2     ERASE   +5D                VELOCITY VECTOR OF ACTIVE  AT CDH TIME
 1912                          E7,1521   E7,1526   RPASS2    ERASE   +5D                POSITION VECTOR OF PASSIVE AT CDH TIME
 1913                          E7,1527   E7,1534   VPASS2    ERASE   +5D                VELOCITY VECTOR OF PASSIVE AT CDH TIME
 1914                          E7,1535   E7,1542   RACT3     ERASE   +5D                POSITION VECTOR OF ACTIVE  AT TPI TIME
 1915                          E7,1543   E7,1550   VACT3     ERASE   +5D                VELOCITY VECTOR OF ACTIVE  AT TPI TIME
 1916                          E7,1551   E7,1556   RPASS3    ERASE   +5D                POSITION VECTOR OF PASSIVE AT TPI TIME
 1917                          E7,1557   E7,1564   VPASS3    ERASE   +5D                VELOCITY VECTOR OF PASSIVE AT TPI TIME
 1918                          E7,1565   E7,1572   VACT4     ERASE   +5D                VELOCITY VECTOR OF ACTIVE  AT INTERCEPT
 1919    REF   1               E7,1543             UNVEC     EQUALS  VACT3              CDHMVR UNIT VECTOR TEMP STORAGE.
 1920                          E7,1573   E7,1574   DELVCSI   ERASE   +1D                THRUST VALUE AT CSI
 1921                          E7,1575   E7,1576   DELVTPI   ERASE   +1D                THRUST VALUE AT TPI OR MID
 1922    REF   2  LAST  143    E7,1575             DELVMID   EQUALS  DELVTPI
 1923                          E7,1577   E7,1600   DIFFALT   ERASE   +1D                ALT DIFFERENCE AT CDH
 1924                          E7,1601   E7,1602   POSTCSI   ERASE   +1                 PERIGEE ALTITUDE AFTER CSI MANEUVER
 1925                          E7,1603   E7,1604   POSTCDH   ERASE   +1                 PERIGEE ALTITUDE AFTER CDH MANEUVER
 1926                          E7,1605   E7,1606   POSTTPI   ERASE   +1                 PERIGEE ALTITUDE AFTER TPI MANEUVER
 1927    REF   1               E7,1605             LOOPCT    EQUALS  POSTTPI            CSI NEWTON ITERATION COUNTER
 1928    REF   1               E7,1603             HAFPA1    EQUALS  POSTCDH            HALF PERIOD
 1929                          E7,1607   E7,1610   GAMPREV   ERASE   +1                 PREVIOUS GAMMA
 1930    REF   3  LAST  143    E7,1575             DVPREV    EQUALS  DELVTPI            PREVIOUS DELVCSI
 1931                          E7,1611   E7,1612   DELDV     ERASE   +1D
 1932                          E7,1613   E7,1614   CSIALRM   ERASE   +1                 FIRST SOLUTION ALARM
 1933                          E7,1615   E7,1615   VERBNOUN  ERASE
 1934    REF   1               E7,1613             TITER     EQUALS  CSIALRM            ITERATION COUNTER
 1935                          E7,1616   E7,1617   RDOTV     ERASE   +1
 1936    REF   1               E7,1505             VAPREC    EQUALS  VPASS1             I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 1937    REF   1               E7,1477             RAPREC    EQUALS  RPASS1             I(6) S-S PREC VEC FOR NOM TPI TIME(ACT V
 1938    REF   1               E7,1527             VPPREC    EQUALS  VPASS2             I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
 1939    REF   1               E7,1521             RPPREC    EQUALS  RPASS2             I(6) S-S PREC VEC FOR NOM TPI TIME(PASS
 1940    REF   4  LAST  143    E7,1575             DELEL     EQUALS  DELVTPI            I(2) S-S
 1941    REF   2  LAST  143    E7,1611             DELTEE    EQUALS  DELDV              I(2)S-S
 1942    REF   2  LAST  143    E7,1573             SECMAX    EQUALS  DELVCSI            I(2) S-S MAX STOP SIZE FOR ROUTINE
 1943    REF   2  LAST  143    E7,1605             DELTEEO   EQUALS  POSTTPI            I(2) S-S BACK VALUES OF DELTA TIME
 1944                          E7,1620   E7,1621   CENTANG   ERASE             +1       I(2) S-S CENTRAL ANGLE COVERED(TPI-TPF)

A1945
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R1946              SOME P47 STORAGE                                                (6D)

 1948                          E7,1622  E7,1627   DELVIMU   ERASE           +5      I(6)DSP NOUN 83 FOR P47 DELTA V (IMU)
A1949

R1950              P30-P40 COMMON STORAGE.                                         ( 3D)

 1952                          E7,1630  E7,1631   TPASS4    ERASE  +1               INTERCEPT TIME
 1953                          E7,1632  E7,1632   QTEMP     ERASE                   I(1)TMP COMMON RETURN SAVE REGISTER.


A1954
R1955              P32,33,34 STORAGE.                                              (6D)

 1957                          E7,1633  E7,1634   TCSI      ERASE           +1      B(2) TMP CSI TIME IN CENTISECONDS
 1958                          E7,1635  E7,1636   TTPI      ERASE           +1      B(2) TMP TPI TIME IN CENTISECONDS
 1959                          E7,1637  E7,1640   TTPI0     ERASE           +1      B(2) TMP TTPI STORAGE FOR RECYCLE


R1960              P30,P40 INTERFACE.                                              (21D)

 1962                          E7,1641  E7,1664   RTIG      ERASE  +19D             I(6)TMP
 1963     REF   1              E7,1647            VTIG      EQUALS RTIG     +6      I(6)TMP
 1964     REF   1              E7,1655            DELVSIN   EQUALS VTIG     +6      I(6)TMP
 1965     REF   1              E7,1663            DELVSAB   EQUALS DELVSIN  +6      I(2)TMP
 1966     REF   1              E7,1663            VGDISP    =      DELVSAB


 1967                          E7,1665  E7,1665   QTEMP1    ERASE                   I(1)TMP HOLDS RETURN.
 1968     REF   1              E7,1665            RGEXIT    EQUALS QTEMP1           SAVE Q
 1969     REF   2  LAST  144   E7,1665            SAVQR52   EQUALS QTEMP1


R1970              INITVEL STORAGE. (IN OVERLAY 0 AND OVERLAY 1.                   (2D)
R1972                     (CALLS LAMBERT, CONIC SUBROUTINES)

 1973     REF   1              E7,1565            VTPRIME   EQUALS VACT4            TOTAL VELOCITY AT DESIRED RADIUS
 1974     REF   1              E7,1616            ITCTR     EQUALS RDOTV            ITERATION COUNTER
 1975                          E7,1666  E7,1667   COZY4     ERASE           +1      COS OF ANGLE WHEN ROTATION STARTS
 1976     REF   3  LAST  143   E7,1611            X1INPUT   EQUALS DELDV            X1 TEMP STORAGE
 1977     REF   1              E7,1607            INTIME    EQUALS GAMPREV          TIME OF RINIT
A1978


R1979              PERIAPO STORAGE. (2D)                                           (2D)

 1981                          E7,1670  E7,1671   XXXALT    ERASE           +1      RADIUS TO LAUNCH PAD OR LANDING SIGHT

 1982     REF   1              E7,1672            END-IN/M  EQUALS XXXALT   +2      NEXT AVAIL ERASABLE AFTER INITVEL/MIDGIM
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R1983               S40.1 STORAGE.                                                            (12D)

 1985                          E7,1672  E7,1705   UT        ERASE               +11D   I(6)     THRUST DIRECTION
 1986  REF     1               E7,1700            VGTIG     EQUALS UT           +6     I(6)OUT
 1987  REF     1               E7,1700            VGPREV    =      VGTIG
R1988  ASTEER STORAGE.                                                                 (22D)

 1990                          E7,1706  E7,1733   VG        ERASE               +21D   I(6)
 1991  REF     1               E7,1714            RMAG      EQUALS VG           +6     I(2)
 1992  REF     1               E7,1716            MUASTEER  EQUALS RMAG         +2     I(2)
 1993  REF     1               E7,1720            MU/A      EQUALS MUASTEER     +2     I(2)
 1994  REF     1               E7,1722            RTMAG     EQUALS MU/A         +2     I(2)
 1995  REF     1               E7,1724            R1C       EQUALS RTMAG        +2     I(6)
 1996  REF     1               E7,1732            SS        EQUALS R1C          +6     I(2)

 1997  REF     2  LAST   144   E7,1655            IC        =      DELVSIN
 1998  REF     1               E7,1762            TIGSAVE   =      P21TIME
 1999  REF     1               E7,1764            TIGSAVEP  =      SCAXIS
 2000  REF     2  LAST   145   E7,1766            MUSCALE   =      SCAXIS       +2
R2001

R2002               P40 STORAGE.                                                       (6D)

R2004                    F,MDOT,AND TDECAY MUST BE CONTIGUOUS FOR VLOAD.
 2005                          E7,1734  E7,1741   F         ERASE               +5     I(2)TMP  S40.1 GENERATES THIS FOR S40.3
 2006  REF     1               E7,1736            MDOT      EQUALS F            +2     I(2)TMP MASS CHNG RATE, KG/CS AT 2**3.
 2007  REF     1               E7,1740            TDECAY    EQUALS MDOT         +2     I(2)IN  DELTA-T TAILOFF, (2**28)CS.
 2008                          E7,1742  E7,1743   VEX       ERASE               +1     I(2) EXHAUST VELOCITY FOR TGO COMPUTAT'N
A2009


R2010               MIDTOAV1(2) STORAGE. (CALLED BY P40,P41,P42)                       (1D)

 2012                          E7,1744  E7,1744   IRETURN1 ERASE                       B(1)     RETURN FROM MIDTOAV1 AND 2
A2013
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P2014    ******* OVERLAY  NUMBER 1  IN EBANK 7   *******
A2015


R2016                INITVEL  (CALLED BY P34,35,38,39,10,11,S40.9,S40.1)                 (6D)

 2018    REF    1                 E7,1471            RTARG1    EQUALS VACT1                I(6)S TEMP STORAGE OF RTARG
A2019

R2020                P35-P40 INTERFACE.                                                   (6D)

 2022    REF    2  LAST  143    E7,1505            VPASS4    EQUALS VPASS1               I(6)TMP VELOCITY OF PASSIVE AT INTERCEPT


R2023                LAT - LONG TEMPORARIES. CAN OVERLAY WITH S40.1                       (3D)

 2025    REF    2  LAST  145    E7,1672            ERADM     EQUALS UT                   I(2)
 2026    REF    1                 E7,1674            INCORPEX EQUALS ERADM      +2        I(1)


R2027                LRS24.1 STORAGE. (CAN SHARE WITH P30'S)                              (40D)

 2029    REF    1                 E7,1675            RLMSRCH   EQUALS INCORPEX +1         I(6) TMP LM POSITION VECTOR
 2030    REF    1                 E7,1703            VXRCM     EQUALS RLMSRCH   +6        I(6)     CM V X R VECTOR
 2031    REF    1                 E7,1711            LOSDESRD EQUALS VXRCM     +6        I(6)     DESIRED LOS VECTOR
 2032    REF    1                 E7,1717            UXVECT    EQUALS LOSDESRD +6         I(6)     X-AXIS SRCH PATTERN COORDS
 2033    REF    1                 E7,1725            UYVECT    EQUALS UXVECT    +6        I(6)     Y-AXIS SRCH PATTERN COORDS
 2034    REF    1                 E7,1733            DATAGOOD EQUALS UYVECT    +6        B(1)DSP FOR R1 - ALL 1-S WHEN LOCKON
 2035    REF    1                 E7,1734            OMEGDISP EQUALS DATAGOOD +1         B(2)     ANGLE OMEGA DISPLAYED IN R2
 2036    REF    1                 E7,1734            OMEGAD    =        OMEGDISP                    PINBALL DEFINITION.
 2037    REF    2  LAST  146    E7,1736            NSRCHPNT EQUALS OMEGDISP +2         B(1)TMP SEARCH PATTERN POINT COUNTER
 2038    REF    1                 E7,1737            SAVLEMV   EQUALS NSRCHPNT +1         I(6) S-S SAVES LOSVEL


A2039
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P2040    ******* OVERLAY NUMBER 2  IN EBANK 7   *******
A2041


R2042                INCORP STORAGE IN E7.                                                    (47D)

 2044    REF    2  LAST  142   E7,1471            TX789       EQUALS F7OVERLA                 I(6)
 2045    REF    1              E7,1477            GAMMA       EQUALS TX789      +6            I(3)
 2046    REF    1              E7,1502            OMEGA       EQUALS GAMMA      +3            I(18)
 2047    REF    1              E7,1524            BVECTOR     EQUALS OMEGA      +18D          I(18)
 2048    REF    1              E7,1546            DELTAQ      EQUALS BVECTOR    +18D          I(2)
R2049                AOTMARK STORAGE                                                          (3D)

 2051    REF    1              E7,1550            MARKCNTR    EQUALS DELTAQ     +2            I(1)
 2052    REF    1              E7,1551            XYMARK      EQUALS MARKCNTR   +1            B(1)
 2053    REF    1              E7,1552            MKDEX       EQUALS XYMARK     +1            B(1)TMP INDEX FOR AOTMARK
A2054

R2055                PLANET STORAGE.                                                          (8D)

 2057    REF    1              E7,1553            PLANVEC     EQUALS MKDEX      +1            (6) REFER VECTOR OF PLANET
 2058    REF    1              E7,1561            TSIGHT      EQUALS PLANVEC    +6            (2) TIME OF MARK OR EST TIME OF MARK
A2059


R2060                LRS22.3 STORAGE. (CAN SHARE WITH P30'S AND OVERLAY LRS24.1               (30D).

 2062    REF    2  LAST  146   E7,1675            LGRET       EQUALS RLMSRCH                  I(1) TMP
 2063    REF    1              E7,1675            RDRET       EQUALS LGRET                    B(1)  TEMP RETURN.
 2064    REF    2  LAST  147   E7,1675            IGRET       EQUALS LGRET                    B(1)  TEMP RETURN.
 2065    REF    1              E7,1676            MX          EQUALS RDRET      +1            I(6)
 2066    REF    1              E7,1704            MY          EQUALS MX +6                    I(6)
 2067    REF    1              E7,1712            MZ          EQUALS MY +6                    I(6)
 2068    REF    2  LAST  147   E7,1676            E0          EQUALS MX                       I(2)
 2069    REF    3  LAST  147   E7,1700            E1          EQUALS MX +2                    I(2)
 2070    REF    4  LAST  147   E7,1702            E2          EQUALS MX +4                    I(2)
 2071    REF    1              E7,1704            E3          EQUALS E2         +2            I(2)
 2072    REF    1              E7,1720            SCALSHFT    EQUALS MZ         +6            B(1) SCALE SHIFT FOR EARTH/MOON
 2073    REF    1              E7,1721            RXZ         EQUALS SCALSHFT   +1            I(2)
 2074    REF    1              E7,1723            ULC         EQUALS RXZ        +2            I(6)
 2075    REF    1              E7,1731            SINTHETA    EQUALS ULC        +6            I(2)

R2076           ***** IN OVERLAY ONE *****

 2077    REF    1              E7,1746            N49FLAG     EQUALS RDOTMSAV                 B(1)S     FLAG INDICATING V0649 RESPONSE
A2078

R2079                LRS22.1 STORAGE. (MUST NOT SHARE WITH P30'S)                             (13D)

R2081                (OUTPUTS ARE TO LRS22.3)
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 2082    REF    1                E7,1733          RRTRUN   EQUALS SINTHETA +2      B(2)OUT  RR TRUNION ANGLE
 2083    REF    1                E7,1735          RRSHAFT  EQUALS RRTRUN   +2      B(2)OUT RRSHAFT ANGLE
 2084    REF    1                E7,1737          LRS22.1X EQUALS RRSHAFT  +2      B(1)TMP
 2085    REF    1                E7,1740          RRBORSIT EQUALS LRS22.1X +1      I(6) TMP RADAR BORESIGHT VECTOR.
 2086    REF    1                E7,1746          RDOTMSAV EQUALS RRBORSIT +6      B(2) S    RR RANGE-RATE(FPS)
A2087

R2088              LRS22.1  (SAME AS PREVIOUS SECTION) ALSO DOWNLINK FOR RR  (R29)(10D)   CANNOT SHARE WITH L.A.D.

 2090    REF    2  LAST  147     E7,1750          RDOTM    EQUALS RDOTMSAV +2      B(2)OUT  RANGE-RATE READING
 2091    REF    1                E7,1752          TANGNB   EQUALS RDOTM    +2      B(2)TMP  RR GIMBAL ANGLES
R2092              RETAIN THE ORDER OF MKTIME TO RM FOR DOWNLINK PURPOSES
 2093    REF    1                E7,1754          MKTIME   EQUALS TANGNB   +2      B(2)OUT  TIME-OF RR READING
 2094    REF    1                E7,1756          RM       EQUALS MKTIME   +2      I(2)OUT  RANGE READING
 2095    REF    1                E7,1760          RANGRDOT EQUALS RM       +2      B(2) DOWNLINKED RAW RANGE AND RRATE
A2096
R20961             LANDING OVERLAY                                                 (1D)

 20963 *REF    2  LAST  148     E7,1750          THRDISP  EQUALS RDOTM             B(1) PERCENT OF FTP I 10,500 LBS.


R2097              R61LEM - PREFERRED TRACKING ATTITUDE ROUTINE  **IN OVERLAY ONE*
R2098                        (CALLED BY P20,R22LEM,LSR22.3)                        (1D)

 2100    REF    2  LAST  148     E7,1745          R65CNTR  EQUALS RRBORSIT +5      B(1)SS  COUNT NUMBER OF TIMES PREFERRED
A2101                                                                                      TRACKING ROUTINE IS TO CYCLE
A2103

R2104              P21 STORAGE                                                     (2D)

 2106    REF    1                E7,1762          P21TIME  EQUALS RANGRDOT +2      I(2)TMP
A2107

R2108              KALCMANU, VECPOINT STORAGE.  CALLED BY R63, R61, R65.           (12D)

 2110    REF    2  LAST  145     E7,1764          SCAXIS   EQUALS P21TIME  +2      I(6)
 2111    REF    3  LAST  145     E7,1772          POINTVSM EQUALS SCAXIS   +6      I(6)
A2112
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P2113    *******  OVERLAY NUMBER 3 IN EBANK 7  *******
A2114


R2115                SERVICER STORAGE                                                     (6D)

 2117    REF   3  LAST  147   E7,1471           ABVEL    EQUALS E7OVERLA            B(2)  DISPLAY
 2118    REF   1              E7,1473           HDOTDISP EQUALS ABVEL     +2        B(2)  DISPLAY
 2119    REF   2  LAST  120   E7,1475           TTFDISP  EQUALS HDOTDISP +2         B(2)  DISPLAY
A2120

R2121                BURN PROG STORAGE.                                                   (2D)

 2123    REF   1              E7,1477           SAVET-30 EQUALS TTFDISP   +2        B(2)TMP TIG-30 RESTART
A2124

R2125                SERVICER STORAGE.                                                    (69D)

 2127    REF   1              E7,1501           VGBODY   EQUALS SAVET-30 +2         B(6)OUT SET.BY S41.1 VG LEM, SC.COORDS
 2128    REF   1              E7,1501           DELVCTL  =      VGBODY
 2129    REF   2  LAST  149   E7,1507           DVTOTAL  EQUALS VGBODY    +6        B(2) DISPLAY NOUN
 2130    REF   1              E7,1511           GOBLTIME EQUALS DVTOTAL   +2        B(2) NOMINAL TIG FOR CALC. OF GOBLATE.
 2131    REF   1              E7,1513           ABDVCONV EQUALS GOBLTIME +2         I(2)
 2132    REF   1              E7,1515           DVCNTR   EQUALS ABDVCONV +2         B(1)
 2133    REF   1              E7,1516           TGO      EQUALS DVCNTR   +1         B(2)
 2134    REF   1              E7,1520           R        EQUALS TGO      +2         I(6)
 2135    REF   1              E7,1520           UNITGOBL EQUALS R                   I(6)
 2136    REF   2  LAST  149   E7,1526           V        EQUALS R         +6
 2137    REF   1              E7,1526           DELVREF  EQUALS V                   I(6)
 2138    REF   1              E7,1534           HCALC    EQUALS DELVREF   +6        B(2)       LR
 2139    REF   1              E7,1536           UNIT/R/  EQUALS HCALC     +2        I(6)
R2140                    (THE FOLLOWING SERVICER ERASABLES CAN BE SHARED WITH SECOND DPS GUIDANCE STORAGE)

 2142    REF   1              E7,1544           RN1      EQUALS UNIT/R/   +6        B(6)
 2143    REF   1              E7,1552           VN1      EQUALS RN1       +6        I(6)                        (IN ORDER  )
 2144    REF   1              E7,1560           PIPTIME1 EQUALS VN1       +6        B(2)                        (    FOR   )
 2145    REF   1              E7,1562           GDT1/2   EQUALS PIPTIME1 +2         I(6)                        (   COPY   )
 2146    REF   1              E7,1570           MASS1    EQUALS GDT1/2    +6        I(2)                        (   CYCLE  )
 2147    REF   1              E7,1572           R1S      EQUALS MASS1     +2        I(6)
 2148    REF   1              E7,1600           V1S      EQUALS R1S       +6        I(6)


R2149                ALIGNMENT/S40.2.3 COMMON STORAGE.                                    (18D)

 2151    REF   1              E7,1606           XSMD     EQUALS V1S       +6        I(6)
 2152    REF   1              E7,1614           YSMD     EQUALS XSMD      +6        I(6)
 2153    REF   1              E7,1622           ZSMD     EQUALS YSMD      +6        I(6)

 2154    REF   2  LAST  149   E7,1606           XSCREF   =      XSMD
 2155    REF   2  LAST  149   E7,1614           YSCREF   =      YSMD
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L      ERASABLE ASSIGNMENTS                                                            USER'S PAGE NO.  61        EC S4

 2156  REF   1             E7,1622       ZSCREF   =      ZSMD

 2157  REF   2 LAST  150   E7,1630       END-ALIG EQUALS ZSMD      +6     NEXT AVAIL ERASABLE AFTER ALIGN/S40.2,3


R2158          ******   P22   ******                                      (24D)

 2160  REF   1             E7,1630       RSUBL    EQUALS END-ALIG         I(6)S-S  LM POSITION VECTOR
 2161  REF   1             E7,1636       UCSM     EQUALS RSUBL     +6     I(6)S-S  VECTOR U
 2162  REF   1             E7,1644       NEWVEL   EQUALS UCSM      +6     I(6)S-S  TERMINAL VELOCITY VECTOR
 2163  REF   1             E7,1652       NEWPOS   EQUALS NEWVEL    +6     I(6)S-S  TERMINAL POSITION VECTOR
 2164  REF   1             E7,1660       LNCHTM   EQUALS NEWPOS    +6     I(2)S-S EST. LAUNCH TIME FOR LEM
 2165  REF   1             E7,1662       TRANSTM  EQUALS LNCHTM    +2     I(2)S-S TRANSFER TIME
 2166  REF   1             E7,1664       NCSMVEL  EQUALS TRANSTM   +2     I(6)S-S NEW CSM VELOCITY
A2167

R2168          *****  P21  *****                                          (18D)

 2170  REF   1                1162       P21ORIG  =      DISPDEX
 2171  REF   3 LAST  147   E7,1675       P21BASER EQUALS RLMSRCH          I(6)TMP
 2172  REF   1             E7,1703       P21BASEV EQUALS P21BASER  +6     I(6)TMP
 2173  REF   1             E7,1711       P21VEL   EQUALS P21BASEV  +6     I(2)TMP  *** NOUN 91 ***
 2174  REF   1             E7,1713       P21GAM   EQUALS P21VEL    +2     I(2)TMP  *** NOUN 91 ***
 2175  REF   1             E7,1715       P21ALT   EQUALS P21GAM    +2     I(2)TMP  *** NOUN 91 ***
A2176
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P2177    *******   OVERLAY NUMBER 4  IN  EBANK 7   *******
A2178

R2179    VARIABLES FOR SECOND DPS GUIDANCE (THE LUNAR LANDING)                                  (BOD)

R2181    THESE ERASABLES MAY BE SHARED WITH CARE

 2182    REF    2  LAST   149     E7,1544            OURTEMPS =      RN1                OVERLAY LAST PART OF SERVICER
 2183    REF    1                 E7,1544            LANDTEMP =      OURTEMPS           B(6)     GUIDANCE
 2184    REF    1                 E7,1552            TTF/8TMP =      LANDTEMP +6        B(2)    GUIDANCE
 2185    REF    1                 E7,1554            ELINCR   =      TTF/8TMP +2        B(2)    GUIDANCE
 2186    REF    1                 E7,1556            AZINCR   =      ELINCR   +2        B(2)    GUIDANCE
 2187    REF    1                 E7,1560            KEEP-2   =      AZINCR   +2        B(2)    TO PREVENT PIPTIME1 OVERLAY
 2188    REF    1                 E7,1562            TABLTTF  =      KEEP-2    +2       B(2)    GUIDANCE
 2189    REF    1                 E7,1573            TPIPOLD  =      TABLTTF  +9D       B(2)    GUIDANCE
 2190    REF    1                 E7,1621            E2DPS    EQUALS OURPERMS
R2191


R2192    THESE ERASABLES MUST NOT OVERLAY GOBLTIME OR SERVICER
 2193    REF    3  LAST   149     E7,1606            PIFPSET  =      XSMD               B(1)    THROTTLE
 2194    REF    1                 E7,1607            RTNHOLD  =      PIFPSET  +1        B(1)    THROTTLE
 2195    REF    1                 E7,1610            FWEIGHT  =      RTNHOLD  +1        B(2)    THROTTLE
 2196    REF    1                 E7,1612            PIF      =      FWEIGHT  +2        B(2)   THROTTLE
 2197    REF    1                 E7,1614            PSEUDO55 =      PIF      +2        B(1)   THROTTLE DOWNLINK
 2198    REF    1                 E7,1615            FC       =      PSEUDO55 +1        B(2)    THROTTLE
 2199    REF    1                 E7,1617            TTHROT   =      FC       +2        B(1)    THROTTLE
 2200    REF    1                 E7,1620            FCOLD    =      TTHROT   +1        B(1)    THROTTLE
A2201


R2202    THESE ERASABLES SHOULD NOT BE SHARED DURING P63, P64, P65, P66, P67

 2203    REF    1                 E7,1621            OURPERMS =      FCOLD    +1        MUSTN'T OVERLAY OURTEMPS OR SERVICER
 2204    REF    2  LAST   151     E7,1621            WCHPHOLD =      OURPERMS           B(1)    GUIDANCE
 2205    REF    1                 E7,1622            FILLER   =      WCHPHOLD +1
 2206    REF    1                 E7,1623            FLPASS0  =      FILLER   +1        B(1) GUIDANCE
 2207    REF    1                 E7,1624            TPIP     =      FLPASS0  +1        B(2)
 2208    REF    1                 E7,1626            VGU      =      TPIP     +2        B(6)    GUIDANCE
 2209    REF    1                 E7,1634            LAND     =      VGU      +6        B(6)    GUIDANCE     CONTIGUOUS
 2210    REF    1                 E7,1642            TTF/8    =      LAND     +6        B(2)    GUIDANCE      CONTIGUOUS
 2211    REF    1                 E7,1644            ELIDUMMY =      TTF/8    +2         (1)    DUMMY FOR ELINCR1
 2212    REF    1                 E7,1645            AZIDUMMY =      ELIDUMMY +1         (1)    DUMMY FOR AZINCR1
 2213    REF    1                 E7,1646            ZERDUMMY =      AZIDUMMY +1         (1)    DUMMY FOR ZERLINA
 2214    REF    1                 E7,1647            ELVDUMMY =      ZERDUMMY +1         (1)    DUMMY FOR ELVIRA
 2215    REF    1                 E7,1650            LRADRET  =      ELVDUMMY +1        B(1)    LR
 2216    REF    1                 E7,1651            VSELECT  =      LRADRET  +1        B(1)    LR
 2217    REF    1                 E7,1652            VMEAS    =      VSELECT  +1        B(2)    LR
 2218    REF    1                 E7,1654            HMEAS    =      VMEAS    +2        B(2)    LR
 2219    REF    1                 E7,1656            VN2      =      HMEAS    +2        B(6)    LR
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L        ERASABLE ASSIGNMENTS                                                              USER'S PAGE NO.  63       EO S4

 2220   REF   1              E7,1656           GNUR     =       VN2               B(6)      LR
 2221   REF   2  LAST  152   E7,1656           GNUV     =       VN2               B(6)      LR
 2222   REF   3  LAST  152   E7,1656           LRADRET1 =       VN2               B(1)      LR
 2223   REF   4  LAST  152   E7,1664           DELTAH   =       VN2       +6      B(2)     DISPLAY
 2224   REF   1              E7,1666           FUNNYDSP =       DELTAH    +2      B(2)     DISPLAY
 2225   REF   1              E7,1670           EOURPERM EQUALS FUNNYDSP +2       NEXT AVAILABLE ERASABLE AFTER OURPERMS
R2226

R2227   (ERASABLES WHICH OVERLAY THE ABOVE BLOCK)

 2228   REF   2  LAST  151   E7,1644           VDGVERT  =       FLIDUMMY          B(2)     P65,P66
 2229   REF   2  LAST  151   E7,1646           NIGNLOOP =       ZERDUMMY          B(1)     IGNALG
 2230   REF   2  LAST  151   E7,1647           NGLIOSUB =       ELVDUMMY          B(1)     IGNALG
 2231   REF   3  LAST  152   E7,1647           WCHVERT  =       ELVDUMMY          B(1)     P65,P66,P67
 2232   REF   2  LAST  152   E7,1666           FUELNEED =       FUNNYDSP          B(1)     DISPLAY
 2233   REF   3  LAST  152   E7,1666           TREDES   =       FUNNYDSP          B(1)     DISPLAY
 2234   REF   4  LAST  152   E7,1667           LOCKANGL =       FUNNYDSP +1       B(1)     DISPLAY
A2235

R2236   ERASABLES CONVENIENTLY DEFINABLE IN THE WORK AREA

 2237                           0022           PROJ     =       18D               I(2)     GUIDANCE
 2238                           0024           UNLRB/2  =       20D               I(6)     GUIDANCE (DURING P64 ONLY)
 2239                           0024           UNLR/2   =       20D               I(6)     GUIDANCE
R2240

R2241   THE END OF THE LUNAR LANDING ERASABLES
A2242


R2243              R12     (FOR LUNAR LANDING)                                    (6D)

 2245   REF   1              E7,1670           LRLCTR   EQUALS FOURPERM          B(1) LR DATA TEST
 2246   REF   1              E7,1671           LRRCTR   EQUALS LRLCTR    +1      B(1)
 2247   REF   1              E7,1672           LRMCTR   EQUALS LRRCTR    +1      B(1)
 2248   REF   1              E7,1673           LRSCTR   EQUALS LRMCTR    +1      B(1)
 2249   REF   1              E7,1674           STILBADH EQUALS LRSCTR    +1      B(1)
 2250   REF   1              E7,1675           STILBADV EQUALS STILBADH +1       B(1)
A2251


R2252              LANDING ANALOGS DISPLAY STORAGE.                               (40D)

 2254   REF   1              E7,1676           LATVMETR EQUALS STILBADV +1       B(1)PRM LATVEL MONITOR METER  (AN ORDER)
 2255   REF   1              E7,1677           FORVMETR EQUALS LATVMETR +1       B(1)PRM FORVEL MONITOR METER  (-ED PAIR)
 2256   REF   1              E7,1700           LATVEL   EQUALS FORVMETR +1       B(1)PRM LATERAL VELOCITY   (AN ORDER)
 2257   REF   1              E7,1701           FORVEL   EQUALS LATVEL    +1      B(1)PRM FORWARD VELOCITY   (-ED PAIR)
 2258   REF   1              E7,1702           TRAKLATV EQUALS FORVEL    +1      B(1)PRM MONITOR FLG 4 LATVEL  (AN ORDER)
 2259   REF   1              E7,1703           TRAKFWDV EQUALS TRAKLATV +1       B(1)PRM MONIT. FLAG FOR FORVEL (ED PAIR)
 2260   REF   1              E7,1704           VHY      EQUALS TRAKFWDV +1       B(1)PRM VHY=VMP.UHYP   (AN ORDER)
 2261   REF  1              E7,1705      VHZ      EQUALS VHY      +1    B(1)PRM VHZ=VMP.UHZP   (-ED PAIR)
 2262   REF  1              E7,1706      VVECT    EQUALS VHZ      +1    B(3)PRM UPDATED S.P. VELOCITY VECTOR
 2263   REF  1              E7,1711      ALTRATE  EQUALS VVECT    +3    B(1)PRM ALTITUDE RATE IN BIT UNITS
 2264   REF  1              E7,1712      ALTSAVE  EQUALS ALTRATE  +1    B(2)PRM ALTITUDE IN BIT UNITS
 2265   REF  1              E7,1714      LADQSAVE EQUALS ALTSAVE  +2    B(1)PRM SAVE Q IN LANDISP
 2266   REF  1              E7,1715      DT       EQUALS LADQSAVE +1    B(1)PRM TIME 1 MINUS (PIPTIME +1)
 2267   REF  1              E7,1716      DALTRATE EQUALS DT       +1    B(1)PRM ALTITUDE RATE ERROR CORRECTION
 2268   REF  1              E7,1717      UHYP     EQUALS DALTRATE +1    B(6)PRM SM UNIT VECTOR
 2269   REF  1              E7,1717      QAXIS    =      UHYP
 2270   REF  2  LAST  153   E7,1725      UHZP     EQUALS UHYP     +6    B(6)PRM SM UNIT VECTOR
 2271   REF  2  LAST  120   E7,1733      DELVS    EQUALS UHZP     +6    B(6)PRM DELVS = WMXR
 2272   REF  1              E7,1741      ALTBITS  EQUALS DELVS    +6    B(2)PRM ALTITUDE IN BIT UNITS, 2.34FT/BT
 2273   REF  1              E7,1743      RUNIT    EQUALS ALTBITS  +2    B(3)PRM SM HALF-UNIT R VECTOR
 2274   REF  1              E7,1745      LASTLADW EQUALS RUNIT    +2    ONLY A TAG TO SIGNIFY LAST L.A.D. WORD
A2275

R2276           P66 ERASABLES (R.C.D.)                                  (1D)

 2278   REF  2  LAST  153   E7,1746      RODCOUNT EQUALS RUNIT    +3
A2279

R2280           P66 ERASABLES (R.O.D.)                                  (14D)

 2282   REF  2  LAST  148   E7,1756      RODSCAL1 EQUALS RM             B(1)
 2283   REF  1              E7,1757      LASTTPIP EQUALS RODSCAL1 +1    I(2)
 2284   REF  1              E7,1761      THISTPIP EQUALS LASTTPIP +2    B(2)
 2285   REF  1              E7,1763      OLDPIPAX EQUALS THISTPIP +2    B(1)
 2286   REF  1              E7,1764      OLDPIPAY EQUALS OLDPIPAX +1    B(1)
 2287   REF  1              E7,1765      OLDPIPAZ EQUALS OLDPIPAY +1    B(1)
 2288   REF  1              E7,1766      DELVROD  EQUALS OLDPIPAZ +1    B(6)
A2289

R2290           NOUN 63 COMPONENT                                       (2D)
 2292   REF  1              E7,1774      HCALC1   EQUALS DELVROD  +6    I(2)
A2293
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P2294    *******  OVERLAY NUMBER 5 IN EBANK 7  *******
A2295


R2296               ASCENT GUIDANCE ERASABLES.                                          (210)

 2298    REF   2  LAST  150    E7,1630           RCO       EQUALS END-ALIG                I(2)TMP  TARGET RADIUS AND OUT-OF-PLANE
 2299    REF   1               E7,1632           YCO       EQUALS RCO       +2            I(2)TMP  DISTANCE, SCALED AT 2(24).
 2300    REF   1               E7,1634           1/DV1     EQUALS YCO        +2           B(2)TMP  ATMAG
 2301    REF   1               E7,1636           1/DV2     EQUALS 1/DV1      +2           B(2)TMP  ATMAG
 2302    REF   1               E7,1640           1/DV3     EQUALS 1/DV2      +2           B(2)TMP  ATMAG
 2303    REF   1               E7,1642           XRANGE    EQUALS 1/DV3      +2           B(2)TMP
 2304    REF   1               E7,1644           ENGOFFDT  EQUALS XRANGE     +2           B(1)TMP
 2305    REF   1               E7,1645           VGVECT    EQUALS ENGOFFDT  +1            I(6)OUT  VELOCITY-TO-BE-GAINED
 2306    REF   1               E7,1653           TXO       EQUALS VGVECT    +6            I(2)TMP  TIME AT WHICH X-AXIS OVERRIDE
A2307                                                                                     IS ALLOWED.

R2308    END OF THE ASCENT GUIDANCE ERASABLES.

R2309    THE FOLLOWING CARDS KEEP THE ASSEMBLER HAPPY UNTIL THE SYMBOLS ARE DELETED FROM THE PINBALL NOUN TABLES.

 2311    REF   1               E7,1745           END-E7.0  EQUALS IRETURN1  +1            FIRST UNUSED LOCATION IN E7 OVERLAY 0
 2312    REF   1               E7,1747           END-E7.1  EQUALS N49FLAG   +1            FIRST UNUSED LOCATION IN E7 OVERLAY 1
 2313    REF   1                  4000           END-E7.2  EQUALS POINTVSM  +6            FIRST UNUSED LOCATION IN E7 OVERLAY 2
 2314    REF   3  LAST  154    E7,1630           END-E7.3  EQUALS END-ALIG                FIRST UNUSED LOCATION IN E7 OVERLAY 3
 2315                          E7,1777           END-E7.4  EQUALS 3777                    ** LAST LOCATION USED IN E7 OVERLAY 4 **
 2316    REF   1               E7,1655           END-E7.5  EQUALS TXO        +2           FIRST UNUSED LOCATION IN E7 OVERLAY 5
 2317                          E7,1777           END-E7    EQUALS 3777                    **LAST LOCATION USED IN E7 **
A2318



*** END OF LUMERASE.134 ***
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0001                          4000                     SETLOC 4000

00015  REF   1                                         COUNT*  $$/RUPTS          FIX-FIX LEAD INS
0002                          4000  0 0004 0           INHINT                    GO
0003   REF   1                4001  3 4054 1           CAF     GOBB
0004   REF   1                4002  56 006 1           XCH     BBANK
0005   REF   1                4003  1 2665 1           TCF     GOPROG

0006   REF   1                4004  52 011 0           DXCH    ARUPT             T6RUPT
0007                          4005  0 0006 1           EXTEND
0008   REF   1                4006  3 4056 0           DCA     T6ADR
0009                          4007  52 006 0           DTCB

0010   REF   2   LAST   155   4010  52 011 0           DXCH    ARUPT             T5RUPT - AUTOPILOT
0011                          4011  0 0006 1           EXTEND
0012   REF   1                4012  3 1264 0           DCA     T5ADR
0013                          4013  52 006 0           DTCB

0014   REF   3   LAST   155   4014  52 011 0           DXCH    ARUPT             T3RUPT
0015   REF   1                4015  3 4057 1           CAF     T3RPTBB
0016   REF   2   LAST   155   4016  56 006 1           XCH     BBANK
0017   REF   1                4017  1 3410 0           TCF     T3RUPT

0018   REF   4   LAST   155   4020  52 011 0           DXCH    ARUPT             T4RUPT
0019   REF   1                4021  3 4064 1           CAF     T4RPTBB
00195  REF   3   LAST   155   4022  56 006 1           XCH     BBANK
0020   REF   1                4023  1 2000 1           TCF     T4RUPT

0023   REF   5   LAST   155   4024  52 011 0           DXCH    ARUPT             KEYRUPT1
0024   REF   1                4025  3 4060 0           CAF     KEYRPTBB
0025   REF   4   LAST   155   4026  56 006 1           XCH     BBANK
0026   REF   1                4027  1 3253 1           TCF     KEYRUPT1

0027   REF   6   LAST   155   4030  52 011 0           DXCH    ARUPT             KEYRUPT2
0028   REF   1                4031  3 4061 1           CAF     MKRUPTBB
0029   REF   5   LAST   155   4032  56 006 1           XCH     BBANK
0030   REF   1                4033  1 2332 0           TCF     MARKRUPT

0031   REF   7   LAST   155   4034  52 011 0           DXCH    ARUPT             UPRUPT
0032   REF   1                4035  3 4060 0           CAF     UPRPTBB
0033   REF   6   LAST   155   4036  56 006 1           XCH     BBANK
0034   REF   1                4037  1 3276 0           TCF     UPRUPT

0035   REF   8   LAST   155   4040  52 011 0           DXCH    ARUPT             DOWNRUPT
0036   REF   1                4041  3 4062 1           CAF     DWNRPTBB
0037   REF   7   LAST   155   4042  56 006 1           XCH     BBANK
0038   REF   1                4043  1 3505 0           TCF     DODOWNTM

0039   REF   9   LAST   155   4044  52 011 0           DXCH    ARUPT             RADAR RUPT
0040   REF   1                4045  3 4063 0           CAF     RDRPTBB
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 0041    REF    8  LAST  155        4046  56 006 1              XCH       BBANK
 0042    REF    1                   4047  1 3157 0              TCF       RADAREAD

 0043    REF   10  LAST  155        4050  52 011 0              DXCH      ARUPT            RUPT10 IS USED ONLY BY LANDING GUIDANCE
 0044    REF    1                   4051  3 4065 0              CA        RUPT10BB
 0045    REF    9  LAST  156        4052  56 006 1              XCH       BBANK
 0046    REF    1                   4053  1 2302 0              TCF       PITFALL


 0047    REF    1              E3,1400                          EBANK=    LST1             RESTART USES E0, E3
 0048    REF    2  LAST  155        4054    12103 0  GOBB       BBCON     GOPROG

 0049    REF    1              E6,1464                          EBANK=    PERROR
 0050    REF    1                   4055    02117 1  T6ADR      2CADR     DOT6RUPT
 0050    REF    1                   4056    36106 0

 0051    REF    2  LAST  156   E3,1400                          EBANK=    LST1
 0052    REF    2  LAST  155        4057    02103 1  T3RPTBB    BBCON     T3RUPT

 0053    REF    1                   0073                        EBANK=    KEYTEMP1
 0054    REF    2  LAST  155        4060    10100 1  KEYRPTBB   BBCON     KEYRUPT1

 0055    REF    1              E7,1404                          EBANK=    AOTAZ
 0056    REF    2  LAST  155        4061    16107 0  MKRUPTBB   BBCON     MARKRUPT

 0057    REF    2  LAST  155        4060             UPRPTBB    =         KEYRPTBB

 0058    REF    1                   0340                        EBANK=    DNTMBUFF
 0059    REF    2  LAST  155        4062    12100 0  DWNRPTBB   BBCON     DODOWNTM

 0060    REF    2  LAST  141   E7,1453                          EBANK=    TTOGO
 0061    REF    2  LAST  156        4063    52107 0  RDRPTBB    BBCON     RADAREAD

 0062    REF    1              E6,1414                          EBANK=    M11
 0063    REF    2  LAST  155        4064    14106 0  T4RPTBB    BBCON     T4RUPT

 00631   REF    2  LAST  142   E7,1444                          EBANK=    ELVIRA
 00632   REF    2  LAST  156        4065    22107 1  RUPT10BB   BBCON     PITFALL
 0001                       12,2000                      BANK    12
 000101 REF    1            06,2000                      SETLOC  T4RUP
 000102                     06,2000                      BANK

 0002   REF    2  LAST  156 E6,1414                      EBANK=  M11
 00025  REF    1                                         COUNT*  $$/T4RPT
 0003   REF    1            06,2000  54 016 1  T4RUPT    TS      BANKRUPT

 0004                       06,2001  0 0006 1            EXTEND
 0005   REF    1            06,2002  22 012 1            QXCH    QRUPT

 0007   REF    1            06,2003  11'310 0            CCS.    DSRUPTSW        GOES 7(-1)0 AROUND AND AROUND
 0008   REF    1            06,2004  1 2010 0            TCF     NORMT4 +1
 0009   REF    2  LAST  157 06,2005  1 2007 0            TCF     NORMT4

 0010   REF    1            06,2006  1 2134 1            TCF     QUIKDSP

 0015   REF    1            06,2007  3 4757 0  NORMT4    CAF     SEVEN
 0016   REF    1            06,2010  54 070 1            TS      RUPTREG1
 0017   REF    2  LAST  157 06,2011  55'310 0            TS      DSRUPTSW

 0019                          4066                      BLOCK   02
 001901 REF    1               4000                      SETLOC  FFTAG10
 001902                        4066                      BANK

 001904 REF    1                                         COUNT*  $$/T4RPT
 0020   REF    1               7732            100MRUPT  =       OCT37766        (DEC 16374)
R0023   RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS, RELAY CODE
R0024   IN LOWER 5 BITS.

 0025                          4066   04025 1  RELTAB    OCT     04025
 0026                          4067   10003 0            OCT     10003
 0027                          4070   14031 0            OCT     14031
 0028                          4071   20033 0            OCT     20033
 0029                          4072   24017 1            OCT     24017
 0030                          4073   30036 1            OCT     30036
 0031                          4074   34034 1            OCT     34034
 0032                          4075   40023 1            OCT     40023
 0033                          4076   44035 1            OCT     44035
 0034                          4077   50037 0            OCT     50037
 0035                          4100   54000 0            OCT     54000
 0036                          4101   60000 1  RELTAB11  OCT     60000
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P0037               SWITCHED-BANK PORTION.

 0038                                12,2000                          BANK    12
 003801 REF    2  LAST  157          06,2000                          SETLOC  T4RUP
 003802                              06,2012                          BANK

 0039    REF    2 LAST   157 TO  157:      10      10*                COUNT*  $$/T4RPT
 0042    REF    1                    06,2012  11'035 1  CORVE         CCS     DSPTAB +11D
 0043    REF    1                    06,2013  0 2063 0                TC      DSPOUT
 0044    REF    2  LAST  158         06,2014  0 2063 0                TC      DSPOUT

 0045    REF    2  LAST  158         06,2015  57'035 0                XCH     DSPTAB +11D
 0046    REF    1                    06,2016  7 4356 1                MASK    LOW11
 0047    REF    3  LAST  158         06,2017  55'035 1                TS      DSPTAB +11D
 0048    REF    1                    06,2020  6 4101 0                AD      RELTAB11
 0049                                06,2021  0 0006 1                EXTEND
 00491   REF    1                    06,2022  01 010 1                WRITE   OUT0
 00492   REF    1                    06,2023  0 2071 0                TC      HANG20
```

```
P0050    DSPOUT PROGRAM. PUTS OUT DISPLAYS.

 0055    REF   1              06,2024  55'015 0  DSPOUTSB TS      NOUT
 0056    REF   1              06,2025  4 4755 0           CS      ZERO
 0057    REF   1              06,2026  54 073 1           TS      DSRUPTEM        SET TO -0 FOR 1ST PASS THRU DSPTAB
 0058    REF   1              06,2027  56 775 1           XCH     DSPCNT
 0059    REF   1              06,2030  6 4754 0           AD      NEG0            TO PREVENT +0
 0060    REF   2  LAST  159   06,2031  54 775 0           TS      DSPCNT
 0061    REF   3  LAST  159   06,2032  50 775 1  DSPSCAN  INDEX   DSPCNT
 0062    REF   4  LAST  158   06,2033  11'022 1           CCS     DSPTAB
 0063    REF   4  LAST  159   06,2034  10 775 0           CCS     DSPCNT          IF DSPTAB ENTRY +, SKIP
 0064    REF   1              06,2035  1 2030 1           TCF     DSPSCAN -2      IF DSPCNT +, TRY AGAIN
 0065    REF   1              06,2036  1 2047 1           TCF     DSPLAY          IF DSPTAB ENTRY -, DISPLAY
 0066                         06,2037   00012 1  TABLNTH  OCT     12              DEC 10   LENGTH OF DSPTAB
 0067    REF   2  LAST  159   06,2040  10 073 1           CCS     DSRUPTEM        IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
 0068                         06,2041   37764 0  120MRUPT DEC     16372           (DSPCNT = 0). +0 INTO NOUT.
 0069    REF   2  LAST  159   06,2042  55'015 0           TS      NOUT
 0070    REF   2  LAST   93   06,2043  0 0002 0           TC      Q
 0071    REF   3  LAST  159   06,2044  54 073 1           TS      DSRUPTEM        IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
 0072    REF   1              06,2045  3 2037 1           CAF     TABLNTH         (DSPCNT=0). +0 INTO DSRUPTEM. PASS AGAIN
 0073    REF   2  LAST  159   06,2046  1 2031 0           TCF     DSPSCAN -1

 0074    REF   1              06,2047  6 4753 1  DSPLAY   AD      ONE
 0075    REF   5  LAST  159   06,2050  50 775 1           INDEX   DSPCNT
 0076    REF   5  LAST  159   06,2051  55'022 1           TS      DSPTAB          REPLACE POSITIVELY
 0077    REF   2  LAST  158   06,2052  7 4356 1           MASK    LOW11           REMOVE BITS 12 TO 15
 0078    REF   4  LAST  159   06,2053  54 073 1           TS      DSRUPTEM
 0079    REF   1              06,2054  3 4350 0           CAF     HI5
 0080    REF   6  LAST  159   06,2055  50 775 1           INDEX   DSPCNT
 0081    REF   1              06,2056  7 4066 1           MASK    RELTAB          PICK UP BITS 12 TO 15 OF RELTAB ENTRY
 0082    REF   5  LAST  159   06,2057  6 0073 0           AD      DSRUPTEM
 0083                         06,2060  0 0006 1           EXTEND
 0084    REF   2  LAST  158   06,2061  01 010 1           WRITE   OUT0

 00841   REF   1              06,2062  1 6742 1           TCF     Q+1


 00842   REF   1              06,2063  10 101 0  DSPOUT   CCS     FLAGWRD5        IS DSKY FLAG ON
 00843   REF   2  LAST  159   06,2064  3 4755 1           CAF     ZERO            NO
 00844   REF   1              06,2065  1 2130 0           TCF     NODSPOUT        NO
 00845   REF   3  LAST  159   06,2066  11'015 0           CCS     NOUT            YES
 00846   REF   1              06,2067  0 2024 0           TC      DSPOUTSB
 00847   REF   2  LAST  159   06,2070  1 2130 0           TCF     NODSPOUT        NO DISPLAY REQUESTS

 0085    REF   1              06,2071  4 2171 0  HANG20   CS      14,11,9
 0086    REF   3  LAST  157   06,2072  27'310 0           ADS     DSRUPTSW

 0087    REF   1              06,2073  3 7734 0           CAF     20MRUPT

 0088    REF   1              06,2074  54 027 0  SETTIME4 TS      TIME4
```

```
P00881  THE STATUS CF THE PRCCEEC FUSFBUTTON IS MCNITCREO EVERY 12C MILLISECONDS VIA THE CHANNEL 32 8IT 14 INBIT.
R008812 THE STATE OF THIS INBIT IS CCMPARED WITH ITS STATE OUPING THE PREVIOUS T4RUPT AND IS PROCESSED AS FOLLOWS.

R008814     IF PREV ON ANO NOW ON     -    BYPASS
R008815     IF PREV ON AND NCW CFF    -    UPCATE IMCCES33
R008816     IF PREV OFF AND NOW ON    -    UPDATE IMODES33 AND PROCESS VIA PINBALL
R008817     IF PREV CFF AND NCW CFF   -    BYPASS

R008818 THE LOGIC EMPLOYED REQUIRES ONLY 9 MCT (APPROX. 108 MICROSECONOS) CF COMPUTER TIME WHEN NO CHANGES OCCUR.


 00882  REF    1                  06,2075   3 1300 0  PROCEEDE CA      IMODES33          MONITIOR FOR PRCCEED 8UTTON
 008821                           06,2076   0 0006 1           EXTENO
 008822 PEF    1                  06,2077   C6 032 C           RXCR    CHAN32
 008823 REF   12   LAST    87     06,2100   7 4736 C           MASK    8IT14
 008824                           06,2101   0 0006 1           EXTEND
 008825 REF    1                  06,2102   1 2116 1           8ZF     T4 JUMP           NO CHANGE

 008826 REF    2   LAST   160     06,2103   23'300 0           LXCH    IMOOES33
 008827                           06,2104   0 0006 1           EXTENO
 008828 REF    1                  06,2105   C6 001 0           RXCR    LCHAN
 008829 REF    3   LAST   160     06,2106   55'300 1           TS      IMOOES33          UPOATE IMOOES33
 00883  REF   13   LAST   160     06,2107   7 4736 0           MASK    8IT14
 008831 PEF    1                  06,2110   10 000 0           CCS     A
 008832 REF    2   LAST   160     06,2111   1 2116 1           TCF     T4JUMP            WAS ON - NOW OFF

 008833 REF    1                  06,2112   3 4355 0           CAF     CHPPRIC           WAS OFF - NOW ON
 008834 REF    1                  06,2113   0 5072 1           TC      NOVAC
 008835 REF    1                     0776                      EBANK=  OSPCCUNT
 008836 REF    1                  06,2114    03506 1           2CADR   PRCCKEY
 008836 REF    1                  06,2115    60101 1
```

```
P0089             JUMP TO APPROPRIATE ONCE-PER SECOND (.96 SEC ACTUALLY) ACTIVITY

 0090   REF   2  LAST  157    06,2116  50 070 0  T4JUMP    INDEX   RUPTREG1
 0091                         06,2117   1 2120 1           TCF     +1

 0092   REF   1               06,2120   0 3164 1           TC      RCSMONIT
 0093   REF   1               06,2121   1 3006 0           TCF     RRAUTCHK
 0094   REF   1               06,2122   1 2172 0           TCF     IMUMON
 0095   REF   1               06,2123   1 3140 0           TCF     DAPT4S
 0096   REF   2  LAST  161    06,2124   0 3164 1           TC      RCSMONIT
 0097   REF   2  LAST  161    06,2125   1 3006 0           TCF     RRAUTCHK
 0098   REF   2  LAST  161    06,2126   1 2172 0           TCF     IMUMON
 0099   REF   2  LAST  161    06,2127   1 3140 0           TCF     DAPT4S

 0102   REF   1                  7734            20MRUPT   =       OCT37776         (DEC 16382)
```

```
P0150            ADDITIONAL ROUTINES FOR 20MS. KEYBOARD ACTIVITY

 0151                          06,2130   0 0006 1  NODSPOUT EXTEND
 0152    REF   3  LAST  159    06,2131  01 010  1           WRITE   OUT0

 0153    REF   1               06,2132   3 2041 0           CAF     120MRUPT        SET FOR NEXT CDRIVE
 0154    REF   1               06,2133   1 2074 1           TCF     SETTIME4

 0155    REF  14  LAST  160    06,2134   3 4736 1  QUIKDSP  CAF     BIT14
 01551   REF   4  LAST  159    06,2135   7 1310 0           MASK    DSRUPTSW
 01552                         06,2136   0 0006 1           EXTEND
 01553   REF   1               06,2137   1 2165 0           BZF     QUIKOFF         WROTE LAST TIME, NOW TURN OFF RELAYS.

 01555   REF   4  LAST  159    06,2140  11'015  0           CCS     NOUT
 0156    REF   2  LAST  159    06,2141   0 2024 0           TC      DSPOUTSB
 0157    REF   1               06,2142   1 2152 1           TCF     NODSPY          NOUT=0 OR BAD RETURN FROM DSPOUTSB
 01575   REF  15  LAST  162    06,2143   4 4736 0           CS      BIT14           GOOD RETURN (WE DISPLAYED SOMETHING)
 01577   REF   5  LAST  162    06,2144  27'310  0  QUIKRUPT ADS     DSRUPTSW

 0158    REF   2  LAST  159    06,2145   3 7734 0           CAF     20MRUPT
 0159    REF   2  LAST  159    06,2146  54 027  0           TS      TIME4

 0160    REF  12  LAST   87    06,2147   3 4743 0           CAF     BIT9
 0161    REF   6  LAST  162    06,2150  27'310  0           ADS     DSRUPTSW

 0162    REF   1               06,2151   0 5270 1           TC      RESUME

 0163                          06,2152   0 0006 1  NODSPY   EXTEND
 0164    REF   4  LAST  162    06,2153  01 010  1           WRITE   OUT0

 0165    REF   3  LAST  162    06,2154   3 7734 0  SYNCT4   CAF     20MRUPT
 0166    REF   3  LAST  162    06,2155  26 027  0           ADS     TIME4

 0167    REF  13  LAST  162    06,2156   3 4743 0           CAF     BIT9
 0168    REF   7  LAST  162    06,2157  27'310  0           ADS     DSRUPTSW

 0169    REF   8  LAST  162    06,2160  11'310  0           CCS     DSRUPTSW
 0170    REF   2  LAST  162    06,2161   0 5270 1           TC      RESUME
 0171                          06,2162    37737 0  OCT37737 OCT     37737
 0172    REF   1               06,2163   0 2154 0           TC      SYNCT4
 0173    REF   3  LAST  162    06,2164   0 5270 1           TC      RESUME

 0174                          06,2165   0 0006 1  QUIKOFF  EXTEND
 0175    REF   5  LAST  162    06,2166  01 010  1           WRITE   OUT0
 0176    REF  16  LAST  162    06,2167   3 4736 1           CAF     BIT14           RESET DSRUPTSW TO SEND DISPLAY NEXT PASS
 0177    REF   1               06,2170   1 2144 0           TCF     QUIKRUPT

 0179                          06,2171    22400 0  14,11,9  OCT     22400
```

```
P0300   PROGRAM NAME:  IMUMON

R0301   FUNCTIONAL DESCRIPTION:  THIS PROGRAM IS ENTERED EVERY 480 MS.  IT DETECTS CHANGES OF THE IMU STATUS BITS IN
R0303   CHANNEL 30 AND CALLS THE APPROPRIATE SUBROUTINES.  THE BITS PROCESSED AND THEIR RELEVANT SUBROUTINES ARE:

R0305             FUNCTION                  BIT    SUBROUTINE CALLED
R0306             --------                  ---    -----------------
R0307             TEMP IN LIMITS             15    TLIM
R0308             ISS TURN-ON REQUEST        14    ITURNON
R0309             IMU FAIL                   13    IMUFAIL (SETISSW)
R0310             IMU CDU FAIL               12    ICDUFAIL (SETISSW)
R0311             IMU CAGE                   11    IMUCAGE
R0312             IMU OPERATE                 9    IMUOP

R0313             THE LAST SAMPLED STATE OF THESE BITS IS LEFT IN IMODES30.  ALSO, EACH SUBROUTINE CALLED FINDS THE NEW
R0315   VALUE OF THE BIT IN A, WITH Q SET TO THE PROPER RETURN LOCATION, NXTIFAIL.

R0317   CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS.

R0318   JOBS OR TASKS INITIATED:  NONE.

R0319   SUBROUTINES CALLED:  TLIM, ITURNON, SETISSW, IMUCAGE, IMUOP.

R0320   ERASABLE INITIALIZATION:
R0321             FRESH START OR RESTART WITH NO GROUPS ACTIVE: C(IMODES30) = OCT 37411.
R0323             RESTART WITH ACTIVE GROUPS: C(IMODES30) = (B(IMODES30)AND(OCT 00035)) PLUS OCT 37400.
R0325                                         THIS LEAVES IMU FAIL BITS INTACT.

R0326   ALARMS:  NONE.

R0327   EXIT:  TNONTEST.

R0328   OUTPUT:  UPDATED IMODES30 WITH CHANGES PROCESSED BY APPROPRIATE SUBROUTINE.

 0330   REF   1                06,2172   3 1277 1  IMUMON   CA      IMODES30          SEE IF THERE HAS BEEN A CHANGE IN THE
 0331                          06,2173   0 0006 1           EXTEND                    RELEVANT BITS OF CHAN 30.
 0332   REF   1                06,2174  06 030  1           RXOR    CHAN30
 0333   REF   1                06,2175   7 2761 1           MASK    30RDMSK
 0334                          06,2176   0 0006 1           EXTEND
 0335   REF   1                06,2177   1 2227 0           BZF     TNONTEST          NO CHANGE IN STATUS.

 0336   REF   3  LAST  161     06,2200  54 070  1           TS      RUPTREG1          SAVE BITS WHICH HAVE CHANGED.
 0337   REF   2  LAST  163     06,2201  22'277  1           LXCH    IMODES30          UPDATE IMODES30.
 0338                          06,2202   0 0006 1           EXTEND
 0339   REF   2  LAST  160     06,2203  06 001  0           RXOR    LCHAN
 0340   REF   3  LAST  163     06,2204  55'277  0           TS      IMODES30

 0341   REF   2  LAST  159     06,2205   4 4753 0           CS      ONE
 0342   REF   4  LAST  163     06,2206  56 070  0           XCH     RUPTREG1
 0343                          06,2207   0 0006 1           EXTEND
 0344   REF   1               06,2210  6 2514 0              BZMF    TLIM             CHANGE IN IMU TEMP.
 0345   REF   1               06,2211  1 2213 1              TCF     NXTIFBIT         BEGIN BIT SCAN.

 0346   REF   3  LAST  163    06,2212  6 4753 1   -1         AD      ONE              (RE-ENTERS HERE FROM NXTIFAIL.)
 0347   REF   5  LAST  163    06,2213  24 0700   NXTIFBIT    INCR    RUPTREG1         ADVANCE BIT POSITION NUMBER.
 0348                         06,2214  6 0000 1   +1         DOUBLE
 0349   REF   2  LAST  160    06,2215  54 0000               TS      A                SKIP IF OVERFLOW.
 0350   REF   2  LAST  164    06,2216  1 2213 1              TCF     NXTIFBIT         LOOK FOR BIT.

 0351   REF   1               06,2217  56 071 1              XCH     RUPTREG2         SAVE OVERFLOW-CORRECTED DATA.
 0352   REF   6  LAST  164    06,2220  50 070 0              INDEX   RUPTREG1         SELECT NEW VALUE OF THIS BIT.
 0353   REF  17  LAST  162    06,2221  3 4736 1              CAF     BIT14
 0354   REF   4  LAST  163    06,2222  7 1277 0              MASK    IMODES30
 0355   REF   7  LAST  164    06,2223  50 070 0              INDEX   RUPTREG1
 0356   REF   1               06,2224  0 2755 1              TC      IFAILJMP

 0357   REF   2  LAST  164    06,2225  10 071 0   NXTIFAIL   CCS     RUPTREG2         PROCESS ANY ADDITIONAL CHANGES.
 0358   REF   3  LAST  164    06,2226  1 2212 0              TCF     NXTIFBIT -1
```

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P0359    PROGRAM NAME:  TNONTEST.

R0360    FUNCTIONAL DESCRIPTION:  THIS PROGRAM HONORS REQUESTS FOR ISS INITIALIZATION.  ISS TURN-ON (CHANNEL 30 BIT 14)
R0362    AND ISS OPERATE (CHANNEL 30 BIT 9) REQUESTS ARE TREATED AS A PAIR AND PROCESSING TAKES PLACE .480 SECONDS
R0364    AFTER EITHER ONE APPEARS.  THIS INITIALIZATION TAKES ON ONE OF THE FOLLOWING THREE FORMS:

R0366              1)  ISS TURN-ON:  IN THIS SITUATION THE COMPUTER IS OPERATING WHEN THE ISS IS TURNED ON.  NOMINALLY,
R0368              BOTH ISS TURN-ON AND ISS OPERATE APPEAR.  THE PLATFORM IS CAGED FOR 90 SECONDS AND THE ICDU'S ZEROED
R0370              SO THAT AT THE END OF THE PROCESS THE GIMBAL LOCK MONITOR WILL FUNCTION PROPERLY.

R0372              2)  ICDU INITIALIZATION:  IN THIS CASE THE COMPUTER WAS PROBABLY TURNED ON WITH THE ISS IN OPERATE OR
R0374              A FRESH START WAS DONE WITH THE ISS IN OPERATE.  IN THIS CASE ONLY ISS OPERATE IS ON.  THE ICDU'S ARE
R0376              ZEROED SO THE GIMBAL LOCK MONITOR WILL FUNCTION.  AN EXCEPTION IS IF THE ISS IS IN GIMBAL LOCK AFTER
R0378              A RESTART, THE ICDU'S WILL NOT BE ZEROED.

R0379              3)  RESTART WITH RESTARTABLE PROGRAM USING THE IMU:  IN THIS CASE, NO INITIALIZATION TAKES PLACE SINCE
R0381              IT IS ASSUMED THAT THE USING PROGRAM DID THE INITIALIZATION AND THEREFORE T4RUPT SHOULD NOT INTERFERE.

R0383    IMODES30 BIT 7 IS SET = 1 BY THE FIRST BIT (CHANNEL 30 BIT 14 OR 9) WHICH ARRIVES.  FOLLOWING THIS, TNONTEST IS
R0385    ENTERED, FINDS BIT 7 = 1 BUT BIT 8 = 0, SO IT SETS BIT 8 = 1 AND EXITS.  THE NEXT TIME IT FINDS BIT 8 = 1 AND
R0387    PROCEEDS, SETTING BITS 8 AND 7 = 0.  AT PROCTNON, IF ISS TURN-ON REQUEST IS PRESENT, THE ISS IS CAGED (ZERO +
R0389    COARSE).  IF ISS OPERATE IS NOT PRESENT PROGRAM ALARM 00213 IS ISSUED.  AT THE END OF A 90 SECOND CAGE, BIT 2
R0391    OF IMODES30 IS TESTED.  IF IT IS = 1, ISS TURN-ON WAS NOT PRESENT FOR THE ENTIRE 90 SECONDS.  IN THAT CASE, IF
R0393    THE ISS TURN-ON REQUEST IS PRESENT THE 90 SECOND WAIT IS REPEATED, OTHERWISE NO ACTION OCCURS UNLESS A PROGRAM
R0395    WAS WAITING FOR THE INITIALIZATION IN WHICH CASE THE PROGRAM IS GIVEN AN IMUSTALL ERROR RETURN.  IF THE DELAY
R0397    WENT PROPERLY, THE ISS DELAY OUTBIT IS SENT AND THE ICDU'S ZEROED.  A TASK IS INITIATED TO REMOVE THE PIPA FAIL
R0399    INHIBIT BIT IN 10.24 SECONDS.  IF A MISSION PROGRAM WAS WAITING IT IS INFORMED VIA ENDIMU.

R0401    AT PROCTNON, IF ONLY ISS OPERATE IS PRESENT (OPONLY), THE CDU'S ARE ZEROED UNLESS THE PLATFORM IS IN COARSE
R0403    ALIGN (= GIMBAL LOCK HERE) OR A MISSION PROGRAM IS USING THE IMU (IMUSEFLG = 1).

R0405    CALLING SEQUENCE:  T4RUPT EVERY 480 MILLISECONDS AFTER IMUMON.

R0406    JOBS OR TASKS INITIATED:  1) ENDTNON, 90 SECONDS AFTER CAGING STARTED.  2) ISSUP, 4 SECONDS AFTER CAGING DONE.
R0408            3) PFAILOK, 10.24 SECONDS AFTER INITIALIZATION COMPLETED.  4) UNZ2, 320 MILLISECONDS AFTER ZEROING
R0410            STARTED.

R0411    SUBROUTINES CALLED:  CAGESUB, CAGESUB2, ZEROICDU, ENDIMU, IMUBAD, NOATTOFF, SETISSW, VARDELAY.

R0413    ERASABLE INITIALIZATION:  SEE IMUMON.

R0414    ALARMS:  PROGRAM ALARM 00213 IF ISS TURN-ON REQUESTED WITHOUT ISS OPERATE.

R0416    EXIT:  ENDTNON EXITS TO C33TEST.  TASKS HAVING TO DO WITH INITIALIZATION EXIT AS FOLLOWS:  MISSION PROGRAM
R0418    WAITING AND INITIALIZATION COMPLETE, EXIT TO ENDIMU, MISSION PROGRAM WAITING AND INITIALIZATION FAILED, EXIT TO
R0420    IMUBAD, IMU NOT IN USE, EXIT TO TASKOVER.

R0421    OUTPUT:  ISS INITIALIZED.

 0422    REF   5  LAST  164   06,2227  4 1277 0  TNONTEST CS      IMODES30         AFTER PROCESSING ALL CHANGES, SEE IF IT
```

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L        T4RUPT PROGRAM                                                                  USER'S PAGE NO. 10      E6 S4

 0423    REF  15  LAST   88   06,2230  7 4745 1           MASK    BIT7           IS TIME TO ACT ON A TURN-ON SEQUENCE.
 0424    REF   3  LAST  164   06,2231  10 000 0           CCS     A
 0425    REF   1              06,2232  1 2374 1           TCF     C33TEST        NO - EXAMINE CHANNEL 33.

 0426    REF  14  LAST   87   06,2233  3 4744 1           CAF     BIT8           SEE IF FIRST SAMPLE OR SECOND.
 0427    REF   6  LAST  165   06,2234  7 1277 0           MASK    IMODES30
 0428    REF   4  LAST  166   06,2235  10 000 0           CCS     A
 0429    REF   1              06,2236  1 2242 0           TCF     PROCTNON       REACT AFTER SECOND SAMPLE.

 0430    REF  15  LAST  166   06,2237  3 4744 1           CAF     BIT8           IF FIRST SAMPLE, SET BIT TO REACT NEXT
 0431    REF   7  LAST  166   06,2240  27'277 0           ADS     IMODES30       TIME.
 0432    REF   2  LAST  166   06,2241  1 2374 1           TCF     C33TEST

R0433                 PROCESS IMU TURN-ON REQUESTS AFTER WAITING 1 SAMPLE FOR ALL SIGNALS TO ARRIVE.

 0435    REF   1              06,2242  4 2777 0  PROCTNON CS      BITS7&8
 0436    REF   8  LAST  166   06,2243  7 1277 0           MASK    IMODES30
 0437    REF   9  LAST  166   06,2244  55'277 0           TS      IMODES30
 0438    REF  18  LAST  164   06,2245  7 4736 0           MASK    BIT14          SEE IF TURN-ON REQUEST.
 0439    REF   5  LAST  166   06,2246  10 000 0           CCS     A
 0440    REF   1              06,2247  1 2347 1           TCF     OPONLY         OPERATE ON ONLY.

 0441    REF  10  LAST  166   06,2250  4 1277 0           CS      IMODES30       IF TURN-ON REQUEST, WE SHOULD HAVE IMU
 0442    REF  14  LAST  162   06,2251  7 4743 1           MASK    BIT9           OPERATE.
 0443    REF   6  LAST  166   06,2252  10 000 0           CCS     A
 0444                         06,2253  1 2256 0           TCF     +3

 0445    REF   1              06,2254  0 5567 0           TC      ALARM          ALARM IF NOT.
 0446                         06,2255   00213 1           OCT     213

 0447    REF   1              06,2256  0 2735 1  +3       TC      CAGESUB
 0448    REF   1              06,2257  3 3005 1           CAF     90SECS
 0449    REF   1              06,2260  0 5203 0           TC      WAITLIST
 0450    REF   3  LAST  157   E6,1414                     EBANK=  M11
 0451    REF   1              06,2261   02266 1           2CADR   ENDTNON
 0451    REF   1              06,2262   14106 0

 0452    REF   3  LAST  166   06,2263  1 2374 1           TCF     C33TEST

 0453    REF   2  LAST  166   06,2264  3 3005 1  RETNON   CAF     90SECS
 0454    REF   1              06,2265  0 5224 0           TC      VARDELAY

 0455    REF  13  LAST   88   06,2266  4 4752 1  ENDTNON  CS      BIT2           RESET TURN-ON REQUEST FAIL BIT.
 0456    REF  11  LAST  166   06,2267  7 1277 0           MASK    IMODES30
 0457    REF  12  LAST  166   06,2270  57'277 1           XCH     IMODES30
 0458    REF  14  LAST  166   06,2271  7 4752 1           MASK    BIT2           IF IT WAS OFF, SEND ISS DELAY COMPLETE.
 0459                         06,2272  0 0006 1           EXTEND
 0460    REF   1              06,2273  1 2306 1           BZF     ENDTNON2

 0461    REF  19  LAST  166   06,2274  3 4736 1           CAF     BIT14          IF IT WAS ON AND TURN-ON REQUEST NOW
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0462   REF  13  LAST  166   06,2275   7 1277 0             MASK    IMODES30      PRESENT, RE-ENTER 90 SEC DELAY IN WL.
0463                        06,2276   0 0006 1             EXTEND
0464   REF   1              06,2277   1 2264 1             BZF     RETNON

0465   REF   1              06,2300   4 0074 0             CS      FLAGWRD0      IF IT IS NOT ON NOW, SEE IF A PROG WAS
0466   REF   1              06,2301   7 4744 0             MASK    IMUSEBIT      WAITING.
0467   REF   7  LAST  166   06,2302  10 000 0              CCS     A
0468   REF   1              06,2303   1 5261 0             TCF     TASKOVER
0469   REF   1              06,2304   0 4635 0             TC      POSTJUMP
0470   REF   1              06,2305    17630 1             CADR    IMUBAD        UNSUCCESSFUL TURN-ON.

0471   REF  13  LAST   87   06,2306   3 4735 1  ENDTNON2   CAF     BIT15         SEND ISS DELAY COMPLETE.
0472                        06,2307   0 0006 1             EXTEND
0473   REF   1              06,2310  05 012 1              WOR     CHAN12

0474   REF   1              06,2311   0 4674 0             TC      IBNKCALL      TURN OFF NO ATT LAMP.
0475   REF   1              06,2312    17257 1             CADR    NOATTOFF

0476   REF   1              06,2313   0 5457 1  UNZ2       TC      ZEROICDU

0477   REF   1              06,2314   4 4763 0             CS      BITS4&5       REMOVE ZERO AND COARSE.
0478                        06,2315   0 0006 1             EXTEND
0479   REF   2  LAST  167   06,2316  03 012 1              WAND    CHAN12

0480   REF  14  LAST  132   06,2317   3 4741 1             CAF     BIT11         WAIT 10 SECS FOR CTRS TO FIND GIMBALS
0481   REF   2  LAST  166   06,2320   0 5224 0             TC      VARDELAY

0482   REF   1              06,2321   4 2774 0  ISSUP      CS      OCT54         REMOVE CAGING, IMU FAIL INHIBIT, AND
0483   REF  14  LAST  167   06,2322   7 1277 0             MASK    IMODES30      ICDUFAIL INHIBIT FLAGS.
0484   REF  15  LAST  167   06,2323  55'277 0              TS      IMODES30

0485   REF  14  LAST   88   06,2324   4 4746 1             CS      BIT6          ENABLE DAP
0486   REF   4  LAST  160   06,2325   7 1300 1             MASK    IMODES33
0487   REF   5  LAST  167   06,2326  55'300 1              TS      IMODES33

04871  REF   1              06,2327   4 0076 1             CS      FLAGWRD2      TEST DRIFTFLG: IF ON, DO NOTHING BECAUSE
04872  REF   1              06,2330   7 4735 0             MASK    DRFTBIT       IMUCOMP SHOULD BE ALL SET UP(RESTART
04873                       06,2331   0 0006 1             EXTEND                WITH IMUSE DOWN).  IF OFF, SET DRIFTFLG
04874                       06,2332   1 2336 1             BZF     +4            AND 1/PIPADT TO GET FREEFALL IMUCOMP
04875  REF   2  LAST  167   06,2333  26 076 1              ADS     FLAGWRD2      GOING (FRESH START OR ISS TURN-ON).
04876  REF   1              06,2334   3 0025 0             CA      TIME1
04877  REF   1              06,2335  57'074 0              XCH     1/PIPADT      CANNOT GET HERE IF RESTART WITH IMUSE UP

0488   REF   1              06,2336   0 2703 1             TC      SETISSW       ISS WARNING MIGHT HAVE BEEN INHIBITED.

0489   REF  14  LAST  167   06,2337   4 4735 0             CS      BIT15         REMOVE IMU DELAY COMPLETE DISCRETE.
0490                        06,2340   0 0006 1             EXTEND
0491   REF   3  LAST  167   06,2341  03 012 1              WAND    CHAN12

0492   REF   1              06,2342   3 5003 1             CAF     4SECS         DONT ENABLE PROG ALARM ON PIP FAIL FOR
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 0493   REF   2  LAST  166    06,2343  0 5203 0             TC      WAITLIST        ANOTHER 4 SECS.
 0494   REF   1               E3,1474                       EBANK=  CDUIND
 0495   REF   1               06,2344   03245 1             2CADR   PFAILOK
 0495   REF   1               06,2345   16103 1

 0499   REF   2  LAST  167    06,2346  1 5261 0             TCF     TASKOVER

 0502   REF  11  LAST   88    06,2347  3 4750 1  OPONLY     CAF     BIT4            IF OPERATE ON ONLY, AND WE ARE IN COARSE
 0503                         06,2350  0 0006 1             EXTEND                  ALIGN, DONT ZERO THE CDUS BECAUSE WE
 0504   REF   4  LAST  167    06,2351  02 012 0             RAND    CHAN12          MIGHT BE IN GIMBAL LOCK
 0505   REF   8  LAST  167    06,2352  10 000 0             CCS     A
 0506   REF   4  LAST  166    06,2353  1 2374 1             TCF     C33TEST

 0507   REF   2  LAST  167    06,2354  3 4744 1             CAF     IMUSEBIT        OTHERWISE, ZERO THE COUNTERS.
 0508   REF   2  LAST  167    06,2355  7 0074 0             MASK    FLAGWRD0        UNLESS SOMEONE IS USING THE IMU.
 0509   REF   9  LAST  168    06,2356  10 000 0             CCS     A
 0510   REF   5  LAST  168    06,2357  1 2374 1             TCF     C33TEST

 0511   REF   1               06,2360  0 2746 0             TC      CAGESUB2        SET TURNON FLAGS.

 05115  REF   2  LAST  167    06,2361  0 4674 0  ISSZERO    TC      IBNKCALL        TURN OFF NO ATT LAMP
 05116  REF   2  LAST  167    06,2362   17257 1             CADR    NOATTOFF            IMU CAGE OFF ENTRY

 0512   REF  13  LAST   88    06,2363  3 4747 1             CAF     BIT5            ISS CDU ZERO
 0513                         06,2364  0 0006 1             EXTEND
 0514   REF   5  LAST  168    06,2365  05 012 1             WOR     CHAN12

 05141  REF   2  LAST  167    06,2366  0 5457 1             TC      ZEROICDU
 0515   REF  15  LAST  167    06,2367  3 4746 0             CAF     BIT6            WAIT 300 MS FOR AGS TO RECEIVE SIGNAL.
 0516   REF   3  LAST  168    06,2370  0 5203 0             TC      WAITLIST
 0517   REF   4  LAST  166    E6,1414                       EBANK=  M11
 0518   REF   1               06,2371   02313 1             2CADR   UNZ2
 0518   REF   1               06,2372   14106 0

 0519   REF   6  LAST  168    06,2373  1 2374 1             TCF     C33TEST
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```
P0520   PROGRAM NAME:  C33TEST

R0521   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THREE FLIP-FLOP INBITS OF CHANNEL 33 AND CALLS THE APPROPRIATE
R0523   SUBROUTINE TO PROCESS A CHANGE.  IT IS ANALOGOUS TO IMUMON, WHICH MONITORS CHANNEL 30, EXCEPT THAT IT READS
R0525   CHANNEL 33 WITH A WAND INSTRUCTION BECAUSE A 'WRITE' PULSE IS REQUIRED TO RESET THE FLIP-FLOPS.  THE BITS
R0527   PROCESSED AND THE SUBROUTINES CALLED ARE:

R0528               BIT    FUNCTION                  SUBROUTINE
R0529               ---    --------                  ----------
R0530                13    PIPA FAIL                 PIPFAIL
R0531                12    DOWNLINK TOO FAST         DNTMFAST
R0532                11    UPLINK TOO FAST           UPTMFAST

R0533   UPON ENTRY TO THE SUBROUTINE, THE NEW BIT STATE IS IN A.

R0534   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER TNONTEST.

R0535   JOBS OR TASKS INITIATED:  NONE.

R0536   SUBROUTINES CALLED:  PIPFAIL, DNTMFAST AND UPTMFAST ON BIT CHANGES.

R0537   ERASABLE INITIALIZATION:  C(IMODES33) = OCT 16000 ON A FRESH START OR RESTART, THEREFORE, THESE ALARMS WILL
R0539   REAPPEAR IF THE CONDITIONS PERSIST.

R0540   ALARMS:  NONE.

R0541   EXIT:  GLOCKMON.

R0542   OUTPUT:  UPDATED BITS 13, 12 AND 11 OF IMODES33 WITH CHANGES PROCESSED.

 0543   REF   6  LAST  167   06,2374  3 1300 0  C33TEST  CA      IMODES33        SEE IF RELEVANT CHAN 33 BITS HAVE
 0544   REF   1              06,2375  7 5026 1           MASK    33RDMSK
 0545   REF   2  LAST   93   06,2376  54 001 1           TS      L               CHANGED.
 0546   REF   2  LAST  169   06,2377  3 5026 0           CAF     33RDMSK
 0547                        06,2400  0 0006 1           EXTEND
 0548   REF   1              06,2401  03 033 1           WAND    CHAN33          RESETS FLIP-FLOP INPUTS
 0549                        06,2402  0 0006 1           EXTEND
 0550   REF   3  LAST  163   06,2403  06 001 0           RXOR    LCHAN
 0551                        06,2404  0 0006 1           EXTEND
 0552   REF   1              06,2405  1 2434 1           BZF     GLOCKMON        ON NO CHANGE.

 0553   REF   8  LAST  164   06,2406  54 070 1           TS      RUPTREG1        SAVE BITS WHICH HAVE CHANGED.
 0554   REF   7  LAST  169   06,2407  23'300 0           LXCH    IMODES33
 0555                        06,2410  0 0006 1           EXTEND
 0556   REF   4  LAST  169   06,2411  06 001 0           RXOR    LCHAN
 0557   REF   8  LAST  169   06,2412  55'300 1           TS      IMODES33        UPDATED IMODES33.

 0558   REF   3  LAST  159   06,2413  3 4755 1           CAF     ZERO
 0559   REF   9  LAST  169   06,2414  56 070 0           XCH     RUPTREG1
 0560                        06,2415  6 0000 1           DOUBLE
 0561    REF    1                06,2416   1 2421 0              TCF      NXTIBT +1          SCAN FOR BIT CHANGES.

 0562    REF    4   LAST  164    06,2417   6 4753 1    -1        AD       ONE
 0563    REF   10   LAST  169    06,2420  24 0070 0   NXTIBT     INCR     RUPTREG1
 0564                            06,2421   6 0000 1    +1        DOUBLE
 0565    REF   10   LAST  168    06,2422  54 0000 0              TS       A                  (CODING IDENTICAL TO CHAN 30).
 0566    REF    2   LAST  170    06,2423   1 2420 1              TCF      NXTIBT

 0567    REF    3   LAST  164    06,2424  56 0071 1              XCH      RUPTREG2
 0568    REF   11   LAST  170    06,2425  50 0070 0              INDEX    RUPTREG1           GET NEW VALUE OF BIT WHICH CHANGED.
 0569    REF   15   LAST   87    06,2426   3 4737 0              CAF      BIT13
 0570    REF    9   LAST  169    06,2427   7 1300 1              MASK     IMODES33
 0571    REF   12   LAST  170    06,2430  50 0070 0              INDEX    RUPTREG1
 0572    REF    1                06,2431   0 2763 1              TC       C33JMP

 0573    REF    4   LAST  170    06,2432  10 0071 0   NXTFL33    CCS      RUPTREG2           PROCESS POSSIBLE ADDITIONAL CHANGES.
 0574    REF    3   LAST  170    06,2433   1 2417 0              TCF      NXTIBT -1
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R0575   PROGRAM NAME:  GLOCKMON

R0576   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THE COUZ COUNTER TO DETERMINE WHETHER THE ISS IS IN GIMBAL LOCK
R0578   AND TAKES ACTION IF IT IS.  THREE REGIONS OF MIDDLE GIMBAL ANGLE (MGA) ARE USED:

R0580            1) ABS(MGA) LESS THAN OR EQUAL TO 70 DEGREES - NORMAL MODE.
R0581            2) ABS(MGA) GREATER THAN 70 DEGREES AND LESS THAN OR EQUAL TO 85 DEGREES - GIMBAL LOCK LAMP TURNED ON.
R0583            3) ABS(MGA) GREATER THAN 85 DEGREES - ISS PUT IN COARSE ALIGN AND NO ATT LAMP TURNED ON.

R0585   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER C33TEST.

R0586   JOBS OR TASKS INITIATED:  NONE.

R0587   SUBROUTINES CALLED:  1) SETCOARS WHEN ABS(MGA) GREATER THAN 85 DEGREES AND ISS NOT IN COARSE ALIGN.
R0589                        2) LAMPTEST BEFORE TURNING OFF GIMBAL LOCK LAMP.

R0590   ERASABLE INITIALIZATION:
R0591            1) FRESH START OR RESTART WITH NO GROUPS ACTIVE:  C(COUZ) = 0, IMODES30 BIT 6 = 0, IMODES33 BIT 1 = 0.
R0593            2) RESTART WITH GROUPS ACTIVE:  SAME AS FRESH START EXCEPT C(COUZ) NOT CHANGED SO GIMBAL MONITOR
R0595                                            PROCEEDS AS BEFORE.

R0596   ALARMS:  1) MGA REGION (2) CAUSES GIMBAL LOCK LAMP TO BE LIT.
R0597            2) MGA REGION (3) CAUSES THE ISS TO BE PUT IN COARSE ALIGN AND THE NO ATT LAMP TO BE LIT IF EITHER NOT
R0599               SO ALREADY.

 0600   REF   1              06,2434  10 034 1  GLOCKMON CCS    COUZ
 0601   REF   1              06,2435  1 2441 0           TCF    GLOCKCHK          SEE IF MAGNITUDE OF MGA IS GREATER THAN
 0602   REF   1              06,2436  1 2465 0           TCF    SETGLOCK          70 DEGREES.
 0603   REF   2  LAST  171   06,2437  1 2441 0           TCF    GLOCKCHK
 0604   REF   2  LAST  171   06,2440  1 2465 0           TCF    SETGLOCK

 0605   REF   1              06,2441  6 2512 0  GLOCKCHK AD     -70DEGS
 0606                        06,2442  0 0006 1           EXTEND
 0607   REF   3  LAST  171   06,2443  6 2464 0           BZMF   SETGLOCK -1       NO LOCK.

 0608   REF   1              06,2444  6 2513 1           AD     -15DEGS           SEE IF ABS(MGA) GREATER THAN 85 DEGREES.
 0609                        06,2445  0 0006 1           EXTEND
 0610   REF   1              06,2446  6 2462 0           BZMF   NOGIMRUN

 0611   REF  12  LAST  168   06,2447  3 4750 1           CAF    BIT4              IF SO, SYSTEM SHOULD BE IN COARSE ALIGN
 0612                        06,2450  0 0006 1           EXTEND                   TO PREVENT GIMBAL RUNAWAY.
 0613   REF   6  LAST  168   06,2451  02 012 0           RAND   CHAN12
 0614   REF  11  LAST  170   06,2452  10 000 0           CCS    A
 0615   REF   2  LAST  171   06,2453  1 2462 1           TCF    NOGIMRUN

 0616   REF   3  LAST  168   06,2454  0 4674 0           TC     IBNKCALL
 0617   REF   1              06,2455   17135 0           CADR   SETCOARS

 06173  REF   1              06,2456  3 6245 1           CAF    SIX               ENABLE ISS ERROR COUNTERS IN 60 MS
 06174  REF   4  LAST  168   06,2457  0 5203 0           TC     WAITLIST
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06175  REF   2  LAST  168   E3,1474                      EBANK= CDUINC
06176  REF   1              06,2460    03131 1           2CADR  CA+ECE
06176  REF   1              06,2461    16103 1
0618   REF  16  LAST  168   06,2462  3 4746 0  NOGIMRUN CAF     BIT6             TURN ON GIMBAL LOCK LAMP.
0619   REF   4  LAST  171   06,2463  1 2465 0           TCF     SETGLOCK

0620   REF   4  LAST  169   06,2464  3 4755 1   -1      CAF     ZERO
0621   REF   6  LAST  159   06,2465  6 1035 0  SETGLOCK AD      DSPTAB +11D      SEE IF PRESENT STATE OF GIMBAL LOCK LAMP
0622   REF  17  LAST  172   06,2466  7 4746 1           MASK    BIT6             AGREES WITH DESIRED STATE BY HALF ADDING
0623                        06,2467  0 0006 1           EXTEND                   THE TWO.
0624   REF   1              06,2470  1 5270 0           BZF     GLOCKOK          OK AS IS.

0625   REF   7  LAST  172   06,2471  7 1035 1           MASK    DSPTAB +11D      IF OFF, DONT TURN ON IF IMU BEING CAGED.
0626   REF  12  LAST  171   06,2472 10 0000 0           CCS     A
0627   REF   1              06,2473  1 2507 0           TCF     GLAMPTST         TURN OFF UNLESS LAMP TEST IN PROGRESS.

0628   REF  18  LAST  172   06,2474  3 4746 0           CAF     BIT6
0629   REF  16  LAST  167   06,2475  7 1277 0           MASK    IMODES30
0630   REF  13  LAST  172   06,2476 10 0000 0           CCS     A
0631   REF   2  LAST  172   06,2477  1 5270 0           TCF     GLOCKOK

0632   REF   8  LAST  172   06,2500  4 1035 1  GLINVERT CS      DSPTAB +11D      INVERT GIMBAL LOCK LAMP.
0633   REF  19  LAST  172   06,2501  7 4746 1           MASK    BIT6
0634   REF  15  LAST  167   06,2502  6 4735 1           AD      BIT15            TO INDICATE CHANGE IN DSPTAB +11D.
0635   REF   9  LAST  172   06,2503 57'035 0            XCH     DSPTAB +11D
0636   REF   1              06,2504  7 2162 1           MASK    OCT37737
0637   REF  10  LAST  172   06,2505 27'035 1            ADS     DSPTAB +11D
0638   REF   3  LAST  172   06,2506  1 5270 0           TCF     GLOCKOK

0639   REF   1              06,2507  0 2766 1  GLAMPTST TC      LAMPTEST         TURN OFF UNLESS LAMP TEST IN PROGRESS.
0640   REF   4  LAST  172   06,2510  1 5270 0           TCF     GLOCKOK
0641   REF   1              06,2511  1 2500 1           TCF     GLINVERT

0642                        06,2512    63434 1 -70DEGS  DEC     -.38888          -70 DEGREES SCALED IN HALF-REVOLUTIONS.
0643                        06,2513    75252 0 -15DEGS  DEC     -.08333
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R0644    PROGRAM NAME:  TLIM.

R0645    FUNCTIONAL DESCRIPTION:  THIS PROGRAM MAINTAINS THE TEMP LAMP (BIT 4 OF CHANNEL 11) ON THE DSKY TO AGREE WITH
R0647    THE TEMP SIGNAL FROM THE ISS (BIT 15 OF CHANNEL 30).  HOWEVER, THE LIGHT WILL NOT BE TURNED OFF IF A LAMP TEST
R0649    IS IN PROGRESS.

R0650    CALLING SEQUENCE:  CALLED BY IMUMON ON A CHANGE OF BIT 15 OF CHANNEL 30.

R0651    JOBS OR TASKS INITIATED:  NONE.

R0652    SUBROUTINES CALLED:  LAMPTEST.

R0653    ERASABLE INITIALIZATION:  FRESH START AND RESTART TURN THE TEMP LAMP OFF.

R0655    ALARMS:  TEMP LAMP TURNED ON WHEN IMU TEMP GOES OUT OF LIMITS.

R0656    EXIT:  NXTIFAIL.

R0657    OUTPUT:  SERVICE OF TEMP LAMP.                                                  IN A, EXCEPT FOR TLIM.

 0659    REF   1              06,2514   7 4733 0  TLIM      MASK    POSMAX          REMOVE BIT FROM WORD OF CHANGES AND SET
 0660    REF   5  LAST  170   06,2515  54 071  0            TS      RUPTREG2        DSKY TEMP LAMP ACCORDINGLY.

 0661    REF  17  LAST  172   06,2516  11'277  0            CCS     IMODES30
 0662    REF   1              06,2517   1 2525 0            TCF     TEMPOK
 0663    REF   2  LAST  173   06,2520   1 2525 0            TCF     TEMPOK

 0664    REF  13  LAST  171   06,2521   3 4750 1            CAF     BIT4            TURN ON LAMP.
 0665                         06,2522   0 0006 1            EXTEND
 0666    REF   1              06,2523  05 011  1            WOR     DSALMOUT
 0667    REF   1              06,2524   1 2225 1            TCF     NXTIFAIL

 0668    REF   2  LAST  172   06,2525   0 2766 1  TEMPOK    TC      LAMPTEST        IF TEMP NOW OK, DONT TURN OFF LAMP IF
 0669    REF   2  LAST  173   06,2526   1 2225 1            TCF     NXTIFAIL        LAMP TEST IN PROGRESS.

 0670    REF  14  LAST  173   06,2527   4 4750 0            CS      BIT4
 0671                         06,2530   0 0006 1            EXTEND
 0672    REF   2  LAST  173   06,2531  03 011  1            WAND    DSALMOUT        TURN OFF LAMP
 0673    REF   3  LAST  173   06,2532   1 2225 1            TCF     NXTIFAIL
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P0674    PROGRAM NAME:  ITURNCN.

R0675    FUNCTIONAL DESCRIPTION:  THIS PROGRAM IS CALLED BY IMUMON WHEN A CHANGE CF BIT 14 OF CHANNEL 30 (ISS TURN-ON
R0677    REQUEST) IS DETECTED.  UPON ENTRY, ITURNON CHECKS IF A TURN-ON DELAY SEQUENCE HAS FAILED, AND IF SO, IT EXITS.
R0679    IF NOT, IT CHECKS WHETHER THE TURN-CN REQUEST CHANGE IS TO CN CR CFF.  IF ON, IT SETS BIT 7 OF IMODES30 TO 1 SO
R0681    THAT TNONTEST WILL INITIATE THE ISS INITIALIZATION SEQUENCE.  IF OFF, THE TURN-ON DELAY SIGNAL, CHANNEL 12 BIT
R0683    15, IS CHECKED AND IF IT IS CN, ITURNON EXITS.  IF THE DELAY SIGNAL IS OFF, PROGRAM ALARM C0207 IS ISSUED, BIT 2
R0685    OF IMODES30 IS SET TO 1 AND THE PROGRAM EXITS.
R0686             THE SETTING OF BIT 2 OF IMODES30 (ISS DELAY SEQUENCE FAIL) INHIBITS THIS ROUTINE AND IMUOP FROM
R0688    PROCESSING ANY CHANGES.  THIS BIT WILL BE RESET BY THE ENDTNON ROUTINE WHEN THE CURRENT 90 SECOND DELAY PERIOD
R0690    ENDS.

R0691    CALLING SEQUENCE:  FRCM IMUMCN WHEN ISS TURN-ON REQUEST CHANGES STATE.

R0692    JCBS OR TASKS INITIATED:  NONE.

R0693    SUBROUTINES CALLED:  ALARM, IF THE ISS TURN-ON REQUEST IS NOT PRESENT FOR 90 SECONDS.

R0695    ERASABLE INITIALIZATICN:  FRESH START AND RESTART SET BIT 15 OF CHANNEL 12 AND BITS 2 AND 7 OF IMODES30 TO 0,
R0697    AND BIT 14 OF IMODES30 TO 1.

R0698    ALARMS:  PRCGRAM ALARM 00207 IS ISSUEC IF THE ISS TURN-ON REQUEST SIGNAL IS NOT PRESENT FOR 90 SECCNDS.

R0700    EXIT:  NXTIFAIL.

R0701    OUTPUT:  BIT 7 OF IMODES30 TC START ISS INITIALIZATION, OR BIT 2 OF IMODES30 AND PRCGRAM ALARM 00207 TO INDICATE
R0703    A FAILED TURN-CN SEQUENCE.

 0704    REF  15  LAST  166   06,2533  3 4752 0  ITURNON  CAF     BIT2            IF DELAY REQUEST HAS GONE OFF
 0705    REF  18  LAST  173   06,2534  7 1277 0           MASK    IMODES30        PREMATURELY, DC NCT PROCESS ANY CHANGES
 0706    REF  14  LAST  172   06,2535  10 000 0           CCS     A               UNTIL THE CURRENT 90 SEC WAIT EXPIRES.
 0707    REF   4  LAST  173   06,2536  1 2225 1           TCF     NXTIFAIL

 0708    REF  20  LAST  166   06,2537  3 4736 1           CAF     BIT14           SEE IF JUST ON OR CFF.
 0709    REF  19  LAST  174   06,2540  7 1277 0           MASK    IMODES30
 0710                         06,2541  0 0006 1           EXTEND
 0711    REF   1              06,2542  1 2556 1           BZF     ITURNON2        IF JUST ON.

 0712    REF  16  LAST  172   06,2543  3 4735 1           CAF     BIT15
 0713                         06,2544  0 0006 1           EXTEND                  SEE IF DELAY PRESENT DISCRETE HAS BEEN
 0714    REF   7  LAST  171   06,2545  02 012 0           RAND    CHAN12          SENT. IF SO, ACTION COMPLETE
 0715                         06,2546  0 0006 1           EXTEND
 0716                         06,2547  1 2551 0           BZF     +2
 0717    REF   5  LAST  174   06,2550  1 2225 1           TCF     NXTIFAIL

 0718    REF  16  LAST  174   06,2551  3 4752 0           CAF     BIT2            IF NOT, SET BIT TO INDICATE REQUEST NOT
 0719    REF  20  LAST  174   06,2552  27'277 0           ADS     IMODES30        PRESENT FOR FULL DURATION
 0720    REF   2  LAST  166   06,2553  0 5567 0           TC      ALARM
 0721                         06,2554   00207 1           OCT     207
 0722    REF   6  LAST  174   06,2555  1 2225 1           TCF     NXTIFAIL
 0723    REF   21  LAST   174    06,2556   4 1277 0  ITURNON2 CS      IMODES30       SET BIT7 TO INDICATE WAIT OF 1 SAMPLE
 0724    REF   16  LAST   166    06,2557   7 4745 1           MASK    BIT7
 0725    REF   22  LAST   175    06,2560  27'277 0            ADS     IMODES30
 0726    REF    1                06,2561   3 2564 1           CAF     RRINIT
 07261   REF    1                06,2562  54 110 0            TS      RADMODES
 0727    REF    7  LAST   174    06,2563   1 2225 1           TCF     NXTIFAIL

 07271                           06,2564    00102 1  RRINIT   OCT     00102
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R0728    PROGRAM NAME:  IMUCAGE.

R0729    FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES OF THE IMUCAGE INBIT, CHANNEL 30 BIT 11.  IF THE BIT
R0731    CHANGES TO 0 (CAGE BUTTON PRESSED), THE ISS IS CAGED (ICDU ZERO + COARSE ALIGN + NO ATT LAMP) UNTIL THE
R0733    ASTRONAUT SELECTS ANOTHER PROGRAM TO ALIGN THE ISS.  ANY PULSE TRAINS TO THE ICDU'S AND GYRO'S ARE TERMINATED,
R0735    THE ASSOCIATED OUTCOUNTERS ARE ZEROED AND THE GYRO'S ARE DE-SELECTED.  NO ACTION OCCURS WHEN THE BUTTON IS
R0737    RELEASED (INBIT CHANGES TO 1).

R0738    CALLING SEQUENCE:  BY IMUMON WHEN IMU CAGE BIT CHANGES.

R0739    JOBS OR TASKS INITIATED:  NONE.

R0740    SUBROUTINES CALLED:  CAGESUB.

R0741    ERASABLE INITIALIZATION:  FRESH START AND RESTART SET BIT 11 OF IMODES30 TO 1.

R0743    ALARMS:  NONE.

R0744    EXIT:  NXTIFAIL.

R0745    OUTPUT:  ISS CAGED, COUNTERS ZEROED, PULSE TRAINS TERMINATED AND NO ATT LAMP LIT.

 0747    REF  15  LAST  174    06,2565  10 000 0  IMUCAGE  CCS     A                 NO ACTION IF GOING OFF.
 0748    REF   1               06,2566  1 2361 0           TCF     ISSZERO
 0749    REF   1               06,2567  4 3002 1           CS      OCT77000          TERMINATE ICDU,RCDU, GYRO PULSE TRAINS
 0750                          06,2570  0 0006 1           EXTEND
 0751    REF   1               06,2571  03 014 1           WAND    CHAN14

 0752    REF   1               06,2572  4 2776 1           CS      OCT272            KNOCK DOWN DISPLAY INERTIAL DATA, IMU
 07521                         06,2573  0 0006 1           EXTEND                    ERROR COUNTER ENABLE, ZERO ICDU, COARSE
 07522   REF   8  LAST  174    06,2574  03 012 1           WAND    CHAN12            ALIGN ENABLE, RR ERROR COUNTER ENABLE

 075221  REF   1               06,2575  4 4745 1           CS      ENGONBIT          INSURE ENGONFLG IS CLEAR.
 075222  REF   2  LAST  159    06,2576  7 0101 0           MASK    FLAGWRD5
 075223  REF   3  LAST  176    06,2577  54 101 0           TS      FLAGWRD5
 07523   REF   1               06,2600  4 4355 1           CS      PRIO30            TURN ENGINE OFF.
 07524                         06,2601  0 0006 1           EXTEND
 07525   REF   3  LAST  173    06,2602  02 011 0           RAND    DSALMOUT
 075251  REF  21  LAST  174    06,2603  6 4736 1           AD      BIT14
 075252                        06,2604  0 0006 1           EXTEND
 075253  REF   4  LAST  176    06,2605  01 011 0           WRITE   DSALMOUT          FORCE BIT14=1, BIT13=0.

 07526   REF   1               06,2606  0 2743 0           TC      CAGESUB1

 07527   REF   4  LAST  171    06,2607  0 4674 0           TC      IBNKCALL          KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 07528   REF   1               06,2610    17166 0          CADR    RNOREFDR

 0753    REF   5  LAST  172    06,2611  4 4755 0           CS      ZERO
 0754    REF   1               06,2612  54 050 0           TS      CDUXCMD
 0755    REF   1               06,2613  54 051 1           TS      CDUYCMD
```

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L          T4RUPT PROGRAM

 0756    REF    1                  06,2614   54 052 1          TS       COUZCMD
 0757    REF    1                  06,2615   54 047 0          TS       GYROCMD

 0758    REF    1                  06,2616   4 3001 1          CS       OCT740         HAVING WAITED AT LEAST 27 MCT FROM
 0759                              06,2617   0 0006 1          EXTEND                  GYRO PULSE TRAIN TERMINATION, WE CAN
 0760    REF    2  LAST   176      06,2620   03 014 1          WAND     CHAN14         DE-SELECT THE GYROS
 0761    REF    8  LAST   175      06,2621   1 2225 1          TCF      NXTIFAIL
```

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P0762    PROGRAM NAME:  IMUOP.

R0763    FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES IN THE ISS OPERATE DISCRETE, BIT 9 OF CHANNEL 30.
R0765    IF THE INBIT CHANGES TO 0, INDICATING ISS ON, IMUOP GENERALLY SETS BIT 7 OF IMODES30 TO 1 TO REQUEST ISS
R0767    INITIALIZATION VIA TNONTEST.  AN EXCEPTION IS DURING A FAILED ISS DELAY DURING WHICH BIT 2 OF IMODES30 IS SET
R0769    TO 1 AND NO FURTHER INITIALIZATION IS REQUIRED.  WHEN THE INBIT CHANGES TO 1, INDICATING ISS OFF, IMUSEFLG IS
R0771    TESTED TO SEE IF ANY PROGRAM WAS USING THE ISS.  IF SO, PROGRAM ALARM 00214 IS ISSUED.

R0773    CALLING SEQUENCE:  BY IMUMON WHEN BIT 9 OF CHANNEL 30 CHANGES.

R0774    JOBS OR TASKS INITIATED:  NONE.

R0775    SUBROUTINES CALLED:  ALARM, IF ISS IS TURNED OFF WHILE IN USE.

R0776    ERASABLE INITIALIZATION:  ON FRESH START AND RESTART, BIT 9 OF IMODES30 IS SET TO 1 EXCEPT WHEN THE GIMBAL LOCK
R0778    LAMP IS ON, IN WHICH CASE IT IS SET TO 0.  THIS PREVENTS ICDU ZERO BY TNONTEST WITH THE ISS IN GIMBAL LOCK.

R0780    ALARMS:  PROGRAM ALARM 00214 IF THE ISS IS TURNED OFF WHILE IN USE.

R0781    EXIT:  NXTIFAIL.

R0782    OUTPUT:  ISS INITIALIZATION REQUEST (IMODES30 BIT 7) OR PROGRAM ALARM 00214.

 0784                             06,2622  0 0006 1  IMUOP     EXTEND
 0785    REF   1                  06,2623  1 2643 0            BZF     IMUOP2

 0786    REF  10  LAST  170       06,2624  4 1300 1            CS      IMODES33          DISABLE DAP
 0787    REF  20  LAST  172       06,2625  7 4746 1            MASK    BIT6
 0788    REF  11  LAST  178       06,2626  2 7300 1            ADS     IMODES33

 07885   REF   5  LAST  176       06,2627  0 4674 0            TC      IBNKCALL          KNOCK DOWN TRACK, REFSMMAT, DRIFT FLAGS
 07886   REF   2  LAST  176       06,2630    17166 0           CADR    RNDREFDR

 07887   REF   2  LAST  166       06,2631  4 2777 0            CS      BITS7&8           KNOCK DOWN RENDEZVOUS, IMUUSE FLAGS
 07888   REF   3  LAST  168       06,2632  7 0074 0            MASK    FLAGWRD0
 0789    REF   4  LAST  178       06,2633  5 6074 1            XCH     FLAGWRD0          IF GOING OFF, ALARM IF PROG USING IMU.
 07891                            06,2634  4 0000 0            COM
 0790    REF   1                  06,2635  7 4744 0            MASK    IMUSEFLG
 0791    REF  16  LAST  176       06,2636  1 0000 0            CCS     A
 0792    REF   9  LAST  177       06,2637  1 2225 1            TCF     NXTIFAIL

 0793    REF   3  LAST  174       06,2640  0 5567 0            TC      ALARM
 0794                             06,2641    00214 0           OCT     214
 0795    REF  10  LAST  178       06,2642  1 2225 1            TCF     NXTIFAIL

 0796    REF  17  LAST  174       06,2643  3 4752 0  IMUOP2    CAF     BIT2              SEE IF FAILED ISS TURN-ON SEQ IN PROG.
 0797    REF  23  LAST  175       06,2644  7 1277 0            MASK    IMODES30
 0798    REF  17  LAST  178       06,2645  1 0000 0            CCS     A
 0799    REF  11  LAST  178       06,2646  1 2225 1            TCF     NXTIFAIL          IF SO, DONT PROCESS UNTIL PRESENT 90
 0800    REF   2  LAST  174       06,2647  1 2556 1            TCF     ITURNON2          SECONDS EXPIRES.
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L         T4RUPT PROGRAM                                                            USER'S PAGE NO.  23      E6 S4

P0801     PROGRAM NAME:  PIPFAIL

R0802     FUNCTIONAL DESCRIPTION:  THIS PROGRAM PROCESSES CHANGES OF BIT 13 OF CHANNEL 33, PIPA FAIL.  IT SETS BIT 10 OF
R0804     IMODES30 TO AGREE.  IT CALLS SETISSW IN CASE A PIPA FAIL NECESSITATES AN ISS WARNING.  IF NOT,I.E., IMODES30
R0806     BIT 1 = 1, AND A PIPA FAIL IS PRESENT AND THE ISS IS NOT BEING INITIALIZED, PROGRAM ALARM 00212 IS ISSUED.

R0808     CALLING SEQUENCE:  BY C33TEST ON CHANGES OF CHANNEL 33 BIT 13.

R0809     JOBS OR TASKS INITIATED:  NONE.

R0810     SUBROUTINES CALLED:  1) SETISSW, AND 2) ALARM (SEE FUNCTIONAL DESCRIPTION).

R0812     ERASABLE INITIALIZATION:  SEE IMUMON FOR INITIALIZATION OF IMODES30.  THE RELAVANT BITS ARE 5, 7, 8, 9, AND 10.

R0814     ALARMS:  PROGRAM ALARM 00212 IF PIPA FAIL IS PRESENT BUT NEITHER ISS WARNING IS TO BE ISSUED NOR THE ISS IS
R0816     BEING INITIALIZED.

R0817     EXIT:  NXTFL33.

R0818     OUTPUT:  PROGRAM ALARM 00212 AND ISS WARNING MAINTENANCE.

 0819     REF  18  LAST  178   06,2650  10 000 0  PIPFAIL   CCS      A                 SET BIT10 IN IMODES30 SO ALL ISS WARNING
 0820     REF  14  LAST  132   06,2651  3 4742 1            CAF      BIT10             INFO IS IN ONE REGISTER.
 0821     REF  24  LAST  178   06,2652  57'277 1            XCH      IMODES30
 0822     REF   1              06,2653  7 3004 1            MASK     -BIT10
 0823     REF  25  LAST  179   06,2654  27'277 0            ADS      IMODES30

 0824     REF   2  LAST  167   06,2655  0 2703 1            TC       SETISSW

 0825     REF  26  LAST  179   06,2656  4 1277 0            CS       IMODES30          IF PIP FAIL DOESNT LIGHT ISS WARNING, DO
 0826     REF  13  LAST   88   06,2657  7 4753 0            MASK     BIT1              A PROGRAM ALARM IF IMU OPERATING BUT NOT
 0827     REF  19  LAST  179   06,2660  10 000 0            CCS      A                 CAGED OR BEING TURNED ON.
 0828     REF   1              06,2661  1 2432 1            TCF      NXTFL33

 0829     REF  27  LAST  179   06,2662  3 1277 1            CA       IMODES30
 0830     REF   1              06,2663  7 3000 0            MASK     OCT1720
 0831     REF  20  LAST  179   06,2664  10 000 0            CCS      A
 0832     REF   2  LAST  179   06,2665  1 2432 1            TCF      NXTFL33           ABOVE CONDITION NOT MET.

 0833     REF   4  LAST  178   06,2666  0 5567 0            TC       ALARM
 0834                          06,2667   00212 0            OCT      212
 0835     REF   3  LAST  179   06,2670  1 2432 1            TCF      NXTFL33
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L         T4RUPT PROGRAM                                                                     USER'S PAGE NO.  24       E6 S4

P0836     PROGRAM NAMES:  DNTMFAST, UPTMFAST

R0837     FUNCTIONAL DESCRIPTION:  THESE PROGRAMS PROCESS CHANGES OF BITS 12 AND 11 OF CHANNEL 33.  IF A BIT CHANGES TO A
R0839     0, A PROGRAM ALARM IS ISSUED.  THE ALARMS ARE:

R0840                BIT    ALARM           CAUSE
R0841                ---    -----           -----
R0842                 12    01105           DOWNLINK TOO FAST
R0843                 11    01106           UPLINK TOO FAST

R0844     CALLING SEQUENCE:  BY C33TEST ON A BIT CHANGE.

R0845     SUBROUTINES CALLED:  ALARM, IF A BIT CHANGES TO A 0.

R0846     ERASABLE INITIALIZATION:  FRESH START OR RESTART, BITS 12 AND 11 OF IMODES33 ARE SET TO 1.

R0848     ALARMS:  SEE FUNCTIONAL DESCRIPTION.

R0849     EXIT:  NXTFL33.

R0850     OUTPUT:  PROGRAM ALARM ON A BIT CHANGE TO 0.

 0851     REF  21  LAST  179   06,2671  10 000 0  DNTMFAST CCS     A               DO PROG ALARM IF TM TOO FAST.
 0852     REF   4  LAST  179   06,2672  1 2432 1           TCF     NXTFL33

 0853     REF   5  LAST  179   06,2673  0 5567 0           TC      ALARM
 0854                          06,2674   01105 1           OCT     1105
 0855     REF   5  LAST  180   06,2675  1 2432 1           TCF     NXTFL33

 0856     REF  22  LAST  180   06,2676  10 000 0  UPTMFAST CCS     A               SAME AS DNLINK TOO FAST WITH DIFFERENT
 0857     REF   6  LAST  180   06,2677  1 2432 1           TCF     NXTFL33         ALARM CODE.

 0858     REF   6  LAST  180   06,2700  0 5567 0           TC      ALARM
 0859                          06,2701   01106 1           OCT     1106
 0860     REF   7  LAST  180   06,2702  1 2432 1           TCF     NXTFL33
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P0861    PROGRAM NAME:  SETISSW

R0862    FUNCTIONAL DESCRIPTION:  THIS PROGRAM TURNS THE ISS WARNING LAMP ON AND OFF (CHANNEL 11 BIT 1 = 1 FOR ON,
R0864    0 FOR OFF) DEPENDING ON THE STATUS OF IMODES30 BITS 13 (IMU FAIL) AND 4 (INHIBIT IMU FAIL), 12 (ICDU FAIL) AND
R0866    3 (INHIBIT ICDU FAIL), AND 10 (PIPA FAIL) AND 1 (INHIBIT PIPA FAIL).  THE LAMP IS LEFT ON IF A LAMP TEST IS IN
R0868    PROGRESS.

R0869    CALLING SEQUENCE:  CALLED BY IMUMON ON CHANGES TO IMU FAIL AND ICDU FAIL.  CALLED BY IFAILCK AND PFAILOK UPON
R0871    REMOVAL OF THE FAIL INHIBITS.  CALLED BY PIPFAIL WHEN THE PIPA FAIL DISCRETE CHANGES.  IT IS CALLED BY PIPUSE
R0873    SINCE THE PIPA FAIL PROGRAM ALARM MAY NECESSITATE AN ISS WARNING, AND LIKEWISE BY PIPFREE WHEN THE ALARM DEPARTS
R0875    AND IT IS CALLED BY IMUZERO3 AND ISSUP AFTER THE FAIL INHIBITS HAVE BEEN REMOVED.

R0877    JOBS OR TASKS INITIATED:  NONE.

R0878    SUBROUTINES CALLED:  NONE.

R0879    ERASABLE INITIALIZATION:

R0880              1) IMODES30 - SEE IMUMON.
R0881              2) IMODES33 BIT 1 = 0 (LAMP TEST NOT IN PROGRESS).

R0882    ALARMS:  ISS WARNING.

R08821   THE FOLLOWING PROGRAM ALARMS WILL SHOW WHICH FAILURE CAUSED THE ISS WARN
R08822   PROGRAM ALARM 00777  PIPA FAIL
R08823   PROGRAM ALARM 03777  ICDU FAIL
R08824   PROGRAM ALARM 04777  ICDU , PIPA FAILS
R08825   PROGRAM ALARM 07777  IMU FAIL
R08826   PROGRAM ALARM 10777  IMU , PIPA FAILS
R08827   PROGRAM ALARM 13777  IMU , ICDU FAILS
R08828   PROGRAM ALARM 14777  IMU , ICDU , PIPA FAILS

R0883    EXIT:  VIA Q.

R0884    OUTPUT:  ISS WARNING LAMP SET PROPERLY.

 0885    REF   1                06,2703  3 4761 0  SETISSW  CAF     OCT15          SET ISS WARNING USING THE FAIL BITS IN
 0886    REF  28  LAST  179     06,2704  7 1277 0           MASK    IMODES30       BITS 13, 12, AND 10 OF IMODES30 AND THE
 0887                           06,2705  0 0006 1           EXTEND                 FAILURE INHIBIT BITS IN POSITIONS
 0888    REF  15  LAST  179     06,2706  7 4742 0           MP      BIT10          4, 3, AND 1.
 0889    REF  29  LAST  181     06,2707  3 1277 1           CA      IMODES30
 0890                           06,2710  0 0006 1           EXTEND
 0891    REF   5  LAST  169     06,2711  04 001 1           ROR     LCHAN          0 INDICATES FAILURE
 0892                           06,2712  4 0000 0           COM
 0893    REF   1                06,2713  7 5025 1           MASK    OCT15000
 0894    REF  23  LAST  180     06,2714  10 000 0           CCS     A
 0895    REF   1                06,2715  1 2726 1           TCF     ISSWON         FAILURE.

 0896    REF  14  LAST  179     06,2716  3 4753 1  ISSWOFF  CAF     BIT1           DONT TURN OFF ISS WARNING IF LAMP TEST
 0897    REF  12  LAST  178     06,2717  7 1300 1           MASK    IMODES33       IN PROGRESS.
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L         T4RUPT PROGRAM                                                                    USER'S PAGE NO.  26        E6 S4

 0898     REF  24  LAST  181   06,2720  10 000 0               CCS     A
 0899     REF   3  LAST  159   06,2721  0 0002 0               TC      Q

 0900     REF  15  LAST  181   06,2722  4 4753 0               CS      BIT1
 0901                          06,2723  0 0006 1               EXTEND
 0902     REF   5  LAST  176   06,2724  03 011 1               WAND    DSALMOUT
 0903     REF   4  LAST  182   06,2725  0 0002 0               TC      Q

 0904                          06,2726  0 0006 1   ISSWDN      EXTEND
 090402   REF   1              06,2727  22 066 1               QXCH    ITEMP6
 090404   REF   1              06,2730  0 5734 1               TC      VARALARM        TELL EVERYONE WHAT CAUSED THE ISSWARNING
 09041    REF  16  LAST  182   06,2731  3 4753 1               CAF     BIT1
 0905                          06,2732  0 0006 1               EXTEND
 0906     REF   6  LAST  182   06,2733  05 011 1               WOR     DSALMOUT
 0907     REF   2  LAST  182   06,2734  0 0066 1               TC      ITEMP6

 0908     REF   1              06,2735  4 3003 0   CAGESUB     CS      BITS6&15        SET OUTBITS AND INTERNAL FLAGS FOR
 0909                          06,2736  0 0006 1               EXTEND                  SYSTEM TURN-ON OR CAGE. DISABLE THE
 0910     REF   9  LAST  176   06,2737  03 012 1               WAND    CHAN12          ERROR COUNTER AND REMOVE IMU DELAY COMP.
 0911     REF   2  LAST  167   06,2740  3 4763 1               CAF     BITS4&5         SEND ZERO AND COARSE.
 0912                          06,2741  0 0006 1               EXTEND
 0913     REF  10  LAST  182   06,2742  05 012 1               WOR     CHAN12

 0914     REF  11  LAST  172   06,2743  4 1035 1   CAGESUB1    CS      DSPTAB +11D     TURN ON NO ATT LAMP
 0915     REF   1              06,2744  7 2773 1               MASK    OC40010
 0916     REF  12  LAST  182   06,2745  27'035 1               ADS     DSPTAB +11D

 0918     REF  30  LAST  181   06,2746  4 1277 0   CAGESUB2    CS      IMODES30        SET FLAGS TO INDICATE CAGING OR TURN-ON
 0919     REF   1              06,2747  7 2775 1               MASK    OCT75               AND INHIBIT ALL ISS WARNING INFO
 0920     REF  31  LAST  182   06,2750  27'277 0               ADS     IMODES30

 0922     REF  13  LAST  181   06,2751  4 1300 1               CS      IMODES33        DISABLE DAP AUTO AND HOLD MODES
 0923     REF  21  LAST  178   06,2752  7 4746 1               MASK    BIT6
 0924     REF  14  LAST  182   06,2753  27'300 1               ADS     IMODES33

 0925     REF   5  LAST  182   06,2754  0 0002 0               TC      Q

 0926     REF   3  LAST  179   06,2703             IMUFAIL     EQUALS  SETISSW
 0927     REF   4  LAST  182   06,2703             ICDUFAIL    EQUALS  SETISSW
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P0928              JUMP TABLES AND CONSTANTS.

 0929    REF   1                06,2755  1 2533 1  IFAILJMP TCF     ITURNON          CHANNEL 30 DISPATCH.
 0930    REF   1                06,2756  1 2703 0           TCF     IMUFAIL
 0931    REF   1                06,2757  1 2703 0           TCF     ICDUFAIL
 0932    REF   1                06,2760  1 2565 1           TCF     IMUCAGE
 0933                           06,2761   76400 1  30RDMSK  OCT     76400            (BIT 10 NOT SAMPLED HERE).
 0934    REF   1                06,2762  1 2622 1           TCF     IMUOP

 0935    REF   1                06,2763  1 2650 1  C33JMP   TCF     PIPFAIL          CHANNEL 33 DISPATCH.
 0936    REF   1                06,2764  1 2671 1           TCF     DNTMFAST
 0937    REF   1                06,2765  1 2676 0           TCF     UPTMFAST

R0938              SUBROUTINE TO SKIP IF LAMP TEST NOT IN PROGRESS.
 0939    REF  15  LAST   182    06,2766  4 1300 1  LAMPTEST CS      IMODES33         BIT 1 OF IMODES33 = 1 IF LAMP TEST IN
 0940    REF  17  LAST   182    06,2767  7 4753 0           MASK    BIT1             PROGRESS.
 0941    REF  25  LAST   182    06,2770  10 000 0           CCS     A
 0942    REF   6  LAST   182    06,2771  24 002 0           INCR    Q
 0943    REF   7  LAST   183    06,2772  0 0002 0           TC      Q

 0944    REF   1                   5026            33RDMSK  EQUALS PRIO16
 0945                           06,2773   40010 1  OC40010  OCT     40010
 0947                           06,2774   00054 0  OCT54    OCT     54
 0948                           06,2775   00075 0  OCT75    OCT     75
 09485                          06,2776   00272 0  OCT272   OCT     00272
 0949                           06,2777   00300 1  BITS7&8  OCT     300
 0950                           06,3000   01720 0  OCT1720  OCT     1720
 0951                           06,3001   00740 1  OCT740   OCT     00740
 0952    REF   1                   5025            OCT15000 EQUALS PRIO15
 0953                           06,3002   77000 1  OCT77000 OCT     77000
 0954                           06,3003   40040 1  BITS6&15 OCT     40040
 0955                           06,3004   76777 1  -BIT10   OCT     -1000

 0956                           06,3005   21450 0  90SECS   DEC     9000
 0957    REF   1                   5741            120MS    =       OCT14            (DEC12)
 0958    REF   4  LAST   162       5270            CLOCKCK  EQUALS RESUME
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R0959   PROGRAM NAME_  RRAUTCHK

R0960   FUNCTIONAL DESCRIPTION_
R0961   RRAUTCHK IS THE RENDEZVOUS RADAR INBIT MONITOR. INITIALLY THE RR
R0962   POWER ON AUTO (CHAN 33 BIT 2) INBIT IS CHECKED. IF NO CHANGE, THE
R0963   PROGRAM EXITS TO RRCDUCHK. IF A CHANGE, RADMODES IS UPDATED
R0964   AND A CHECK MADE IF RR POWER HAS JUST COME ON. IF JUST OFF, A CHECK
R0965   IS MADE TO SEE IF A PROGRAM WAS USING THE RR (STATE BIT 7). IF NO,
R0966   THE PROGRAM EXITS TO RRCDUCHK. IF YES, PROGRAM ALARM 00514
R0967   IS REQUESTED BEFORE EXITING TO RRCDUCHK. IF RR POWER HAS JUST COME
R0968   ON, A CHECK IS MADE TO SEE IF A PROGRAM WAS USING THE RR (STATE BIT 7).
R0969   IF YES, THE PROGRAM EXITS TO RRCDUCHK WITHOUT REQUESTING THE TURN-ON
R0970   SEQUENCE. IF NO, RADMODES IS UPDATED TO INDICATE RR CDU ZERO AND
R0971   RR TURN-ON SEQUENCE (BITS 13, 1). A 10 MILLISECOND WAITLIST CALL
R0972   IS THEN SET FOR RRTURNON BEFORE THE PROGRAM EXITS TO NORRGMON.

R0973   CALLING SEQUENCE_
R0974   T4RUPT EVERY 480 MILLISECONDS

R0975   ERASABLE INITIALIZATION REQUIRED_
R0976   RADMODES, STATE

R0977   SUBROUTINES CALLED_
R0978   WAITLIST

R0979   JOBS OR TASKS INITIATED_
R0980   RRTURNON

R0981   ALARMS_  PROGRAM ALARM 00514 - RADAR GOES OUT OF AUTO MODE WHILE BEING
R0982   USED

R0983   EXIT_ RRCDUCHK, NORRGMON

 0984   REF   2  LAST  175   06,3006   3 0110 1  RRAUTCHK CA       RADMODES         SEE IF CHANGE IN RR AUTO MODE BIT
 0985                        06,3007   0 0006 1           EXTEND
 0986   REF   2  LAST  169   06,3010   06 033 1           RXOR     CHAN33
 0987   REF   1              06,3011   7 4752 1           MASK     AUTOMBIT BIT2
 0988                        06,3012   0 0006 1           EXTEND
 0989   REF   1              06,3013   1 3037 1           BZF      RRCDUCHK

 0990   REF   3  LAST  184   06,3014   22 110 1           LXCH     RADMODES         UPDATE RADMODES.
 0991                        06,3015   0 0006 1           EXTEND
 0992   REF   6  LAST  181   06,3016   06 001 0           RXOR     LCHAN
 09925  REF   1              06,3017   7 3033 0           MASK     OCT05776         CLR CONT. DES., REMODE, REPOS, CDUZERO,
 0993   REF   4  LAST  184   06,3020   54 110 0           TS       RADMODES           AND TURNON BITS.
 0994   REF  18  LAST  178   06,3021   7 4752 1           MASK     BIT2             SEE IF JUST ON.
 0995   REF  26  LAST  183   06,3022   10 000 0           CCS      A
 0996   REF   2  LAST  184   06,3023   1 3034 1           TCF      RRCDUCHK -3      OFF: GO DISABLE RR CDU ERROR COUNTERS.
 0999   REF   1              06,3024   3 7666 0           CA       OCT10001         SET RRCDUZRO AND TURNON BITS.
 1000   REF   5  LAST  184   06,3025   26 110 0           ADS      RADMODES
 1001    REF    5  LAST  170    06,3026   3 4753 1             CAF     ONE
 1002    REF    5  LAST  171    06,3027   0 5203 0             TC      WAITLIST
 1003    REF    1               E7,1456                        EBANK=  LOSCOUNT
 1004    REF    1               06,3030    02073 1             2CADR   RRTURNON
 1004    REF    1               06,3031    52107 0

 1005    REF    1               06,3032   1 3126 0             TCF     NORRGMON

 1006                           06,3033    05776 1  OCT05776 OCT     5776
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R1007    PROGRAM NAME_ RRCDUCHK

R1008    FUNCTIONAL DESCRIPTION_
R1009    RRCDUCHK CHECKS FOR RR CDU FAIL (CHAN 30 BIT 7). INITIALLY THE
R1010    RR CDU FAIL BIT IS SAMPLED (CHAN 30 BIT 7). IF NO CHANGE, THE
R1011    PROGRAM EXITS TO RRGIMON. IF A CHANGE, THE RR AUTO MODE
R1012    (RADMODES BIT 2) BIT IS CHECKED. IF NOT IN RR AUTO MODE, THE
R1013    PROGRAM EXITS TO NORRGMON. IF IN AUTO MODE, RADMODES BIT 7
R1014    (RR CDU OK) IS UPDATED AND IF P-20 IS OPERATING PROGRAM ALARM 00515 IS
R1015    REQUESTED. CONTROL IS TRANSFERRED TO SETTRKF TO UPDATE
R1016    THE TRACKER FAIL LAMP (DSPTAB+11D BIT 8). CONTROL RETURNS TO
R1017    RRGIMON.

R1018    CALLING SEQUENCE_
R1019    EVERY 480 MILLISECONDS FROM RRAUTCHK (VIA T4RUPT) UNLESS A
R1020    TURN-ON SEQUENCE HAS JUST BEEN INITIATED.

R1021    ERASABLE INITIALIZATION REQUIRED_
R1022    RADMODES

R1023    SUBROUTINES CALLED_
R1024    SETTRKF

R1025    JOBS OR TASKS INITIATED_
R1026    NONE

R1027    ALARMS_
R1028    TRACKER FAIL
R1029    PROGRAM ALARM 00515 - RRCDU FAIL DURING P-20

R1030    EXIT_
R1031    RRGIMON, NORRGMON

 10315   REF  19  LAST  184   06,3034   4 4752 1         -3  CS       BIT2
 10316                        06,3035   0 0006 1             EXTEND
 10317   REF  11  LAST  162   06,3036   03 012 1             WAND     CHAN12          AT TURNON, DISABLE CDU ERROR COUNTERS

 1032    REF   6  LAST  184   06,3037   3 0110 1   RRCDUCHK  CA       RADMODES        LAST SAMPLED BIT IN RADMODES.
 1033                         06,3040   0 0006 1             EXTEND
 1034    REF   2  LAST  163   06,3041   06 030 1             RXOR     CHAN30
 1035    REF   1              06,3042   7 4745 1             MASK     RCDUFBIT
 1036                         06,3043   0 0006 1             EXTEND
 1037    REF   1              06,3044   1 3071 0             BZF      RRGIMON

 1038    REF   2  LAST  184   06,3045   3 4752 0             CAF      AUTOMBIT        IF RR NOT IN AUTO MODE, DON'T CHANGE BIT
 1039    REF   7  LAST  186   06,3046   7 0110 0             MASK     RADMODES        7 OF RADMODES. IF THIS WERE NOT DONE,
 1040    REF  27  LAST  184   06,3047   10 000 0             CCS      A               THE TRACKER FAIL MIGHT COME ON WHEN
 1041    REF   2  LAST  185   06,3050   1 3126 0             TCF      NORRGMON        JUST READING LR DATA.

 1042    REF   2  LAST  186   06,3051   3 4745 0             CAF      RCDUFBIT        SET BIT 7 OF RADMODES FOR SETTRKF.
 1043   REF    8  LAST  186    06,3052   22 110 1            LXCH    RADMODES        UPDATE RADMODES.
 1044                          06,3053   0 0006 1            EXTEND
 1045   REF    3  LAST  169    06,3054   06 001 0            RXOR    L
 1046   REF    9  LAST  187    06,3055   54 110 0            TS      RADMODES

 1047   REF   10  LAST  187    06,3056   3 0110 1            CA      RADMODES        DID RR CDU FAIL
 1048   REF    1               06,3057   7 4615 0            MASK    13,7,2          CDU ZERO+ CDUFAIL+ RR AUTO
 1049   REF   28 'LAST  186    06,3060   10 000 0            CCS     A
 1050   REF    1               06,3061   1 3070 1            TCF     TRKFLCDU        NO
 1051   REF    5  LAST  178    06,3062   4 0074 0            CS      FLAGWRD0        RNDVFLG  P20 OR P22 OPERATING
 1052   REF    1               06,3063   7 4745 1            MASK    RNDVZBIT
 1053   REF   29  LAST  187    06,3064   10 000 0            CCS     A
 1054   REF    2  LAST  187    06,3065   1 3070 1            TCF     TRKFLCDU        NO
 1055   REF    7  LAST  180    06,3066   0 5567 0            TC      ALARM           YES
 1056                          06,3067    00515 0            OCT     00515
 1057   REF    1               06,3070   0 4564 1  TRKFLCDU  TC      SETTRKF         UPDATE TRACKER FAIL LAMP ON DSKY
```

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L       T4RUPT PRCGRAM                                                                       USER'S PAGE NC.  32        F6 S4

P1058   PROGRAM NAME_  RRGIMCN                                                        F AUTO MODE EXCEPT WHEN THE RR COUS APE

R1060   FUNCTICNAL CESCRIPTICN_                                                       TTER IS INITIATED BY THIS MCNITOR WHEN
R1062   RRGIMON IS THE RR GIMBAL LIMIT MCNITCR. INITIALLY THE FOLLOWING IS            ED TO ORIVE THE GIMBALS TO T = 0 AND
R1064   CHECKEO_ REMOOE, RR CCU:S BEING ZEROEO, REPOSITION, ANO RR
R1065   NCT IN AUTC MOCE (RACMOCES BITS 14, 13, 11 2). IF ANY OE THESE
R1066   EXIST THE PROGRAM EXITS TC GPMATRIX. IF NCNE ARE PRESENT RRLIMCHK
R1067   IS CALLEO TO SEE IF THE PRESENT RR COU ANGLES (OPTY, OPTX) ARE WITHIN
R1068   THE LIMITS OE THE CUFRENT MCCE. IF WITHIN LIMITS, THE PROGRAM EXITS
R1069   TC NORRGMON. IF NOT WITHIN LIMITS, THE REPOSITION ELAG (RADMCOES
R1070   BIT 11) IS SET, THE RR AUTC TRACKER ANO RR ERROR COUNTER
R1071   (CHAN 12 BITS 14, 2) ARE CISABLED, AND A 20 MILLISECONO WAITLIST
R1072   CALL IS SET FOR OORREPOS AFTER WHICH THE PROGRAM EXITS TO NORRGMCN.

R1073   CALLING SEQUENCE_
R1074   EVERY 480 MILLISECONDS EROM RRCOUCHK (VIA T4RUPT) UNLESS TURN-CN
R1075   HAS JUST BEEN INITIATEO VIA RRAUTCHK OR IF THERE HAS BEEN A CHANGE IN
R1076   THE RR COU FAIL BIT (CHAN 30 BIT 7) ANC THE RR IS NOT IN THE AUTO MODE
R1077   (RACMODES BIT 2).

R1078   ERASABLE INITIALIZATICN_  RACMCCES

R1079   SUBROUTINES CALLEO_
R1080   RRLIMCHK, WAITLIST

R1081   JCBS CR TASKS INITIATEO_
R1082   CCRREPOS

R1083   ALARMS_
R1084   NCNE

R1085   EXIT_
R1086   NCRRGMON

 1087   REF   4  LAST  176   06,3071  30 101 1  RRGIMON  CAF    FLAGWRC5        IS NO ANGLE MONITOR ELAG SET
 1088   REE   1              06,3072   7 4750 0           MASK   NORRM8IT
 1089   REE  30  LAST  187   06,3073  10 000 0           CCS    A
 1090   REF   3  LAST  186   06,3074   1 3126 0           TCF    NORRGMCN        YES - SKIP LIMIT CHECK
 10901  REE   1              06,3075   4 0103 1           CS     FLAGWR07        IS SERVICER RUNNING?
 10902  REF   1              06,3076   7 4747 0           MASK   AVEGEBIT
 10903  REF  31  LAST  188   06,3077  10 000 0           CCS    A
 10904                       06,3100   1 3105 1           TCF    +5              NO.  OO R25
 10905  REF   1              06,3101   3 0102 1           CA     FLAGWR06        YES.  IS MUNFLAG SET?
 10906  REF   1              06,3102   7 4744 0           MASK   MUNFL8IT
 10907  REF  32  LAST  188   06,3103  10 000 0           CCS    A
 10908  REF   4  LAST  188   06,3104   1 3126 0           TCF    NORRGMON        YES.  OON'T OO P25
 1091   REF   1              06,3105   3 3135 0     +5    CAF    OCT32002        INHIBIT BY REMOCE,ZEROING,MONITOR,
 1092   REE  11  LAST  187   06,3106   7 0110 0           MASK   RAOMOOES-       OR RR NOT IN AUTO.
 1093   REF  33  LAST  188   06,3107  10 000 0           CCS    A
 1094   REF   5  LAST  188   06,3110   1 3126 0           TCE    NORRGMON
```

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L        T4RUPT PROGRAM                                                                                USER'S PAGE NO.  33       E6 S4

 1095    REF    1               06,3111   0 4523 1             TC      RRLIMCHK         SEE IF ANGLES IN LIMITS.
 1096    REF    1               06,3112    00035 1             ADRES   CDUT

 1097    REF    1               06,3113   1 3115 0             TCF     MONREPOS

 1098    REF    6   LAST  188   06,3114   1 3126 0             TCF     NORRGMON         (ADDITIONAL CODING MAY GO HERE).

 1099    REF    1               06,3115   3 4741 1   MONREPOS  CAF     REPOSBIT         SET FLAG TO SHOW REPOSITION IN PROGRESS.
 1100    REF   12   LAST  188   06,3116   26 110 0             ADS     RADMODES

 1101    REF    1               06,3117   4 3136 1             CS      OCT20002         DISABLE TRACKER AND ERROR COUNTER.
 1102                           06,3120   0 0006 1             EXTEND
 1103    REF   12   LAST  186   06,3121   03 012 1             WAND    CHAN12

 1104    REF    2   LAST   37   06,3122   3 4752 0             CAF     TWO
 1105    REF    6   LAST  185   06,3123   0 5203 0             TC      WAITLIST
 1106    REF    2   LAST  185   E7,1456                        EBANK=  LOSCOUNT
 1107    REF    1               06,3124    02140 0             2CADR   DORREPOS
 1107    REF    1               06,3125    52107 0

 1108    REF   13   LAST  189   06,3126   3 0110 1   NORRGMON  CA      RADMODES         IF SELECT SWITCH IS NOT IN LGC, SEND RR
 11081   REF    3   LAST  186   06,3127   7 4752 1             MASK    AUTOMBIT           CDU ZERO BIT TO PREVENT MEMORY CYCLE
 11082   REF   34   LAST  188   06,3130   10 000 0             CCS     A                  SNATCHING BY MANIC RR CDUS.  BIT2 OF
 11083                          06,3131   13 132 0             NOOP                       RADMODES AGREES WITH BIT2 OF CHANNEL
 11084                          06,3132   0 0006 1             EXTEND                     33.  FOR THIS CODING, WHICH ASSUMES
 11085   REF   13   LAST  189   06,3133   05 012 1             WOR     CHAN12             AUTOMBIT = BIT2, THANKS TO HUGH B-S
 11086   REF    1               06,3134   1 3140 0             TCF     ENDRRMON

 11087   REF    3   LAST  161   06,3140              ENDRRMON  EQUALS  DAPT4S

 1109                           06,3135    32002 1   OCT32002  OCT     32002
 1110                           06,3136    20002 1   OCT20002  OCT     20002
 1111                           06,3137    02100 1   OCT02100  OCT     02100            P20,P22 MASK BITS
```

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L        T4RUPT PROGRAM                                                                 USER'S PAGE NO.  34      F6 S4

P1112    PROGRAM NAME: GPMATRIX (DAPT4S) MOD. NO. 2  DATE: OCTOBER 27, 1966

R1113    AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R11131   MODIFIED:  7FEB. 1968 BY P. S. WEISSMAN TO DELETE COMPUTATION OF MR12 AND MR13, WHICH ARE NO LONGER REQIUPED.

R1114    THIS PROGRAM CALCULATES ALL THE SINGLE-PRECISION MATRIX ELEMENTS WHICH ARE USED BY LEM DAP TO TRANSFORM VECTORS
R1116    FROM GIMBAL TO PILOT (BODY) AXES AND BACK AGAIN.  THESE ELEMENTS ARE USED EXCLUSIVELY BY BASIC LANGUAGE ROUTINES
R1118    AND THEREFORE ARE NOT ARRAYED FOR USE BY INTERPRETIVE PROGRAMS.

R1119    CALLING SEQUENCE: GPMATRIX IS TRANSFERRED TO FROM DAPT4S AND IS THUS EXECUTED 4 TIMES A SECOND BY T4RUPT
R1121    DAPT4S IS LISTED IN T4JUMP TABLE TWICE EXPLICITLY AND ALSO OCCURS AFTER PRAUTCHK (WHICH IS ALSO LISTED TWICE)

R1123    SUBROUTINES CALLED: SPSIN, SPCOS.

R1124    NORMAL EXIT MODE:  TCF   RESUME

R1125    ALARM AND ABORT MODES:  NONE.

R1130    INPUT:  CDUX, CDUY, CDUZ.

R1131    OUTPUT:  M11, M21, M31, M22, M32.

R1132    AOG = CDUX, AIG = CDUY, AMG = CDUZ: MNEMONIC IS: OIM = XYZ

R1133      *        *     SIN(MG)           0          1  *
R1134      M    =   *    COS(MG)COS(OG) SIN(OG)   0  *
R1135       GP      *   -COS(MG)SIN(OG) COS(OG)   0  *

R1136      *        *  0    COS(OG)/COS(MG)         -SIN(OG)/COS(MG)          *
R1137      M    =   *  0    SIN(OG)                  COS(OG)                  *
R1138       PG      *  1   -SIN(MG)COS(OG)/COS(MG)  SIN(MG)SIN(OG)/COS(MG)   *

 1143    REF    5  LAST  168   E6,1414                      EBANK= M11
 1144    REF    1              06,3140           DAPT4S    EQUALS GPMATRIX
R1145    T4RUPT DAP LOGIC:

 1146    REF    2  LAST  171   06,3140  30 034 0  GPMATRIX CAE     CDUZ               SINGLE ENTRY POINT
 1147    REF    1              06,3141  0 5033 1           TC      SPSIN              SIN(CDUZ) = SIN(MG)
 1148    REF    6  LAST  190   06,3142  55'414 0           TS      M11                SCALED AT 1

 1149    REF    3  LAST  190   06,3143  30 034 0           CAE     CDUZ
 1150    REF    1              06,3144  0 5032 0           TC      SPCOS              COS(CDUZ) = COS(MG)
 1151    REF    1              06,3145  54 061 1           TS      COSMG              SCALED AT 1 (ONLY A FACTOR)

 1152    REF    1              06,3146  30 032 0           CAE     CDUX
 1153    REF    2  LAST  190   06,3147  0 5033 1           TC      SPSIN              SIN(CDUX) = SIN(OG)
 1154    REF    1              06,3150  55'417 0           TS      M22                SCALED AT 1 (ALSO IS MR22)

 1155    REF    2  LAST  190   06,3151  4 1417 0           CS      M22
 1156                            06,3152   0 0006 1             EXTEND
 1157    REF    2  LAST   190    06,3153   7 0061 1             MP        COSMG             -SIN(OG)COS(MG)
 1158    REF    1                06,3154   55'416 1             TS        M31               SCALED AT 1

 1159    REF    2  LAST   190    06,3155   30 032 0             CAE       CDUX
 1160    REF    2  LAST   190    06,3156   0 5032 0             TC        SPCOS             COS(CDUX) = COS(CG)
 1161    REF    1                06,3157   55'420 1             TS        M32               SCALED AT 1 (ALSO IS MR23)

 1162                            06,3160   0 0006 1             EXTEND
 1163    REF    3  LAST   191    06,3161   7 0061 1             MP        COSMG             COS(OG)COS(MG)
 1164    REF    1                06,3162   55'415 1             TS        M21               SCALED AT 1

 1191    REF    5  LAST   183    06,3163   0 5270 1             TC        RESUME

 1193    REF    6  LAST   191       5270             ENCDAPT4   EQUALS    RESUME
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R0001    PROGRAM DESCRIPTION

R0002    AUTHOR:  J S MILLER

R00025   MODIFIED 6 MARCH 1968 BY P S WEISSMAN TO SET UP JOB FOR 1/ACCS WHEN THE MASKS ARE CHANGED

R0003         THIS ROUTINE IS ATTACHED TO T4RUPT, AND IS ENTERED EVERY 480 MS.  ITS FUNCTION IS TO EXAMINE THE LOW 8 BITS
R0005    OF CHANNEL 32 TO SEE IF ANY ISOLATION-VALVE CLOSURE BITS HAVE APPEARED OR DISAPPEARED (THE CREW IS WARNED OF JET
R0007    FAILURES BY LAMPS LIT BY THE GRUMMAN FAILURE-DETECTION CIRCUITRY; THEY MAY RESPOND BY OPERATING SWITCHES WHICH
R0009    ISOLATE PAIRS OF JETS FROM THE PROPELLANT TANKS AND SET BITS IN CHANNEL 32).  IN THE EVENT THAT CHANNEL 32 BITS
R0011    DIFFER FROM 'PVALVEST', THE RECORD OF ACTIONS TAKEN BY THIS ROUTINE, THE APPROPRIATE BITS IN 'CH5MASK' &
R0013    'CH6MASK', USED BY THE DAP JET-SELECTION LOGIC, ARE UPDATED, AS IS 'PVALVEST'.  TO SPEED UP & SHORTEN THE
R0015    ROUTINE, NO MORE THAN ONE CHANGE IS ACCEPTED PER ENTRY.  THE HIGHEST-NUMBERED BIT IN CHANNEL 32 WHICH REQUIRES
R0017    ACTION IS THE ONE PROCESSED.

R0018         THE CODING IN THE FAILURE MONITOR HAS BEEN WRITTEN SO AS TO HAVE ALMOST COMPLETE RESTART PROTECTION.  FOR
R0020    EXAMPLE, NO ASSUMPTION IS MADE WHEN SETTING A 'CH5MASK' BIT TO 1 THAT THE PREVIOUS STATE IS 0, ALTHOUGH IT OF
R0022    COURSE SHOULD BE.  ONE CASE WHICH MAY BE SEEN TO EVADE PROTECTION IS THE OCCURRENCE OF A RESTART AFTER UPDATING
R0024    ONE OR BOTH DAP MASK-WORDS BUT BEFORE UPDATING 'PVALVEST', COUPLED WITH A CHANGE IN THE VALVE-BIT BACK TO ITS
R0026    FORMER STATE.  THE CONSEQUENCE OF THIS IS THAT THE NEXT ENTRY WOULD NOT SEE THE CHANGE INCOMPLETELY INCORP-
R0028    ORATED BY THE LAST PASS (BECAUSE IT WENT AWAY AT JUST THE RIGHT TIME), BUT THE DAP MASK-WORDS WILL BE INCORRECT.
R0030    THIS COMBINATION OF EVENTS SEEMS QUITE REMOTE, BUT NOT IMPOSSIBLE UNLESS THE CREW OPERATES THE SWITCHES AT HALF-
R0032    SECOND INTERVALS OR LONGER.  IN ANY EVENT, A DISAGREEMENT BETWEEN REALITY AND THE DAP MASKS WILL BE CURED IF
R0034    THE MISINTERPRETED SWITCH IS REVERSED AND THEN RESTORED TO ITS CORRECT POSITION (SLOWLY).

R0036    CALLING SEQUENCE:

R0037              TCF    RCSMONIT        (IN INTERRUPT MODE, EVERY 480 MS.)

R0038    EXIT:  TCF  RCSMONEX  (ALL PATHS EXIT VIA SUCH AN INSTRUCTION)
 0039    REF    7  LAST  191       5270              RCSMONEX EQUALS RESUME

R0040    ERASABLE INITIALIZATION REQUIRED:

R0041              VIA FRESH START:  PVALVEST           = +0  (ALL JETS ENABLED)
R0042                                CH5MASK, CH6MASK   = +0  (ALL JETS OK)

R0043    OUTPUT:   CH5MASK & CH6MASK UPDATED  (1'S WHERE JETS NOT TO BE USED, IN CHANNEL 5 & 6 FORMAT)
R0045              PVALVEST UPDATED  (1'S WHEN VALVE CLOSURES HAVE BEEN TRANSLATED INTO CH5MASK & CH6MASK; CHAN 32 FORMAT)
R00465             JOB TO DO 1/ACCS.

R0047    DEBRIS:  A, L, Q AND DEBRIS OF NOVAC.

R0048    SUBROUTINE CALLED:  NOVAC.

 0052    REF    1                  1257              EBANK= CH5MASK

 0059                           23,2000              BANK    23
 0060    REF    1               06,2000              SETLOC  RCSMONT
 0061                           06,3164              BANK
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L        RCS FAILURE MONITOR                                                                    USER'S PAGE NO.  2      E? S4

 0062   REF    1                                                       COUNT* $$/T4RCS

 00625  REF    1                 06,3164                   RCSMONIT EQUALS RCSMON

 0063   REF    6  LAST  176      06,3164   4 4755 0   RCSMON   CS       ZERO
 0064                            06,3165   0 0006 1            EXTEND
 0065   REF    2  LAST  160      06,3166   06 032 0            RXOR     CHAN32            PICK UP + INVERT INVERTED CHANNEL 32.
 0066   REF    1                 06,3167   7 4357 0            MASK     LOW8              KEEP JET-FAIL BITS ONLY.
 0067   REF    8  LAST  183      06,3170   54 002 1            TS       Q

                                                                                             -     -
 0068   REF    1                 06,3171   4 1273 1            CS       PVALVEST
 0069   REF    9  LAST  193      06,3172   7 0002 1            MASK     Q                 FORM PC + PC.
 0070   REF    4  LAST  187      06,3173   54 001 1            TS       L                  (P = PREVIOUS ISOLATION VALVE STATE,
 0071   REF   10  LAST  193      06,3174   4 0002 1            CS       Q                   C = CURRENT VALVE STATE (CH 32)).
 0072   REF    2  LAST  193      06,3175   7 1273 1            MASK     PVALVEST
 0073   REF    5  LAST  193      06,3176   26 001 1            AOS      L                 RESULT NZ INDICATES ACTION REQUIRED.

 0074                            06,3177   0 0006 1            EXTEND
 0075   REF    1                 06,3200   1 5270 0            BZE      RCSMONEX          QUIT IF NO ACTION REQUIRED.

 0076                            06,3201   0 0006 1            EXTEND
 0077   REF   17  LAST  175      06,3202   7 4745 1            MP       BIT7              MOVE BITS 8 - 1 OF A TO 14 - 7 OF L.
 0078   REF    6  LAST  193      06,3203   56 001 0            XCH      L                 ZERO TO L IN THE PROCESS.

 0079   REF    7  LAST  193      06,3204   24 001 0    -3      INCR     L
 0080                            06,3205   6 0000 1            DOUBLE                     BOUND TO GET OVERFLOW IN THIS LOOP,
 0081                            06,3206   54 000 0            OVSK                       SINCE WE ASSURED INITIAL NZ IN A.
 0082                            06,3207   1 3204 0            TCF      -3

 0083   REF    8  LAST  193      06,3210   50 001 0            INDEX    L
 0084   REF   16  LAST  166      06,3211   3 4743 0            CA       BIT8 -1           SAVE THE RELEVANT BIT (8 - 1).
 0085   REF   11  LAST  193      06,3212   54 002 1            TS       Q
 0086   REF    3  LAST  193      06,3213   7 1273 1            MASK     PVALVEST          LOOK AT PREVIOUS VALVE STATE BIT.
 0087   REF   35  LAST  189      06,3214   10 000 0            CCS      A
 0088   REF    1                 06,3215   1 3231 0            TCF      VOPENED           THE VALVE HAS JUST BEEN OPENED.

 0089   REF    2  LAST  192      06,3216   4 1257 1            CS       CH5MASK           THE VALVE HAS JUST BEEN CLOSED.
 0090   REF    9  LAST  193      06,3217   50 001 0            INDEX    L
 0091   REF    1                 06,3220   7 3250 1            MASK     5FAILTAB
 0092   REF    3  LAST  193      06,3221   27'257 1            AOS      CH5MASK           SET INHIBIT BIT FOR CHANNEL 5 JET.

 0093   REF    1                 06,3222   4 1260 0            CS       CH6MASK
 0094   REF   10  LAST  193      06,3223   50 001 0            INDEX    L
 0095   REF    1                 06,3224   7 3260 1            MASK     6FAILTAB
 0096   REF    2  LAST  193      06,3225   27'260 0            AOS      CH6MASK           SET INHIBIT BIT FOR CHANNEL 6 JET.

 0097   REF   12  LAST  193      06,3226   3 0002 0            CA       Q
 0098   REF    4  LAST  193      06,3227   27'273 1            AOS      PVALVEST          RECORD ACTION TAKEN.

 0099   REF    1                 06,3230   1 3244 1            TCF      1/ACCFIX          SET UP 1/ACCJOB AND EXIT.
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GAP:  ASSEMBLE REVISION 001 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969  LEMONAID.104  PAGE  194

L        RCS FAILURE MONITOR                                                                       USER'S PAGE NO.   3       E2 S4

 0100    REF  11  LAST  193    06,3231   50 001 0  VOPENED   INDEX   L                  A VALVE HAS JUST BEEN OPENED.
 0101    REF   2  LAST  193    06,3232   4 3250 1            CS      5FAILTAB
 0102    REF   4  LAST  193    06,3233   7 1257 1            MASK    CH5MASK
 0103    REF   5  LAST  194    06,3234   55'257 1            TS      CH5MASK            REMOVE INHIBIT BIT FOR CHANNEL 5 JET.

 0104    REF  12  LAST  194    06,3235   50 001 0            INDEX   L
 0105    REF   2  LAST  193    06,3236   4 3260 1            CS      6FAILTAB
 0106    REF   3  LAST  193    06,3237   7 1260 0            MASK    CH6MASK
 0107    REF   4  LAST  194    06,3240   55'260 0            TS      CH6MASK            REMOVE INHIBIT BIT FOR CHANNEL 6 JET.

 0108    REF  13  LAST  193    06,3241   4 0002 1            CS      Q
 0109    REF   5  LAST  193    06,3242   7 1273 1            MASK    PVALVEST
 0110    REF   6  LAST  194    06,3243   55'273 1            TS      PVALVEST           RECORD ACTION TAKEN.

 0111    REF   1               06,3244   3 7720 0  1/ACCFIX  CAF     PRIO27             SET UP 1/ACCS SO THAT THE SWITCH CURVES
 0112    REF   2  LAST  160    06,3245   0 5072 1            TC      NOVAC                FOR TJETLAW CAN BE MODIFIED IF CH5MASK
 0113    REF   4  LAST  134    E6,1536                       EBANK=  AOSQ                 HAS BEEN ALTERED.
 0114    REF   1               06,3246    03652 0            2CADR   1/ACCJOB
 0114    REF   1               06,3247    42106 0
 0115    REF   2  LAST  193    06,3250   1 5270 0            TCF     RCSMONEX           EXIT.


 0117                          06,3247             5FAILTAB  EQUALS  -1                 CH 5 JET BIT CORRESPONDING TO CH 32 BIT:
 0118                          06,3251    00040 0            OCT     00040              8
 0119                          06,3252    00020 0            OCT     00020              7
 0120                          06,3253    00100 0            OCT     00100              6
 0121                          06,3254    00200 0            OCT     00200              5
 0122                          06,3255    00010 0            OCT     00010              4
 0123                          06,3256    00001 0            OCT     00001              3
 0124                          06,3257    00004 0            OCT     00004              2
 0125                          06,3260    00002 0            OCT     00002              1

 0126                          06,3257             6FAILTAB  EQUALS  -1                 CH 6 JET BIT CORRESPONDING TO CH 32 BIT:
 0127                          06,3261    00010 0            OCT     00010              8
 0128                          06,3262    00020 0            OCT     00020              7
 0129                          06,3263    00004 0            OCT     00004              6
 0130                          06,3264    00200 0            OCT     00200              5
 0131                          06,3265    00001 0            OCT     00001              4
 0132                          06,3266    00002 0            OCT     00002              3
 0133                          06,3267    00040 0            OCT     00040              2
 0134                          06,3270    00100 0            OCT     00100              1
```

```
L       DOWNLINK LISTS                                                                  USER'S PAGE NO.  1       EO S4

 DD01                          22,2004                       BANK    22
 DD02   REF   1                05,2000                       SETLOC  DOWNTELM
 DD03                          05,2065                       BANK

 DD04   REF   2  LAST  156        D340                       EBANK=  DNTMBUFF

RDD05   SPECIAL DOWNLINK OP CODES
ADD06                                                        OP CODE ADDRESS(EXAMPLE) SENDS..       BIT 15  BITS 14-12 BITS 11
ADD07                                                                                                                        -0
ADD08                                                        ------ ----------       ----------    ------  ---------- -------
ADD09                                                                                                                         --
ADD10                                                        1DNADR TIME2            (2 AGC WDS)      0          0       ECADR
ADD11                                                        2DNADR TEPHEM           (4 AGC WDS)      0          1       ECADR
ADD12                                                        3DNADR VGBODY           (6 AGC WDS)      0          2       ECADR
ADD13                                                        4DNADR STATE            (8 AGC WDS)      0          3       ECADR
ADD14                                                        5DNADR UPBUFF           (10AGC WDS)      0          4       ECADR
ADD15                                                        6DNADR DSPTAB           (12AGC WDS)      0          5       ECADR
ADD16                                                        DNCHAN 30               CHANNELS         0          7       CHANNEL
ADD17                                                                                                                    ADDRESS
ADD18                                                        DNPTR  NEXTLIST         POINTS TO NEXT   0          6       ADRES
ADD19                                                                                 LIST.

RDD20   DOWNLIST FORMAT DEFINITIONS AND RULES-
RDD21   1. END OF A LIST = -XDNADR (X = 1 TO 6), -DNPTR, OR -DNCHAN.
RDD22   2. SNAPSHOT SUBLIST = LIST WHICH STARTS WITH A -1DNADR.
RDD23   3. SNAPSHOT SUBLIST CAN ONLY CONTAIN 1DNADRS.
RDD24   4. TIME2 1DNADR MUST BE LOCATED IN THE CONTROL LIST OF A DOWNLIST.
RDD25   5. ERASABLE DOWN TELEMETRY WORDS SHOULD BE GROUPED IN SEQUENTIAL
RDD26      LOCATIONS AS MUCH AS POSSIBLE TO SAVE STORAGE USED BY DOWNLINK LISTS.


 DD27   REF   1                                              COUNT*  $$/DLIST
 DD28                             0007              ERASZERO EQUALS  7
 DD29   REF   1                   0007              UNKNOWN  EQUALS  ERASZERO
 DD30   REF   2  LAST  195        0007              SPARE    EQUALS  ERASZERO           USE SPARE TO INDICATE AVAILABLE SPACE
 DD32                          05,2065    77340 0   LOWIDCOD OCT     77340              LOW ID CODE


 DD33   REF   1                05,2172              NOMDNLST EQUALS  LMCSTADL           FRESH START AND POST P27 DOWNLIST

 DD34   REF   1                05,2407              AGSLIST  EQUALS  LMAGSIDL

 DD35   REF   2  LAST  195     05,2407              UPDNLIST EQUALS  LMAGSIDL           UPDATE PROGRAM (P27) DOWNLIST
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L        DOWNLINK LISTS                                                             USER'S PAGE NO.  2      EC S4

P0036    LM ORBITAL MANEUVERS LIST

R0037        ------------------  CONTROL LIST  --------------------------

 0038                           05,2066                LMORBM01 EQUALS                   SEND ID BY SPECIAL CODING
 0039    REF   1                05,2066   32127 1               DNPTR   LMORBM01         COLLECT SNAPSHOT
 0040    REF   3  LAST  195     05,2067   24340 0               6DNADR  DNTMBUFF         SEND SNAPSHOT
 0041    REF   1                05,2070   03451 1               1DNADR  DELLT4           DELLT4,+1
 0042    REF   2  LAST  142     05,2071   13443 0               3DNADR  RTARG            RTARG,+1...+5
 0043    REF   1                05,2072   02256 1               1DNADR  ELEV             ELEV,+1
 0044    REF   1                05,2073   01341 0               1DNADR  TEVENT           TEVENT,+1
 0045    REF   1                05,2074   25733 1               6DNADR  REFSMMAT         REFSMMAT+0...+11D
 0046    REF   1                05,2075   03633 1               1DNADR  TCSI             TCSI,+1
 0047    REF   1                05,2076   12266 0               3DNADR  DELVEET1         DELVEET1+0...+5
 0048    REF   2  LAST  145     05,2077   13700 1               3DNADR  VGTIG            VGTIG+0...+5
 0049    REF   2  LAST  107     05,2100   01335 0               1DNADR  DNLRVELZ         DNLRVELZ,DNLRALT
 0050    REF   1                05,2101   03630 1               1DNADR  TPASS4           TPASS4,+1
 0051    REF   1                05,2102   32136 1               DNPTR   LMORBM02         COMMON DATA
 0052    REF   1                05,2103   00024 1               1DNADR  TIME2            TIME2/1
 0053    REF   1                05,2104   32145 0               DNPTR   LMORBM03         COLLECT SNAPSHOT
 0054    REF   4  LAST  196     05,2105   24340 0               6DNADR  DNTMBUFF         SEND SNAPSHOT
 0055    REF   1                05,2106   32154 0               DNPTR   LMORBM04         COMMON DATA
 0056    REF   1                05,2107   07115 0               2DNADR  POSTORKU         POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0058    REF   1                05,2110   00007 0               1DNADR  SPARE
 0059    REF   1                05,2111   01776 0               1DNADR  TCDH             TCDH,+1
 0060    REF   1                05,2112   12274 0               3DNADR  DELVEET2         DELVEET2+0...+5
 0061    REF   1                05,2113   03635 1               1DNADR  TTPI             TTPI,+1
 0062    REF   1                05,2114   12365 1               3DNADR  DELVEET3         DELVEET3+0...+5
 0063    REF   2  LAST  107     05,2115   01330 0               1DNADR  DNRRANGE         DNRRANGE,DNRRDOT
 0065    REF   2  LAST  107     05,2116   05333 1               2DNADR  DNLRVELX         DNLRVELX,DNLRVELY,DNLRVELZ,DNLRALT
 0066    REF   1                05,2117   03577 1               1DNADR  DIFFALT          DIFFALT,+1
 0067    REF   1                05,2120   01326 1               1DNADR  LEMMASS          LEMMASS,CSMMASS
 0068    REF  32  LAST  182     05,2121   01277 1               1DNADR  IMODES30         IMODES30,IMODES33
 0069    REF   1                05,2122   03441 0               1DNADR  TIG              TIG,+1
 0070    REF   1                05,2123   32157 0               DNPTR   LMORBM05         COMMON DATA
 0071    REF   1                05,2124   32170 0               DNPTR   LMORBM06         COMMON DATA
 0072    REF   2  LAST  196     05,2125   00007 0               1DNADR  SPARE            FORMERLY PIF
 0073    REF   2  LAST  149     05,2126   74261 1              -1DNADR  TGO              TGO,+1

R0074        ------------------  SUB-LISTS  ----------------------------

 0075    REF   2  LAST  121     05,2127   76056 0  LMORBM01-1DNADR  R-OTHER +2       R-OTHER+2,+3               SNAPSHOT
 0076    REF   3  LAST  196     05,2130   01723 0               1DNADR  R-OTHER +4       R-OTHER+4,+5
 0077    REF   2  LAST  121     05,2131   01725 0               1DNADR  V-OTHER          V-OTHER,+1
 0078    REF   3  LAST  196     05,2132   01727 1               1DNADR  V-OTHER +2       V-OTHER+2,+3
 0079    REF   4  LAST  196     05,2133   01731 0               1DNADR  V-OTHER +4       V-OTHER+4,+5
 0080    REF   1                05,2134   01570 1               1DNADR  T-OTHER          T-OTHER,+1
 0081    REF   4  LAST  196     05,2135   76060 0              -1DNADR  R-OTHER          R-OTHER+0,+1

 0082    REF   1                05,2136   04320 1  LMORBM02 2DNADR  REDOCTR          REDOCTR,THETAD,+1,+2       COMMON DATA
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  0083   REF   1              05,2137   01432 0                1DNADR PSBBQ        PSBBD,+1
  0084   REF   5  LAST  130   05,2140   07021 0                2DNADR OMEGAP       OMEGAP,OMEGAQ,OMEGAR,GARBAGE
  0085   REF   4  LAST  137   05,2141   07234 0                2DNADR CDUXD        CDUXD,CDUYD,CDUZD,GARBAGE
  0086   REF   3  LAST  191   05,2142   04032 1                2DNADR CDUX         CDUX,CDUY,CDUZ,CDUT
  0087   REF  16  LAST   96   05,2143   24074 1                6DNADR STATE        STATE+0...+11D (FLAGWRDS)
  0088   REF  13  LAST  182   05,2144   52755 1               -6DNADR DSPTAB       DSPTAB TABLES

  0089   REF   1              05,2145   76556 0    LMORBM03-1DNADR RN +2         RN +2,+3                 SNAPSHOT
  0090   REF   2  LAST  197   05,2146   01223 0                1DNADR RN +4        RN +4,+5
  0091   REF   1              05,2147   01225 0                1DNADR VN           VN,+1
  0092   REF   2  LAST  197   05,2150   01227 1                1DNADR VN +2        VN +2,+3
  0093   REF   3  LAST  197   05,2151   01231 0                1DNADR VN +4        VN +4,+5
  0094   REF   1              05,2152   01233 1                1DNADR PIPTIME      PIPTIME,+1
  0095   REF   3  LAST  197   05,2153   76560 0               -1DNADR RN           RN,+1

  0096   REF   3  LAST  135   05,2154   07242 1    LMORBM04 2DNADR OMEGAPD       OMEGAPD,OMEGAQD,OMEGARD,GARBAGE
  0097   REF   1              05,2155   10372 0                3DNADR CADRFLSH     CADRFLSH,+1,+2,FAILREG,+1,+2
  0098   REF  14  LAST  189   05,2156   77667 0               -1DNADR RADMODES     RADMODES,DAPBOOLS        COMMON DATA

  0099   REF   6  LAST  197   05,2157   07021 0    LMORBM05 2DNADR OMEGAP        OMEGAP,OMEGAQ,OMEGAR,GARBAGE
  0100   REF   5  LAST  197   05,2160   07234 0                2DNADR CDUXD        CDUXD,CDUYD,CDUZD,GARBAGE
  0101   REF   4  LAST  197   05,2161   04032 1                2DNADR CDUX         CDUX,CDUY,CDUZ,CDUT
  0102   REF   1              05,2162   03024 1                1DNADR ALPHAQ       ALPHAQ,ALPHAR            COMMON DATA
  0103   REF   1              05,2163   03113 1                1DNADR POSTORKP     POSTORKP,NEGTORKP
  0104                        05,2164   34011 0                DNCHAN 11           CHANNELS11,12
  0105                        05,2165   34013 1                DNCHAN 13           CHANNELS13,14
  0106                        05,2166   34030 0                DNCHAN 30           CHANNELS30,31
  0107                        05,2167   43745 0               -DNCHAN 32           CHANNELS32,33

  0108   REF   2  LAST  149   05,2170   03560 1    LMORBM06 1DNADR PIPTIME1      PIPTIME,+1               COMMON DATA
  0109   REF   4  LAST   99   05,2171   67453 1               -3DNADR DELV         DELV+0...+5

 R0110         ----------------------------------------------------------
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L       DOWNLINK LISTS                                                                       USER'S PAGE NO.   4       EO S4

P0111   LM COAST AND ALIGNMENT DOWNLIST

R0112       -----------------  CONTROL LIST  --------------------------

 0113                           05,2172                 LMCSTADL EQUALS                      SEND ID BY SPECIAL CODING
 0114   REF   1                 05,2172   32127 1                DNPTR  LMCSTA01             COLLECT SNAPSHOT
 0115   REF   5  LAST  196      05,2173   24340 0                6DNADR DNTMBUFF             SEND SNAPSHOT
 0116   REF   1                 05,2174   02020 1                1DNADR AGSK                 AGSK,+1
 0117   REF   2  LAST  125      05,2175   02774 1                1DNADR TALIGN               TALIGN,+1
 0118   REF   2  LAST  196      05,2176   07115 0                2DNADR POSTORKU             POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0120   REF   3  LAST  196      05,2177   01330 0                1DNADR DNRRANGE             DNRRANGE,DNRRDOT
 0121   REF   2  LAST  196      05,2200   01341 0                1DNADR TEVENT               TEVENT,+1
 0122   REF   2  LAST  196      05,2201   25733 1                6DNADR REFSMMAT             REFSMMAT+0...+11D
 0123   REF   1                 05,2202   00734 1                1DNADR AOTCODE              AOTCODE,GARBAGE
 0124   REF   1                 05,2203   12022 1                3DNADR RLS                  RLS+0...+5
 0125   REF   3  LAST  196      05,2204   05333 1                2DNADR DNLRVELX             DNLRVELX,DNLRVELY,DNLRVELZ,DNLRALT
 0126   REF   3  LAST  196      05,2205   13700 1                3DNADR VGTIG                VGTIGX,Y,Z
 0127   REF   1                 05,2206   32136 1                DNPTR  LMCSTA02             COMMON DATA
 0128   REF   2  LAST  196      05,2207   00024 1                1DNADR TIME2                TIME2/1
 0129   REF   1                 05,2210   32145 0                DNPTR  LMCSTA03             COLLECT SNAPSHOT
 0130   REF   6  LAST  198      05,2211   24340 0                6DNADR DNTMBUFF             SEND SNAPSHOT
 0131   REF   1                 05,2212   32154 0                DNPTR  LMCSTA04             COMMON DATA
 0132   REF   1                 05,2213   32226 0                DNPTR  LMCSTA07             COMMON DATA
 0133   REF   4  LAST  198      05,2214   05333 1                2DNADR DNLRVELX             DNLRVELX,DNLRVELY,DNLRVELZ,DNLRALT
 0134   REF   1                 05,2215   04036 0                2DNADR CDUS                 CDUS,PIPAX,PIPAY,PIPAZ
 0135   REF   2  LAST  196      05,2216   00112 0                1DNADR LASTYCMD             LASTYCMD,LASTXCMD
 0136   REF   2  LAST  196      05,2217   01326 1                1DNADR LEMMASS              LEMMASS,CSMMASS
 0137   REF  33  LAST  196      05,2220   01277 1                1DNADR IMODES30             IMODES30,IMODES33
 0138   REF   2  LAST  196      05,2221   03441 0                1DNADR TIG                  TIG,+1
 0139   REF   1                 05,2222   32157 0                DNPTR  LMCSTA05             COMMON DATA
 0140   REF  14  LAST  197      05,2223   52755 1               -6DNADR DSPTAB               DSPTAB+0...+11D TABLE

R0141       -----------------  SUB-LISTS  ----------------------------

 0142   REF   2  LAST  196      05,2127                 LMCSTA01 EQUALS LMDR8M01             COMMON DOWNLIST DATA

 0143   REF   2  LAST  196      05,2136                 LMCSTA02 EQUALS LMDR8M02             COMMON DOWNLIST DATA

 0144   REF   2  LAST  196      05,2145                 LMCSTA03 EQUALS LMDR8M03             COMMON DOWNLIST DATA

 0145   REF   2  LAST  196      05,2154                 LMCSTA04 EQUALS LMDR8M04             COMMON DOWNLIST DATA

 0146   REF   2  LAST  196      05,2157                 LMCSTA05 EQUALS LMDR8M05             COMMON DOWNLIST DATA

 0147   REF   1                 05,2224   05700 0       LMCSTA06 2DNADR X789                 X789+0...+3                COMMON DATA
 0148   REF   3  LAST  198      05,2225   77665 1               -1DNADR LASTYCMD             LASTYCMD,LASTXCMD
 0149   REF   2  LAST  124      05,2226   12737 1       LMCSTA07 3DNADR DGC                  DGC,+1,IGC,+1,MGC,+1       COMMON DATA
 0150   REF   2  LAST  125      05,2227   02755 1                1DNADR BESTI                BESTI,BESTJ
 0151   REF   2  LAST  125      05,2230   12760 0                3DNADR STARSAV1             STARSAV1+0...+5
 0152   REF   3  LAST  129      05,2231   65011 1               -3DNADR STARSAV2             STARSAV2+0...+5
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R0153        -----------------------------------------------------------
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P0154   LM RENDEZVOUS AND PRE-THRUST DOWNLIST

R0155        -----------------  CONTROL LIST  --------------------------

 0156                          05,2232               LMRENDCL EQUALS                SEND ID BY SPECIAL CODING
 0157   REF   1                05,2232   32127 1              DNPTR   LMRENDO1      COLLECT SNAPSHOT
 0158   REF   7  LAST  198     05,2233   24340 0              6DNADR  DNTMBUFF      SEND SNAPSHOT
 0159   REF   1                05,2234   32276 0              DNPTR   LMREND07      COLLECT SNAPSHOT
 0160   REF   8  LAST  200     05,2235   14340 0              4DNADR  DNTMBUFF      SEND SNAPSHOT
 0161   REF   2  LAST  196     05,2236   03451 1              1DNADR  DELLT4        DELLT4,+1
 0162   REF   3  LAST  196     05,2237   13443 0              3DNADR  RTARG         RTARG+0...+5
 0163   REF   1                05,2240   13433 1              3DNADR  DELVSLV       DELVSLV+0...+5
 0164   REF   2  LAST  196     05,2241   03633 1              1DNADR  TCSI          TCSI,+1
 0165   REF   2  LAST  196     05,2242   12266 0              3DNADR  DELVEET1      DELVEET+0-..+5
 0166   REF   3  LAST  196     05,2243   00007 0              1DNADR  SPARE
 0167   REF   2  LAST  196     05,2244   03630 1              1DNADR  TPASS4        TPASS4,+1
 0168   REF   1                05,2245   32224 1              DNPTR   LMREND06      COMMON DATA
 0169   PEF   1                05,2246   32136 1              DNPTR   LMREND02      COMMON DATA
 0170   PEF   3  LAST  198     05,2247   00024 1              1DNADR  TIME2         TIME2/1
 0171   REF   1                05,2250   32145 0              DNPTR   LMREND03      COLLECT SNAPSHOT
 0172   REF   9  LAST  200     05,2251   24340 0              6DNADR  DNTMBUFF      SEND SNAPSHOT
 0173   REF   1                05,2252   32154 0              DNPTR   LMREND04      COMMON DATA
 0174   PEF   3  LAST  198     05,2253   07115 0              2DNADR  POSTORKL      POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0176   REF   4  LAST  200     05,2254   00007 0              1DNADR  SPARE
 0177   REF   2  LAST  196     05,2255   01776 0              1DNADR  TCDH          TCDH,+1
 0178   REF   2  LAST  196     05,2256   12274 0              3DNADR  DELVEET2      DELVEET2+0.. +5
 0179   REF   2  LAST  196     05,2257   03635 1              1DNADR  TTPI          TTPI,+1
 0180   REF   2  LAST  196     05,2260   12365 1              3DNADR  DELVEET3      DELVEET3+0...+5
 0181   REF   2  LAST  196     05,2261   02256 1              1DNADR  ELEV          ELEV,+1
 0182   REF   2  LAST  198     05,2262   04036 0              2DNADR  CDUS          CDUS,PIPAX,PIPAY,PIPAZ
 0183   REF   4  LAST  198     05,2263   00112 0              1DNADR  LASTYCMD      LASTYCMD,LASTXCMD
 0184   REF   3  LAST  198     05,2264   01326 1              1DNADR  LEMMASS       LEMMASS,CSMMASS
 0185   REF  34  LAST  198     05,2265   01277 1              1DNADR  IMODES30      IMODES30,IMODES33
 0186   REF   3  LAST  198     05,2266   03441 0              1DNADR  TIG           TIG,+1
 0187   REF   1                05,2267   32157 0              DNPTR   LMREND05      COMMON DATA
 0188   REF   5  LAST  200     05,2270   00007 0              1DNADR  SPARE
 0189   REF   1                05,2271   03620 0              1DNADR  CENTANG       CENTANG,+1
 0190   REF   1                05,2272   03466 0              1DNADR  NN            NN,+1
 0191   REF   2  LAST  196     05,2273   03577 1              1DNADR  DIFFALT       DIFFALT,+1
 0192   REF   1                05,2274   02347 0              1DNADR  DELVTPF       DELVTPF,+1
 0193   REF   6  LAST  200     05,2275   77770 1             -1DNADR  SPARE

R0194        -----------------  SUB-LISTS  --------------------------

 0195   REF   3  LAST  198     05,2127               LMREND01 EQUALS LMORBM01       COMMON DOWNLIST DATA

 0196   REF   3  LAST  198     05,2136               LMREND02 EQUALS LMORBM02       COMMON DOWNLIST DATA

 0197   REF   3  LAST  198     05,2145               LMREND03 EQUALS LMORBM03       COMMON DOWNLIST DATA
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L        DOWNLINK LISTS                                                              USER'S PAGE NO.   7       EC S4

 0198    REF   3  LAST  198   05,2154               LMREND04 EQUALS LMORBM04        COMMON DOWNLIST DATA

 0199    REF   3  LAST  198   05,2157               LMREND05 EQUALS LMORBM05        COMMON DOWNLIST DATA

 0200    REF   1              05,2224               LMREND06 EQUALS LMCSTA06        COMMON DOWNLIST DATA

 0201    REF   1              05,2276   74320 0   LMREND07-1DNADR AIG               AIG,AMG                 SNAPSHOT
 0202    REF   1              05,2277   03461 1            1DNADR AOG               AOG,TRKMKCNT
 0203    REF   2  LAST  148   05,2300   03752 1            1DNADR TANGNB            TANGNB,+1
 0204    REF   2  LAST  148   05,2301   03754 1            1DNADR MKTIME            MKTIME,+1
 0205    REF   2  LAST  148   05,2302   74017 1           -1DNADR RANGRDOT          DNRRANGE,DNRRDOT
R0206        ------------------------------------------------------------
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L        DOWNLINK LISTS                                                                         USER'S PAGE NO.   8      EQ S4

P0207    LM DESCENT AND ASCENT DOWNLIST

R0208          -----------------  CONTROL LIST  --------------------------

 0209                               05,2303                  LMDSASDL EQUALS                  SEND ID BY SPECIAL CODING
 0210    REF    1                   05,2303   32341 0                 DNPTR   LMDSAS07        COLLECT SNAPSHOT
 0211    REF    1                   05,2304   32355 0                 DNPTR   LMDSAS08        SEND SNAPSHOT
 0212    REF    3  LAST   198       05,2305   01341 0                 1DNADR  TEVENT          TEVENT,+1
 0213    REF    2  LAST   137       05,2306   13252 0                 3DNADR  UNFC/2          UNFC/2+0...+5
 0214    REF    2  LAST   154       05,2307   13645 1                 3DNADR  VGVECT          VGVECT+0...+5
 0215    REF    2  LAST   151       05,2310   03642 1                 1DNADR  TTF/8           TTF/8,+1
 0216    REF    2  LAST   152       05,2311   03664 0                 1DNADR  DELTAH          DELTAH,+1
 0217    REF    2  LAST   198       05,2312   12022 1                 3DNADR  RLS             RLS+0...+5
 0220    REF    2  LAST   120       05,2313   02276 0                 1DNADR  ZDOTD           ZDOTD,+1
 0221    REF    1                   05,2314   32224 1                 DNPTR   LMDSAS09        COMMON DATA
 0222    REF    1                   05,2315   32136 1                 DNPTR   LMDSAS02        COMMON DATA
 0223    REF    4  LAST   200       05,2316   00024 1                 1DNADR  TIME2           TIME2/1
 0224    REF    1                   05,2317   32145 0                 DNPTR   LMDSAS03        COLLECT SNAPSHOT
 0225    REF   10  LAST   200       05,2320   24340 0                 6DNADR  DNTMBUFF        SEND SNAPSHOT
 0226    REF    1                   05,2321   32154 0                 DNPTR   LMDSAS04        COMMON DATA
 0227    REF    4  LAST   200       05,2322   07115 0                 2DNADR  POSTORKU        POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0229    REF    2  LAST   123       05,2323   12626 0                 3DNADR  RGU             RGU+0...+5
 0230    REF    2  LAST   151       05,2324   13626 1                 3DNADR  VGU             VGU+0...+5
 0231    REF    2  LAST   151       05,2325   13634 1                 3DNADR  LAND            LAND+0...+5
 0232    REF    2  LAST   120       05,2326   02262 0                 1DNADR  AT              AT,+1
 0233    REF    2  LAST   122       05,2327   02400 1                 1DNADR  TLAND           TLAND,+1
 0234    REF    2  LAST   151       05,2330   03615 0                 1DNADR  FC              FC,GARBAGE
 0235    REF    5  LAST   200       05,2331   00112 0                 1DNADR  LASTYCMD        LASTYCMD,LASTXCMD
 0236    REF    4  LAST   200       05,2332   01326 1                 1DNADR  LEMMASS         LEMMASS,CSMMASS
 0237    REF   35  LAST   200       05,2333   01277 1                 1DNADR  IMODES30        IMODES30,IMODES33
 0238    REF    4  LAST   200       05,2334   03441 0                 1DNADR  TIG             TIG,+1
 0239    REF    1                   05,2335   32157 0                 DNPTR   LMDSAS05        COMMON DATA
 0240    REF    1                   05,2336   32170 0                 DNPTR   LMDSAS06        COMMON DATA
 0241    REF    2  LAST   151       05,2337   03614 1                 1DNADR  PSEUDO55        PSEUDO55,GARBAGE
 0242    REF    3  LAST   156       05,2340   74324 1                -1DNADR  TTOGO           TTOGO,+1
R0243          -----------------  SUB-LISTS  --------------------------
                                                                                   HAS CDUS
 0244    REF    4  LAST   200       05,2136                  LMDSAS02 EQUALS LMORBM02         COMMON DOWNLIST DATA

 0245    REF    4  LAST   200       05,2145                  LMDSAS03 EQUALS LMORBM03         COMMON DOWNLIST DATA

 0246    REF    4  LAST   201       05,2154                  LMDSAS04 EQUALS LMORBM04         COMMON DOWNLIST DATA

 0247    REF    4  LAST   201       05,2157                  LMDSAS05 EQUALS LMORBM05         COMMON DOWNLIST DATA

 0248    REF    2  LAST   196       05,2170                  LMDSAS06 EQUALS LMORBM06         COMMON DOWNLIST DATA

 0249    REF    2  LAST   120       05,2341   75441 1        LMDSAS07-1DNADR  LRZCDUDL        LRZCDUDL,GARBAGE                SNAPSHOT
 0250    REF    2  LAST   151       05,2342   03651 0                 1DNADR  VSELECT         VSELECT,GARBAGE
 0251    REF    1                   05,2343   02337 1                 1DNADR  LRVTIMDL        LRVTIMDL,+1
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L        DOWNLINK LISTS                                                                 USER'S PAGE NO.   9       E0 S4

 0252    REF   2  LAST  151    05,2344   03652 0               1DNADR VMEAS            VMEAS,+1
 0253    REF   3  LAST  201    05,2345   03754 1               1DNADR MKTIME           MKTIME, +1
 0254    REF   2  LAST  151    05,2346   03654 0               1DNADR HMEAS            HMEAS,+1
 0255    REF   3  LAST  153    05,2347   03756 0               1DNADR RM               RM,+1
 0256    REF   2  LAST  201    05,2350   03457 1               1DNADR AIG              AIG,AMG
 0257    REF   2  LAST  201    05,2351   03461 1               1DNADR AOG              AOG,TRKMKCNT
 0258    REF   3  LAST  201    05,2352   03752 1               1DNADR TANGNB           TANGNB,+1
 0259    REF   4  LAST  203    05,2353   03754 1               1DNADR MKTIME           MKTIME,+1
 0260    REF   2  LAST  120    05,2354   75443 0              -1DNADR LRXCDUDL         LRXCDUDL,LRYCDUDL

 0261    REF  11  LAST  202    05,2355   24340 0  LMDSAS08 6DNADR DNTMBUFF         SEND SNAPSHOT
 0262    REF  12  LAST  203    05,2356   57423 0              -5DNADR DNTMBUFF +12D

 0263    REF   2  LAST  201    05,2224            LMDSAS09 EQUALS LMCSTA06         COMMON DOWNLIST DATA

R0264          -------------------------------------------------------
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P0265   LM LUNAR SURFACE ALIGN DOWNLIST

R0266        -----------------  CONTROL LIST  -------------------------

 0267                             05,2357                LMLSALDL EQUALS                      SEND ID BY SPECIAL CODING
 0268   REF   1                   05,2357   32127 1               DNPTR   LMLSAL01            COLLECT SNAPSHOT
 0269   REF  13   LAST  203       05,2360   24340 0               6DNADR  DNTMBUFF            SEND SNAPSHOT
 0270   REF   1                   05,2361   32276 0               DNPTR   LMLSAL07            COLLECT SNAPSHOT
 0271   REF  14   LAST  204       05,2362   14340 0               4DNADR  DNTMBUFF            SEND SNAPSHOT
 0272   REF   3   LAST  198       05,2363   02774 1               1DNADR  TALIGN              TALIGN,+1
 0273   REF   3   LAST  198       05,2364   25733 1               6DNADR  REFSMMAT            REFSMMAT+0...+11D
 0274   REF   2   LAST  197       05,2365   26236 1               6DNADR  YNBSAV              YNBSAV+0...+5,ZNBSAV+0...+5
 0275   REF   1                   05,2366   32224 1               DNPTR   LMLSAL08            COMMON DATA
 0276   REF   1                   05,2367   32136 1               DNPTR   LMLSAL02            COMMON DATA
 0277   REF   5   LAST  202       05,2370   00024 1               1DNADR  TIME2               TIME/1
 0278   REF   1                   05,2371   32145 0               DNPTR   LMLSAL03            COLLECT SNAPSHOT
 0279   REF  15   LAST  204       05,2372   24340 0               6DNADR  DNTMBUFF            SEND SNAPSHOT
 0280   REF   1                   05,2373   32154 0               DNPTR   LMLSAL04            COMMON DATA
 0281   REF   1                   05,2374   32226 0               DNPTR   LMLSAL09            COMMON DATA
 0282   REF   4   LAST  197       05,2375   12230 0               3DNADR  GSAV                GSAV+0...+5
 0283   REF   2   LAST  198       05,2376   02020 1               1DNADR  AGSK                AGSK,+1
 0284   REF   6   LAST  202       05,2377   00112 0               1DNADR  LASTYCMD            LASTYCMD,LASTXCMD
 0285   REF   5   LAST  202       05,2400   01326 1               1DNADR  LEMMASS             LEMMASS,CSMMASS
 0286   REF  36   LAST  202       05,2401   01277 1               1DNADR  IMODES30            IMODES30,IMODES33
 0287   REF   5   LAST  202       05,2402   03441 0               1DNADR  TIG                 TIG,+1
 0288   REF   1                   05,2403   32157 0               DNPTR   LMLSAL05            COMMON DATA
 0289   REF   1                   05,2404   32170 0               DNPTR   LMLSAL06            COMMON DATA
 0290   REF   7   LAST  200       05,2405   00007 0               1DNADR  SPARE
 0291   REF   8   LAST  204       05,2406   77770 1              -1DNADR  SPARE

R0292        -----------------  SUB-LISTS  ----------------------------

 0293   REF   4   LAST  200       05,2127                LMLSAL01 EQUALS LMORBM01            COMMON DOWNLIST DATA

 0294   REF   5   LAST  202       05,2136                LMLSAL02 EQUALS LMORBM02            COMMON DOWNLIST DATA

 0295   REF   5   LAST  202       05,2145                LMLSAL03 EQUALS LMORBM03            COMMON DOWNLIST DATA

 0296   REF   5   LAST  202       05,2154                LMLSAL04 EQUALS LMORBM04            COMMON DOWNLIST DATA

 0297   REF   5   LAST  202       05,2157                LMLSAL05 EQUALS LMORBM05            COMMON DOWNLIST DATA

 0298   REF   3   LAST  202       05,2170                LMLSAL06 EQUALS LMORBM06            COMMON DOWNLIST DATA

 0299   REF   2   LAST  200       05,2276                LMLSAL07 EQUALS LMREND07            COMMON DOWNLIST DATA

 0300   REF   3   LAST  203       05,2224                LMLSAL08 EQUALS LMCSTA06            COMMON DOWNLIST DATA

 0301   REF   2   LAST  198       05,2226                LMLSAL09 EQUALS LMCSTA07            COMMON DOWNLIST DATA
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R0302        ----------------------------------------------------------------
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L       DOWNLINK LISTS                                                                              USER'S PAGE NO. 12      EO S4

PD303   LM AGS INITIALIZATION AND UPDATE DOWNLIST

RD304       -----------------  CONTROL LIST  --------------------------

 0305                           05,2407                 LMAGSIDL EQUALS                      SEND ID BY SPECIAL CODING
 0306   REF   2  LAST  118      05,2407   12200 0                3DNADR AGSBUFF +0           AGSBUFF+0...+5
 0307   REF   3  LAST  206      05,2410   02214 1                1DNADR AGSBUFF +12D         AGSBUFF+12D,GARBAGE
 0308   REF   4  LAST  206      05,2411   12201 1                3DNADR AGSBUFF +1           AGSBUFF+1...+6
 0309   REF   5  LAST  206      05,2412   02215 0                1DNADR AGSBUFF +13D         AGSBUFF+13D,GARBAGE
 0310   REF   6  LAST  206      05,2413   12206 0                3DNADR AGSBUFF +6           AGSBUFF+6...+11
 0311   REF   7  LAST  206      05,2414   02214 1                1DNADR AGSBUFF +12D         AGSBUFF+12,GARBAGE
 0312   REF   8  LAST  206      05,2415   12207 1                3DNADR AGSBUFF +7           AGSBUFF+7...+12D
 0313   REF   9  LAST  206      05,2416   02215 0                1DNADR AGSBUFF +13D         AGSBUFF+13D,GARBAGE
 0314   REF   2  LAST  104      05,2417   25167 0                6DNADR COMPNUMB             COMPNUMB,UPOLDMOD,UPVERB,UPCOUNT,
A0315                                                                                        UPBUFF+0...+7
 0316   REF   1                 05,2420   25203 1                6DNADR UPBUFF +8D           UPBUFF +8D...+19D
 0317   REF   1                 05,2421   32136 1                DNPTR  LMAGSI02             COMMON DATA
 0318   REF   6  LAST  204      05,2422   00024 1                1DNADR TIME2                TIME2/1
 0319   REF   1                 05,2423   32145 0                DNPTR  LMAGSI03             COLLECT SNAPSHOT
 0320   REF  16  LAST  204      05,2424   24340 0                6DNADR DNTMBUFF             SEND SNAPSHOT
 0321   REF   1                 05,2425   32154 0                DNPTR  LMAGSI04             COMMON DATA
 0322   REF   5  LAST  202      05,2426   07115 0                2DNADR POSTORKU             POSTORKU,NEGTORKU,POSTORKV,NEGTORKV
 0324   REF   9  LAST  204      05,2427   00007 0                1DNADR SPARE
 0325   REF  10  LAST  206      05,2430   00007 0                1DNADR SPARE
 0326   REF   3  LAST  204      05,2431   02020 1                1DNADR AGSK                 AGSK,+1
 0327   REF   2  LAST  206      05,2432   25173 0                6DNADR UPBUFF               UPBUFF+0...+11D
 0328   REF   3  LAST  206      05,2433   15207 0                4DNADR UPBUFF +12D          UPBUFF+12D...+19D
 0329   REF   6  LAST  204      05,2434   01326 1                1DNADR LEMMASS              LEMMASS,CSMMASS
 0330   REF  37  LAST  204      05,2435   01277 1                1DNADR IMODES30             IMODES30,IMODES33
 0331   REF  11  LAST  206      05,2436   00007 0                1DNADR SPARE
 0332   REF   1                 05,2437   32157 0                DNPTR  LMAGSI05             COMMON DATA
 0333   REF  15  LAST  198      05,2440   52755 1               -6DNADR DSPTAB               DSPTAB+0...+11D

R0334       -----------------  SUB-LISTS  ---------------------------

 0335   REF   6  LAST  204      05,2136                 LMAGSI02 EQUALS LMORBM02             COMMON DOWNLIST DATA

 0336   REF   6  LAST  204      05,2145                 LMAGSI03 EQUALS LMORBM03             COMMON DOWNLIST DATA

 0337   REF   6  LAST  204      05,2154                 LMAGSI04 EQUALS LMORBM04             COMMON DOWNLIST DATA

 0338   REF   6  LAST  204      05,2157                 LMAGSI05 EQUALS LMORBM05             COMMON DOWNLIST DATA

R0339       ---------------------------------------------------------

 0340   REF   2  LAST  195      05,2441   02172 1       DNTABLE  GENADR LMCSTADL             LM COAST AND ALIGN DOWNLIST
 0341   REF   3  LAST  195      05,2442   02407 0                GENADR LMAGSIDL             LM AGS INITIALIZATION/UPDATE DOWNLIST
 0342   REF   1                 05,2443   02232 0                GENADR LMRENDDL             LM RENDEZVOUS AND PRE-THRUST DOWNLIST
 0343   REF   1                 05,2444   02066 0                GENADR LMORBMDL             LM ORBITAL MANEUVERS DOWNLIST
 0344   REF   1                 05,2445   02303 0                GENADR LMDSASDL             LM DESCENT AND ASCENT DOWNLIST
 0345   REF   1               05,2446   02357 1          GENADR LMLSALDL        LM LUNAR SURFACE ALIGN DOWNLIST
R0346    ------------------------------------------------------------
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L        AGS INITIALIZATION                                                      USER'S PAGE NO.   1        E0 S4

R0001    PROGRAM NAME:    AGS INITIALIZATION (R47)

R0002    WRITTEN BY   :   RHODE / KILROY / FOLLETT

R0003    MOD NO.  :       0
R0004    DATE     :       23 MARCH 1967
R0005    MOD BY   :       KILROY

R0006    MOD NO.  :       1
R0007    DATE     :       28 OCTOBER 1967
R0008    MOD BY   :       FOLLETT

R0009    FUNCT. DESC.:    (1) TO PROVIDE THE AGS ABORT ELECTRONICS ASSEMBLY(AEA) WITH THE LEM AND CSM STATE VECTORS
R0011                     (POSITION,VELOCITY,TIME) IN LEM IMU COORDINATES BY MEANS OF THE LGC DIGITAL DOWNLINK.

R0013                     (2) TO ZERO THE ICDU, LGC AND AEA GIMBAL ANGLE COUNTERS SIMULTANEOUSLY IN ORDER TO ESTABLISH A
R0015                     COMMON ZERO REFERENCE FOR THE MEASUREMENT OF GIMBAL(EULER) ANGLES WHICH DEFINE LEM ATTITUDE
R0019                     (3) TO ESTABLISH THE GROUND ELAPSED TIME OF AEA CLOCK ZERO.(IF AN AEA CLOCK ZERO IS
R0021                     REQUESTED DURING THIS PROGRAM

R0022    LOG SECTION :    AGS INITIALIZATION

R0023    CALLING SEQ :    PROGRAM IS ENTERED WHEN ASTRONAUT KEYS V47E ON DSKY.
R0024                     R47 MAY BE CALLED AT ANY TIME EXCEPT WHEN ANOTHER EXTENDED VERB IS IN PROGRESS

R0026    SUBROUTINES
R0027    CALLED       :

R0028    NORMAL EXIT :    ENDEXT

R0029    ALARM/ABORT :    ALARM - BAD REFSMMAT - CODE:220
R0030                     OPERATOR ERROR IF V47 SELECTED DURING ANOTHER EXTENDED VERB.

R0032    ERASABLES
R0033    USED         :   SAMPTIME     (2) TIME OF :ENTER: KEYSTROKE
R0034                     AGSK         (2) GROUND ELAPSED TIME OF THE AEA CLOCK :ZERO:
R0036                     AGSBUFF    (140) CONTAINS AGS INITIALIZATION DATA (SEE :OUTPUT: BELOW)
R0038                     AGSWORD      (1) PREVIOUS DOWNLIST SAVED HERE

 0039    REF  10  LAST  206   E4,1600                      EBANK= AGSBUFF

 0040                         40,2000                      BANK    40
 0041    REF   1              32,2000                      SETLOC  R47
 0042                         32,2005                      BANK

 0043    REF   1                                           COUNT*  $$/R47

 0044    REF   1              32,2005  3 4737 0  AGSINIT   CAF     REFSMBIT
 0045    REF   1              32,2006  7 0077 0            MASK    FLAGWRD3          CHECK REFSMFLG.
 0046    REF  36  LAST  193   32,2007  1 0000 0            CCS     A
 0047    REF    1                32,2010   0 2017 0            TC      REDSPTEM         REFSMMAT IS OK
 0048    REF    8  LAST   187    32,2011   0 5567 0            TC      ALARM            REFSMMAT IS BAD
 0049                            32,2012    00220 1            OCT     220
 0050    REF    1                32,2013   0 5472 0            TC      ENDEXT

 0061                            32,2014   0 0006 1  NEWAGS    EXTEND
 0062    REF    1                32,2015   3 0014 1            DCA     SAMPTIME         TIME OF THE :ENTER: KEYSTROKE
 0063    REF    4  LAST   206    32,2016   53421 0             DXCH    AGSK             BECOMES NEW AEA CLOCK :ZERO:

 0064                            32,2017   0 0006 1  REDSPTEM  EXTEND
 0065    REF    5  LAST   209    32,2020   3 1421 1            DCA     AGSK
 0066    REF    2  LAST   102    32,2021   53051 0             DXCH    DSPTEMX
 0067    REF    1                32,2022   3 2172 1  AGSDISPK  CAF     V06N16
 0068    REF    1                32,2023   0 4616 1            TC      BANKCALL         R1 = 00XXX. HRS., R2 = 000XX MIN.,
 0069    REF    1                32,2024    20334 1            CADR    GOMARKF          R3 = 0XX.XX SEC.
 0070    REF    2  LAST   209    32,2025   0 5472 0            TC      ENDEXT           TERMINATE RETURN
 0071    REF    1                32,2026   0 2036 0            TC      AGSVCALC         PROCEED   RETURN
 00711   REF   22  LAST   182    32,2027   4 4746 1            CS      BIT6             IS ENTER VIA A V32
 00712   REF   12  LAST    98    32,2030   6 0154 1            AD      MPAC
 00713                           32,2031   0 0006 1            EXTEND
 00714   REF    1                32,2032   1 2014 1            BZF     NEWAGS           YES, USE KEYSTROKE TIME FOR NEW AGSK

 0072                            32,2033   0 0006 1            EXTEND                   NO, NEW AGSK LOADED VIA V25
 0073    REF    3  LAST   209    32,2034   3 1051 1            DCA     DSPTEMX          LOADED INTO DSPTEMX BY KEYING
 0074    REF    2  LAST   209    32,2035   0 2016 1            TC      REDSPTEM -1      V25E FOLLOWED BY HRS.,MINS.,SECS
A0075                                                                                   DISPLAY THE NEW K

 0076    REF    1                32,2036   0 6042 1  AGSVCALC  TC      INTPRET
 00761                           32,2037    77614 1            SET
 00762   REF    1                32,2040    01076 1                    NODOFLAG         DONT ALLOW V37
 0077                            32,2041    77414 0            SET     EXIT
 0078    REF    1                32,2042    02076 1                    XDSPFLAG

 0079    REF    2  LAST   209    32,2043   3 2172 1            CAF     V06N16
 00795   REF    2  LAST   209    32,2044   0 4616 1            TC      BANKCALL
 00796   REF    1                32,2045    20621 0            CADR    EXDSPRET

 0082    REF    2  LAST   209    32,2046   0 6042 1            TC      INTPRET          EXTRAPOLATE LEM AND CSM STATE VECTORS
 0083                            32,2047    77634 0            RTB                      TO THE PRESENT TIME
 0084    REF    1                32,2050    21574 1                    LOADTIME         LOAD MPAC WITH TIME2,TIME1
 0085    REF    1                32,2051    34041 0            STCALL  TDEC1            CALCULATE LEM STATE VECTOR
 0086    REF    2  LAST    37    32,2052    27056 1                    LEMPREC
 0087                            32,2053    77624 1            CALL                     CALL ROUTINE TO CONVERT TO SM COORDS AND
 0088    REF    1                32,2054    64132 0                    SCALEVEC         PROVIDE PROPER SCALING
 0089    REF   11  LAST   208    32,2055    16201 0            STODL   AGSBUFF          (LEMPREC AND CSMPREC LEAVE TDEC1 IN TAT)
 0090    REF    1                32,2056    00015 0                    TAT              TAT = TIME TO WHICH RATT1 AND VATT1 ARE
 0091    REF    2  LAST   209    32,2057    34041 0            STCALL  TDEC1            COMPUTED(CSEC SINCE CLOCK START 8-28).
 0092    REF    2  LAST    37    32,2060    27042 1                    CSMPREC          CALCULATE CSM STATE VECTOR FOR SAME TIME
 0093                            32,2061    77624 1            CALL
 0094    REF    2  LAST   209    32,2062    64132 0                    SCALEVEC
 0095   REF  12  LAST  209   32,2063   16207 0             STODL  AGSBUFF +6
 0096   REF   2  LAST  210   32,2064   00015 0                    TAT
 0097                        32,2065   56225 1             DSU    DDV                CALCULATE AND STORE THE TIME
 0098   REF   6  LAST  209   32,2066   02021 0                    AGSK
 0099   REF   1              32,2067   24175 1                    TSCALF
 0100   REF  13  LAST  210   32,2070   02215 0             STORE  AGSBUFF +12D
 0101                        32,2071   77776 1             EXIT

 0102   REF   1              32,2072  3 4753 1             CAF    LAGSLIST
 0103   REF   2  LAST   99   32,2073  54 333 0             TS     DNLSTCOD

 0104   REF   1              32,2074  3 2176 0             CAF    20SEC              DELAY FOR 20 SEC WHILE THE AGS
 0105   REF   3  LAST  209   32,2075  0 4616 1             TC     BANKCALL           DOWNLIST IS TRANSMITTED
 0106   REF   1              32,2076   01736 1             CADR   DELAYJOB

 0107   REF   1              32,2077  3 1321 0             CA     AGSWORD
 0108   REF   3  LAST  210   32,2100  54 333 0             TS     DNLSTCOD           RETURN TO THE OLD DOWNLIST
 0109   REF   3  LAST  168   32,2101  3 4744 1             CAF    IMUSEBIT
 0110   REF   6  LAST  187   32,2102  7 0074 0             MASK   FLAGWRD0           CHECK IMUSE FLAG.
 0111   REF  37  LAST  208   32,2103  10 000 0             CCS    A
 0112   REF   1              32,2104  0 2122 1             TC     AGSEND             IMU IS BEING USED - DO NOT ZERO
 01121  REF   1              32,2105  11'301 0  CKSTALL    CCS    IMUCADR            CHECK FOR IMU USAGE WHICH AVOIDS THE
 01122                       32,2106  1 2111 0             TCF    +3                 IMUSE BIT:  I. E., IMU COMPENSATION.
 01123                       32,2107  1 2115 1             TCF    +6                 FREE.  GO AHEAD WITH THE IMU ZERO.
 01124                       32,2110  1 2111 0             TCF    +1
 01125  REF   1              32,2111  3 4363 0     +3      CAF    TEN                WAIT .1 SEC AND TRY AGAIN.
 01126  REF   4  LAST  210   32,2112  0 4616 1             TC     BANKCALL
 01127  REF   2  LAST  210   32,2113   01736 1             CADR   DELAYJOB
 01128  REF   1              32,2114  1 2105 0             TCF    CKSTALL

 0113   REF   5  LAST  210   32,2115  0 4616 1     +6      TC     BANKCALL           IMU IS NOT IN USE
 0114   REF   1              32,2116   16705 1             CADR   IMUZERO            SET IMU ZERO DISCRETE FOR 320MSECS
 0115   REF   6  LAST  210   32,2117  0 4616 1             TC     BANKCALL           WAIT 3SEC FOR COUNTERS TO INCREMENT
 0116   REF   1              32,2120   17707 1             CADR   IMUSTALL
 0117   REF   2  LAST  210   32,2121  0 2122 1             TC     AGSEND
 0118   REF   1              32,2122  0 5516 0  AGSEND     TC     DOWNFLAG           ALLOW V37
 0119   REF   2  LAST  209   32,2123   00054 0             ADRES  NODOFLAG

 0120   REF   1              32,2124  3 2173 0             CAF    V50N16
 0121   REF   7  LAST  210   32,2125  0 4616 1             TC     BANKCALL
 01211  REF   1              32,2126   20342 0             CADR   GOMARK3
 01212  REF   3  LAST  209   32,2127  1 5472 1             TCF    ENDEXT
 01213  REF   4  LAST  210   32,2130  1 5472 1             TCF    ENDEXT
 0122   REF   5  LAST  210   32,2131  0 5472 0             TC     ENDEXT

 0127                        32,2132   64375 1  SCALEVEC   VLOAD  MXV
 0128   REF   1              32,2133   00025 0                    VATT1
 0129   REF   4  LAST  204   32,2134   01734 0                    REFSMMAT
 0130                        32,2135   72561 0             VXSC   VSL2
 0131   REF   1              32,2136   24202 1                    VSCALE
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L          AGS INITIALIZATION                                                                          USER'S PAGE NO.   4       E4 S3

 01311                                32,2137    53255 0               VAC      VAC                  THIS SECTION ROUNOS THE VECTOR, AND
 01312   REF    1                     32,2140    24204 1                        AGSRN01              CORRECTS FOR THE FACT THAT THE AGS
 01313   REF    1                     32,2141    24212 0                        AGSRN02              IS A 2 S COMPLIMENT MACHINE WHILE THE
 01314                                32,2142    77634 0               RTB                           LGC IS A 1 S COMPLIMENT MACHINE.
 01315   REF    1                     32,2143    21773 1                        VECSGNAG
 0132    REF    2  LAST   210         32,2144    24025 0               STOVL    VATT1
 0133    REF    1                     32,2145    C0017 1                        RATT1
 0134                                 32,2146    74321 1               MXV      VXSC
 0135    REF    5  LAST   210         32,2147    01734 0                        REFSMMAT
 0136    REF    1                     32,2150    24200 0                        RSCALE
 0137                                 32,2151    53212 0               VSL8     VAO                  AGAIN THIS SECTION ROUNDS. TWO VECTORS
 01371   REF    2  LAST   211         32,2152    24204 1                        AGSRN01              ARE AOOEO TO DEFEAT ALSIGNAG IN THE
 01372                                32,2153    47055 1               VAD      RTB                  CASE OF A HIGH-ORDER ZERO COUPLED WITH
 01373   REF    2  LAST   211         32,2154    24212 0                        AGSRN02              A LOW OROER NEGATIVE RAFT.
 01374   REF    2  LAST   211         32,2155    21773 1                        VECSGNAG
 01375                                32,2156    77750 0               LXA,1
 0138    REE    3  LAST   211         32,2157    00024 1                        VATT1
 0139                                 32,2160    72130 0               SXA,1    LXA,1
 0140    REF   13  LAST   209         32,2161    00155 0                        MPAC +1
 0141    REF    4  LAST   211         32,2162    00026 0                        VATT1  +2
 0142                                 32,2163    72130 0               SXA,1    LXA,1
 0143    REF   14  LAST   211         32,2164    00160 0                        MPAC +4
 0144    REF    5  LAST   211         32,2165    CC03C 1                        VATT1  +4
 0145                                 32,2166    43530 0               SXA,1    RVQ
 0146    REE   15  LAST   211         32,2167    00162 1                        MPAC +6

 0147    REF    6  LAST   185            4753            LAGSLIST =             ONE
 0148                                 32,2170    00216 1   V01N14      VN       0114
 01485                                32,2171    144CC C   V50N00A     VN       5000
 0149    REF    1                        6010              V00N25      EQUALS   OCT31
 01495                                32,2172    01420 0   V06N16      VN       0616
 01496   REF    1                        4242              V00N34      EQUALS   34DEC
 01497                                32,2173    14420 1   V50N16      VN       5016
 0150                                 32,2174    03100 0   TSCALE      2DEC     100B-10              CSEC TO SEC SCALE FACTOR
 0150                                 32,2175    C0000 1
 0151                                 32,2176    03720 1   20SEC       DEC      2000
 0152                                 32,2177    15077 0   RSCALE      2DEC     3.280839 B-?         METERS TO FEET SCALE FACTOR
 0152                                 32,2200    05041 1
 0153                                 32,2201    24402 1   VSCALE      2DEC     3.280839 E2 8-9 METERS/CS TO FEET/SEC SCALE FACTOR
 0153                                 32,2202    25724 1
 01531                                32,2203    00000 1   AGSRND1     2OCT     0000060000
 01531                                32,2204    60000 1
 01532                                32,2205    00000 1               2OCT     0000060000
 01532                                32,2206    60000 1
 01533                                32,2207    00000 1               2OCT     0000060000
 01533                                32,2210    60000 1
 01534                                32,2211    00000 1   AGSRND2     2OCT     0000037777
 01534                                32,2212    37777 1
 01535                                32,2213    00000 1               2OCT     0000037777
 01535                                32,2214    37777 1
 01536                       32,2215   00000 1            2OCT    00000037777
 01536                       32,2216   37777 1
 0154    REF    1            30,2000                      SBANK= LOWSUPER         FOR SUBSEQUENT LOW 2CADRS.
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R00743
 0075                           10,2000                        BANK    10
 0076   REF   2  LAST    43     05,2000                        SETLOC  FRANDRES
 0077                           05,2447                        BANK

 0078   REF   3  LAST   156     E3,1400                        EBANK=  LST1

 0079   REF   2 LAST    43 TC    43:       1       1*          COUNT*  $$/START            FRESH AND RESTART
 0080                           05,2447   0 0004 0   SLAP1     INHINT                      FRESH START. COMES HERE FROM PINBALL
 0081   REF   1                 05,2450   0 3105 0             TC      STARTSUB            SUBROUTINE DOES MOST OF THE WORK.

 0082   REF   1                 05,2451   1 2456 0   STARTSW   TCF     SKIPSIM             PATCH....TCF STARTSIM...FOR SIMULATION
 0083   REF  22  LAST   176     05,2452   3 4736 1   STARTSIM  CAF     BIT14
 0084   REF   1                 05,2453   0 5105 0             TC      FINDVAC
 0085                           05,2454    77777 0   SIM2CADR  OCT     77777               PATCH 2CADR (AND EBANK DESIGNATION) OF
 0086                           05,2455    77777 0             OCT     77777               SIMULATION START ADDRESS.

 0087   REF  16  LAST   206     05,2456   3 1035 0   SKIPSIM   CA      DSPTAB +11D
 00871  REF   1                 05,2457   7 4771 0             MASK    BITS4&6             TURN OFF ALL DSPTAB +11D LAMPS
 00872  REF  17  LAST   174     05,2460   6 4735 1             AD      BIT15               EXCEPT THE GIMBAL LOCK & NO ATT ONLY ON
 0088   REF  17  LAST   213     05,2461   55'035 1             TS      DSPTAB +11D         REQUESTED FRESH START.

 0093   REF   7  LAST   193     05,2462   3 4755 1             CA      ZERO
 00931  REF   2  LAST   109     05,2463   55'365 1             TS      ERCOUNT
 009315 REF   1                 05,2464   54 375 1             TS      FAILREG
 00932  REF   2  LAST   213     05,2465   54 376 1             TS      FAILREG +1
 009325 REF   3  LAST   213     05,2466   54 377 0             TS      FAILREG +2
 00933  REF   2  LAST   196     05,2467   54 320 1             TS      REDOCTR

 009335 REF   1                 05,2470   4 4644 1             CS      PRIO12
 00934  REF   9  LAST   162     05,2471   55'310 0             TS      DSRUPTSW

 0094   REF  23  LAST   213     05,2472   3 4736 1   DOFSTART  CAF     BIT14               INSURE ENGINE IS OFF.
 0095                           05,2473   0 0006 1             EXTEND
 0096   REF   7  LAST   182     05,2474   01 011 0             WRITE   DSALMOUT
 0097   REF   8  LAST   213     05,2475   4 4755 0             CS      ZERO
 0098   REF   1                 05,2476   54 055 0             TS      THRUST

 0099   REF   1                 05,2477   3 4751 0   DOFSTRT1  CAF     FOUR
 0100   REF   1                 05,2500   55'262 1             TS      RCSFLAGS            INITIALIZE ATTITUDE ERROR DISPLAYS.
 0101   REF   2  LAST   176     05,2501   3 4355 0             CA      PRIO30
 0102   REF   1                 05,2502   54 366 0             TS      RESTREG             SUPER BANK PRIORITY FOR DISPLAYS.

 0103   REF   9  LAST   213     05,2503   3 4755 1             CA      ZERO
 0104   REF   2  LAST   105     05,2504   55'245 1             TS      ABDELV              DAP INITIALIZATION
 0105   REF   1                 05,2505   54 371 0             TS      NVSAVE
 0106   REF   1                 05,2506   55'071 1             TS      EBANKTEM
 0107   REF   6  LAST   194     05,2507   55'257 1             TS      CH5MASK
 0108   REF   5  LAST   194     05,2510   55'260 0             TS      CH6MASK
 0109   REF   7  LAST   194     05,2511   55'273 1             TS      PVALVEST            FOR RCS FAILURE MONITOR
 0110   REF   2  LAST  108   05,2512   55'360 1          TS      FRESTORE          ***** MUST NOT BE REMOVED FROM DOFSTART
 0111   REF   2  LAST  108   05,2513   55'362 0          TS      SMODE             ***** MUST NOT BE REMOVED FROM DOFSTART
 0112   REF   4  LAST  210   05,2514   54 333 0          TS      DNLSTCOD          SELECT POO DOWNLIST
 0113   REF   2  LAST  210   05,2515   55'321 1          TS      AGSWORD           ALLOW AGS INITIALIZATION
 0114   REF   2  LAST  111   05,2516   55'501 0          TS      UPSVFLAG          ZERO UPDATE STATE VECTOR REQUEST FLAGWRD
 0115                        05,2517   0 0006 1          EXTEND
 0116   REF   1              05,2520   01 005 0          WRITE   CHAN5             TURN OFF RCS JETS.
 0117                        05,2521   0 0006 1          EXTEND
 0118   REF   1              05,2522   01 006 0          WRITE   CHAN6             TURN OFF RCS JETS.
 0119                        05,2523   0 0006 1          EXTEND
 0120   REF  14  LAST  189   05,2524   01 012 0          WRITE   CHAN12 -
 0121                        05,2525   0 0006 1          EXTEND
 0122   REF   1              05,2526   01 013 1          WRITE   CHAN13
 0123                        05,2527   0 0006 1          EXTEND
 0124   REF   3  LAST  177   05,2530   01 014 0          WRITE   CHAN14
 0125   REF  18  LAST  213   05,2531   4 1035 1          CS      DSPTAB +11D
 0126   REF   2  LAST  213   05,2532   7 4771 0          MASK    BITS4&6
 0127   REF  38  LAST  210   05,2533   10 000 0          CCS     A
 0128                        05,2534   0 2540 1          TC      +4
 0129   REF   3  LAST  214   05,2535   3 4771 1          CA      BITS4&6
 0130                        05,2536   0 0006 1          EXTEND                    THE IMU WAS IN COARSE ALIGN IN GIMBAL
 0131   REF  15  LAST  214   05,2537   05 012 1          WOR     CHAN12            LOCK, SO PUT IT BACK INTO COARSE ALIGN.
 0132   REF   1              05,2540   0 2641 0    +4    TC      MR.KLEAN

 0133   REF  10  LAST  213   05,2541   4 4755 0          CS      ZERO
 0134   REF   1              05,2542   55'010 0          TS      MODREG

 0135   REF   1              05,2543   3 3373 0          CAF     IM30INIF          FRESH START IMU INITIALIZATION.
 0136   REF  38  LAST  206   05,2544   55'277 0          TS      IMODES30

 0137   REF   1              05,2545   3 3065 1          CAF     MAXDB
 0138   REF   1              05,2546   55'343 0          TS      DB
 0139   REF   2  LAST  213   05,2547   3 4751 0          CAF     FOUR
 0140   REF   1              05,2550   55'322 1          TS      RATEINDX          INITIALIZE KALCMANU RATE
 0141   REF   1              05,2551   3 3061 0          CA      BOOLSTRT
 0142   REF   1              05,2552   54 111 1          TS      DAPBOOLS
 0143   REF   1              05,2553   3 5015 0          CAF     EBANK6
 0144   REF   1              05,2554   54 003 0          TS      EBANK
 0145   REF   1              06,1400                     EBANK=  HIASCENT

 01451  REF   1              05,2555   3 3056 1          CA      STIKSTRT
 01452  REF   1              05,2556   55'444 0          TS      STIKSENS
 01453  REF   1              05,2557   3 3057 0          CA      RATESTRT
 01454  REF   2  LAST  131   05,2560   55'476 1          TS      -RATEDB
 0146   REF   1              05,2561   3 2000 0          CAF     FULLAPS           INITIALIZE MAXIMUM ASCENT MASS FOR USE
 0147   REF   2  LAST  214   05,2562   55'400 0          TS      HIASCENT            BY 1/ACCS UNTIL THE PAD LOAD IS DONE.
 0148   REF   1              05,2563   3 3062 0          CA      77001OCT              LOAD DAP FILTER GAINS PAD LOAD
 0149   REF   1              05,2564   55'403 0          TS      DKTRAP                TO BEST PRESENT ESTIMATE OF GOODIES
 0150   REF   1              05,2565   55'406 0          TS      LMTRAP            .14 DEG
 0151   REF   1              05,2566   3 3063 1          CA      60DEC
 0152   REF   1              05,2567  55'405 0           TS      DKKADSN
 0153   REF   1              05,2570  55'410 1           TS      LMKADSN         6 SEC GAIN FOR ALPHA
 0154   REF  11  LAST  214   05,2571  3 4755 1           CA      ZERO
 0155   REF   1              05,2572  55'407 1           TS      LMOMEGAN        UNITY GAIN
 0156   REF   2  LAST  210   05,2573  3 4363 0           CA      TEN
 0157   REF   1              05,2574  55'404 1           TS      DKOMEGAN        1 SEC GAIN FOR OMEGA
 0158   REF  17  LAST  193   05,2575  3 4744 1           CAF     BIT8            SET DOCKED DB TO 1.4 DEG.  MAY OVERWRITE
 0159   REF   1              05,2576  55'411 0           TS      DKDB              WITH PAD LOAD.
 0160   REF   1              05,2577  3 5026 0           CAF     IM33INIT
 0161   REF  23  LAST  209   05,2600  6 4746 0           AD      BIT6            KEEP BOTH DAP AND ERROR-NEEDLES DISPLAY
 0162   REF  16  LAST  183   05,2601  55'300 1           TS      IMODES33          OFF UNTIL ICDU ZERO IS FINISHED.

 0163                        05,2602  0 0006 1           EXTEND                  INITIALIZE SWITCHES ONLY ON FRESH START.
 0164   REF   1              05,2603  3 3400 0           DCA     SWINIT
 0165   REF  17  LAST  197   05,2604  52 075 1           DXCH    STATE
 0166   REF   2  LAST  215   05,2605  3 3401 1           CA      SWINIT +2
 0167   REF  18  LAST  215   05,2606  54 076 1           TS      STATE +2
 0168   REF   2  LAST  208   05,2607  3 4737 0           CA      REFSMBIT        DO NOT ALTER REFSMFLG ON FRESH START.
 0169   REF  19  LAST  215   05,2610  7 0077 0           MASK    STATE +3
 0170   REF   3  LAST  215   05,2611  6 3402 1           AD      SWINIT +3
 0171   REF  20  LAST  215   05,2612  54 077 0           TS      STATE +3
 0172                        05,2613  0 0006 1           EXTEND
 0173   REF   4  LAST  215   05,2614  3 3404 1           DCA     SWINIT +4
 0174   REF  21  LAST  215   05,2615  52 101 0           DXCH    STATE +4
 0175                        05,2616  0 0006 1           EXTEND
 0176   REF   5  LAST  215   05,2617  3 3406 0           DCA     SWINIT +6
 0177   REF  22  LAST  215   05,2620  52 103 1           DXCH    STATE +6
 0178   REF   1              05,2621  3 4744 1           CA      SURFFBIT        DO NOT ALTER SURFFLAG ON FRESH START.
 0179   REF   1              05,2622  6 4740 0           AD      CMOONBIT                    CMOONFLG
 0180   REF   1              05,2623  6 4741 1           AD      LMOONBIT                    LMOONFLG
 0181   REF  23  LAST  215   05,2624  7 0104 0           MASK    STATE +8D
 0182   REF   6  LAST  215   05,2625  6 3407 1           AD      SWINIT +8D
 0183   REF  24  LAST  215   05,2626  54 104 0           TS      STATE +8D
 0184   REF   7  LAST  215   05,2627  3 3410 1           CA      SWINIT +9D
 0185   REF  25  LAST  215   05,2630  54 105 1           TS      STATE +9D
 0186   REF   1              05,2631  3 4737 0           CA      APSFLBIT        DO NOT ALTER APSFLAG ON FRESH START.
 0187   REF  26  LAST  215   05,2632  7 0106 1           MASK    STATE +10D
 0188   REF   8  LAST  215   05,2633  6 3411 0           AD      SWINIT +10D
 0189   REF  27  LAST  215   05,2634  54 106 1           TS      STATE +10D
 0190   REF   9  LAST  215   05,2635  3 3412 0           CAF     SWINIT +11D
 0191   REF  28  LAST  215   05,2636  54 107 0           TS      STATE +11D

 0192   REF   2  LAST  167   05,2637  0 4635 0  ENDRSTRT TC      POSTJUMP        NOW IN ANOTHER BANK.
 0193   REF   1              05,2640   03211 0           CADR    DUMMYJOB + 2    PICKS UP AT PELINT.   (DONT ZERO NEWJOB)

 0194                        05,2641  0 0004 0  MR.KLEAN INHINT
 0195                        05,2642  0 0006 1           EXTEND
 0196   REF   2  LAST  159   05,2643  3 4755 1           DCA     NEG0
 0197   REF   1              05,2644  52 754 0           DXCH    -PHASE2
 0198                             05,2645  0 0006 1  P00KLEAN EXTEND
 0199    REF    3  LAST  215      05,2646  3 4755 1           DCA     NEG0
 0200    REF    1                 05,2647  52 760 1           DXCH    -PHASE4
 0201                             05,2650  0 0006 1  V37KLEAN EXTEND
 0202    REF    4  LAST  216      05,2651  3 4755 1           DCA     NEG0
 0203    REF    1                 05,2652  52 762 0           DXCH    -PHASE5
 0204                             05,2653  0 0006 1  ABTKLEAN EXTEND
 0205    REF    5  LAST  216      05,2654  3 4755 1           DCA     NEG0
 0206    REF    1                 05,2655  52 756 1           DXCH    -PHASE3
 0207                             05,2656  0 0006 1           EXTEND
 0208    REF    6  LAST  216      05,2657  3 4755 1           DCA     NEG0
 0209    REF    1                 05,2660  52 752 0           DXCH    -PHASE1
 0210                             05,2661  0 0006 1           EXTEND
 0211    REF    7  LAST  216      05,2662  3 4755 1           DCA     NEG0
 0212    REF    1                 05,2663  52 764 0           DXCH    -PHASE6
 0213    REF   14  LAST  194      05,2664  0 0002 0           TC      Q
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P0214              COMES HERE FROM LOCATION 4000, GOJAM. RESTART ANY PROGRAMS WHICH MAY HAVE BEEN RUNNING AT THE TIME

 0215  REF   4  LAST  213   E3,1400                         EBANK= LST1
 0217  REF   3  LAST  213   05,2665   24 320 0   GOPROG    INCR    REDOCTR            ADVANCE RESTART COUNTER.

 0218  REF  15  LAST  216   05,2666   22 002 0             LXCH    Q
 0219                       05,2667   0 0006 1             EXTEND
 0220  REF   1              05,2670   04 007 1             RDR     SUPERBNK
 0221  REF   2  LAST  197   05,2671   53'433 0             DXCH    RSBBQ
 0222  REF  19  LAST  214   05,2672   3 1035 0             CA      DSPTAB +11D
 0223  REF  15  LAST  173   05,2673   7 4750 0             MASK    BIT4
 0224                       05,2674   0 0006 1             EXTEND
 0225                       05,2675   1 2701 1             BZF     +4
-0226  REF  24  LAST  215   05,2676   6 4746 0             AD      BIT6               SET ERROR COUNTER ENABLE
 0227                       05,2677   0 0006 1             EXTEND
 0228  REF  16  LAST  214   05,2700   05 012 1             WOR     CHAN12 -           ISS WAS IN COARS ALIGN SO GO BACK TO
 0229  REF   1              05,2701   0 3066 1   BUTTONS   TC      LIGHTSET

R0230                                                ERASCHK TEMPORARILY STORES THE CONTENTS OF TWO ERASABLE LOCATIONS, X
R0232                                                AND X+1 INTO SKEEP5 AND SKEEP6. IT ALSO STORES X INTO SKEEP7 AND
R0234                                                ERESTORE. IF ERASCHK IS INTERRUPTED BY A RESTART, C(ERESTORE) SHOULD
R0236                                                EQUAL C(SKEEP7),AND BE A + NUMBER LESS THAN 2000 OCT. OTHERWISE
R0238                                                C(ERESTORE) SHOULD EQUAL +0.

 0239  REF   2  LAST  159   05,2702   3 4350 0             CAF     HI5
 0240  REF   3  LAST  214   05,2703   7 1360 1             MASK    ERESTORE
 0241                       05,2704   0 0006 1             EXTEND
 0242                       05,2705   1 2707 1             BZF     +2                 IF ERESTORE NOT = +0 OR +N LESS THAN 2K,
 0243  REF   1              05,2706   1 3103 1             TCF     NONAVKEY +3        DO FRESH START - E MEMORY MIGHT BE BAD
 0244  REF   4  LAST  217   05,2707   4 1360 1             CS      ERESTORE
 0245                       05,2710   0 0006 1             EXTEND
 0246  REF   1              05,2711   1 2726 1             BZF     DORSTART           = +0 CONTINUE WITH RESTART.
 0247  REF   1              05,2712   6 1377 0             AD      SKEEP7
 0248                       05,2713   0 0006 1             EXTEND
 0249                       05,2714   1 2716 1             BZF     +2                 = SKEEP7, RESTORE E MEMORY.
 0250  REF   2  LAST  217   05,2715   1 3103 1             TCF     NONAVKEY +3        DO FRESH START - E MEMORY MIGHT BE BAD
 0251  REF   2  LAST  109   05,2716   3 1374 0             CA      SKEEP4
 0252  REF   2  LAST  214   05,2717   54 003 0             TS      EBANK              EBANK OF E MEMORY THAT WAS UNDER TEST-
 0253                       05,2720   0 0006 1             EXTEND                     (NOT DXCH SINCE THIS MIGHT HAPPEN AGAIN)
 0254  REF   2  LAST  109   05,2721   3 1376 1             DCA     SKEEP5
 0255  REF   2  LAST  217   05,2722   51'377 0             INDEX   SKEEP7
 0256                       05,2723   52 001 1             DXCH    0000               E MEMORY RESTORED.
 0257  REF  12  LAST  215   05,2724   3 4755 1             CA      ZERO
 0258  REF   5  LAST  217   05,2725   55'360 1             TS      ERESTORE
 0259  REF   2  LAST  213   05,2726   0 3105 0   DORSTART  TC      STARTSUB           DO INITIALIZATION AFTER ERASE RESTORE

 0271  REF   1              05,2727   4 4736 0   SETINFL   CS      INTFLBIT
 0272  REF   2  LAST   82   05,2730   7 0106 1             MASK    FLGWRD10
 0273  REF   3  LAST  217   05,2731   54 106 1             TS      FLGWRD10
 0274   REF   1                05,2732   3 3375 0                CA       9,6,4            LEAVE PROG ALARM,GIMBAL LOCK, NO ATT
 0275   REF  20   LAST   217   05,2733   7 1035 1                MASK     DSPTAB +110      LAMPS INTACT ON HARDWARE RESTART
 0276   REF  18   LAST   213   05,2734   6 4735 1                AD       BIT15
 0277   REF  21   LAST   218   05,2735   57'035 0                XCH      DSPTAB +110
 0278   REF   1                05,2736   3 3361 0                CAF      IFAILINH         LEAVE IMU FAILURE INHIBITS INTACT ON
 0279   REF  39   LAST   214   05,2737   7 1277 0                MASK     IMODES30         HARDWARE RESTART. RESET ALL FAILURE
 0280   REF   1                05,2740   6 3374 1                AD       IM30INIR         CODES.
 0281   REF  40   LAST   218   05,2741   55'277 0                TS       IMODES30

 0282   REF   3   LAST   214   05,2742   3 1321 0                CA       AGSWORD          BE SURE OF CORRECT DOWNLIST
 0283   REF   5   LAST   214   05,2743   54 333 0                TS       DNLSTCOD

 0284   REF  16   LAST   217   05,2744   3 4750 1                CA       BIT4             TURN ON THROTTLE COUNTER
 0285                          05,2745   0 0006 1                EXTEND
 0286   REF   4   LAST   214   05,2746   05 014 1                WOR      CHAN14           TURN ON THRUST DRIVE
 0287   REF   5   LAST   188   05,2747   4 0101 0                CS       FLAGWRD5
 0288   REF   2   LAST   176   05,2750   7 4745 1                MASK     ENGONBIT
 0289   REF  39   LAST   214   05,2751   10 000 0                CCS      A
 0290                          05,2752   1 2757 1                TCF      +5
 0291   REF  16   LAST   170   05,2753   3 4737 0                CAF      BIT13
 0292                          05,2754   0 0006 1                EXTEND
 0293   REF   8   LAST   213   05,2755   05 011 1                WOR      DSALMOUT         TURN ENGINE ON
 0294   REF   1                05,2756   1 2773 1                TCF      GORROG3
 0295   REF  24   LAST   213   05,2757   3 4736 1      +5        CAF      BIT14
 0296                          05,2760   0 0006 1                EXTEND
 0297   REF   9   LAST   218   05,2761   05 011 1                WOR      DSALMOUT         TURN ENGINE OFF.
 0298   REF   2   LAST   218   05,2762   1 2773 1                TCF      GORROG3

 0299                          05,2763   0 0004 0   ENEMA        INHINT
 0300   REF   1                05,2764   0 3114 0                TC       STARTSB1
 0301   REF   1                05,2765   1 2767 1                TCF      GOPROG2A
 0302   REF   1                05,2766   0 3157 1   GORROG2      TC       STARTSB2
 0303   REF   2   LAST   217   05,2767   0 3066 1   GOPROG2A     TC       LIGHTSET
 0304   REF   1                05,2770   4 3064 1                CS       PSFLGBTS         CLEAR BITS 7 AND 14.
 0305   REF   4   LAST   217   05,2771   7 0106 1                MASK     FLGWRD10
 0306   REF   5   LAST   218   05,2772   54 106 1                TS       FLGWRD10

 0307   REF   1                05,2773   3 4756 1   GORROG3      CAF      NUMGRPS          VERIFY RHASE TABLE AGREEMENTS
 0308   REF  16   LAST   211   05,2774   54 161 0   PCLOOR       TS       MPAC +5
 0309                          05,2775   6 0000 1                DOUBLE
 0310                          05,2776   0 0006 1                EXTEND
 0311   REF  40   LAST   218   05,2777   5 0000 1                INDEX    A
 0312   REF   2   LAST   216   05,3000   3 0752 1                CCA      -RHASE1          COMPLEMENT INTO A, DIRECT INTO L.
 0313                          05,3001   0 0006 1                EXTEND
 0314   REF   7   LAST   184   05,3002   06 001 0                RXCR     LCHAN            RESULT MUST BE -0 FOR AGREEMENT.
 0315   REF  41   LAST   218   05,3003   10 000 0                CCS      A
 0316   REF   1                05,3004   1 3052 1                TCF      PTBAD            RESTART FAILURE.
 0317   REF   2   LAST   218   05,3005   1 3052 1                TCF      RTBAD
 0318   REF   3   LAST   218   05,3006   1 3052 1                TCF      RTBAD
 0319   REF  17  LAST  218   05,3007  10 161 0            CCS     MPAC +5        PROCESS ALL RESTART GROUPS.
 0320   REF   1              05,3010   1 2774 0            TCF     PCLOOP

 0321   REF  18  LAST  219   05,3011  54 162 0            TS      MPAC +6        SET TO +0.
 0322   REF   1              05,3012   0 5315 0            TC      MMDSPLAY       DISPLAY MAJOR MODE

 0323                        05,3013   0 0004 0            INHINT                 RELINT DONE IN MMDSPLAY

 0324   REF   1              05,3014   4 4736 0            CS      DIDFLBIT       CLEAR DIDFLAG IN ORDER TO FORCE R10 TO
 0325   REF   1              05,3015   7 0075 1            MASK    FLAGWRD1       RE-INITIALIZE ITSELF IF IT HAD BEEN
 0326   REF   2  LAST  219   05,3016  54 075 1            TS      FLAGWRD1       OPERATING AT THE TIME OF THE RESTART.

 03262  REF   1              05,3017   4 4740 1            CS      RODFLBIT       CLEAR RODFLAG.  IF P66 IS IN OPERATION
 03264  REF   3  LAST  219   05,3020   7 0075 1            MASK    FLAGWRD1            IT WILL RE-INITIALIZE ITSELF AND
 03266  REF   4  LAST  219   05,3021  54 075 1            TS      FLAGWRD1            CONTINUE.

 03267  REF   1              05,3022   4 4741 0            CS      P21FLBIT       CLEAR P21FLAG SO THAT P21 WILL COMPUTE
 03268  REF   7  LAST  210   05,3023   7 0074 0            MASK    FLAGWRD0       NEW BASE STATE VECTORS.
 03269  REF   8  LAST  219   05,3024  54 074 0            TS      FLAGWRD0

 0327   REF   2  LAST  218   05,3025   3 4756 1            CAF     NUMGRPS        SEE IF ANY GROUPS RUNNING.
 0328   REF  19  LAST  219   05,3026  54 161 0  NXTRST     TS      MPAC +5
 0329                        05,3027   6 0000 1            DOUBLE
 0330   REF  42  LAST  218   05,3030  50 000 1            INDEX   A
 0331   REF   1              05,3031  10 752 0            CCS     PHASE1
 0332   REF   1              05,3032   1 3034 1            TCF     PACTIVE        PNZ - GROUP ACTIVE.
 0333   REF   1              05,3033   1 3041 0            TCF     PINACT         +0 - GROUP NOT RUNNING.

 0334   REF  20  LAST  219   05,3034  54 154 0  PACTIVE    TS      MPAC
 0335   REF  21  LAST  219   05,3035  24 154 1            INCR    MPAC           ABS OF PHASE.
 0336   REF  22  LAST  219   05,3036  24 162 1            INCR    MPAC +6        INDICATE GROUP DEMANDS PRESENT.
 0337   REF   1              05,3037   3 3060 1            CA      RACTCADR
 0338   REF   1              05,3040   0 4622 0            TC      SWCALL         MUST RETURN TO SWRETURN.

 0339   REF  23  LAST  219   05,3041  10 161 0  PINACT     CCS     MPAC +5        PROCESS ALL RESTART GROUPS.
 0340   REF   1              05,3042   1 3026 1            TCF     NXTRST

 0341   REF  24  LAST  219   05,3043  10 162 0            CCS     MPAC +6        NO, CHECK PHASE ACTIVITY FLAG
 0342   REF   1              05,3044   1 2637 0            TCF     ENDRSTRT       PHASE ACTIVE
 0343   REF  19  LAST  218   05,3045   3 4735 1            CAF     BIT15          IS MODE -0
 0344   REF   2  LAST  214   05,3046   7 1010 0            MASK    MODREG
 0345                        05,3047   0 0006 1            EXTEND
 0346   REF   1              05,3050   1 6001 1            BZF     GOTOPOOH       NO
 0347   REF   2  LAST  219   05,3051   1 2637 0            TCF     ENDRSTRT       YES
 0348   REF   9  LAST  209   05,3052   0 5567 0  PTBAD      TC      ALARM          SET ALARM TO SHOW PHASE TABLE FAILURE.
 0349                        05,3053    01107 0            OCT     1107

 0350   REF   1              05,3054   1 2477 0            TCF     DOFSTRT1

R0351   ******** ****** ******
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R0352
R0353    DO NOT USE GOPROG2 OR ENEMA WITHOUT CONSULTING POOH PEOPLE
R0354
 0355    REF  17  LAST  218        4737              OCT10000 =       BIT13
 0356    REF   3  LAST  213        4355              OCT30000 =       PRIO30
 0357                        05,3055   07777 1  OCT7777  OCT      7777
 03571                       05,3056   32321 0  STIKSTRT DEC      0.825268       20 D/S MAXIMUM COMMANDED RATE
 03572                       05,3057   77445 1  RATESTRT DEC      -218
 0358    REF   1             05,3060   03527 1  RACTCADR CADR     RESTARTS
 0359                        05,3061   21322 1  BOOLSTRT OCT      21322
 0360                        05,3062   77001 0  77001OCT OCT      77001          .14 DEG SCALED AT 4.5 DEG
 0361                        05,3063   00074 1  60DEC    DEC      60
 0363                        05,3064   20100 1  RSFLGBTS OCT      20100
 03631                       05,3065   03434 1  MAXDB    OCTAL    03434          5 DEG ATTITUDE DEADBAND, SCALED AT 45

 0364    REF  14  LAST  168  05,3066  3 4747 1  LIGHTSET CAF      BIT5           CHECK FOR MARK REJECT AND ERROR RESET
 0365                        05,3067  0 0006 1           EXTEND
 0366    REF   1             05,3070  02 016 1           RAND     NAVKEYIN
 0367                        05,3071  0 0006 1           EXTEND
 0368    REF   3  LAST  217  05,3072  1 3100 1           BZF      NONAVKEY       NO MARK REJECT
 0369                        05,3073  0 0006 1           EXTEND
 0370    REF   1             05,3074  00 015 0           READ     MNKEYIN        CHECK IF KEYS 2M AND 5M ON
 0371    REF   1             05,3075  6 3372 1           AD       -ELR           MAIN DSKY KEYCODE(BITS 1-5)
 0372                        05,3076  0 0006 1           EXTEND
 0373                        05,3077  1 3101 0           BZF      +2

 0374    REF  16  LAST  217  05,3100  0 0002 0  NONAVKEY TC       Q

 0375    REF   3  LAST  217  05,3101  0 3105 0           TC       STARTSUB
 0376    REF   1             05,3102  1 2472 0           TCF      DOFSTART
 03762   REF   4  LAST  220  05,3103  0 3105 0     +3    TC       STARTSUB
 03764   REF   2  LAST  219  05,3104  1 2477 0           TCF      DOFSTRT1       DO FRESH START BUT DON'T TOUCH ENGINE
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P0377              INITIALIZATION COMMON TO BOTH FRESH START AND RESTART.

 0378   REF   5  LAST  194    E6,1536   .                   EBANK=  AOSC
 0379   REF   1               05,3105  3 3362 0  STARTSLB CAF     LDNPHAS1        SET POINTER SO NEXT 20MS DOWNRUPT WILL
 0380   REF   2  LAST   99    05,3106  54 335 0           TS      DNTMGOTO        CAUSE THE CURRENT DOWNLIST TO BE
A0381                                                                             INTERRUPTED AND START SENDING FROM THE
A0382                                                                             BEGINNING OF THE CURRENT DOWNLIST.
 0383   REF  25  LAST  217    05,3107  3 4746 0           CAF     BIT6
 0384                         05,3110  0 0006 1           EXTEND
 0385   REF   3  LAST  184    05,3111  02 033 0           RAND    CHAN33
 0386   REF   1               05,3112  6 3376 0           AD      RMODINIT
 0387   REF  15  LAST  197    05,3113  54 110 0           TS      RADMODES

 0388   REF   2  LAST  173    05,3114  3 4733 1  STARTSB1 CAF     POSMAX
 0389   REF   1               05,3115  54 026 1           TS      TIME3
 0390   REF   1               05,3116  6 7751 0           AD      MINUS2
 0391   REF   4  LAST  162    05,3117  54 027 0           TS      TIME4
 0392   REF   1               05,3120  6 7752 0           AD      NEGONE
 0393   REF   1               05,3121  54 030 0           TS      TIME5

 0394   REF   2  LAST  214    05,3122  3 5015 0           CAF     FBANK6
 0395   REF   3  LAST  217    05,3123  54 003 0           TS      EBANK

 0396   REF  18  LAST  220    05,3124  4 4737 1           CS      BIT13           CAUSE DAPIDLER TO CALL 1/ACCS
 03961  REF   2  LAST  213    05,3125  7 1262 1           MASK    RCSFLAGS
 0397   REF   3  LAST  221    05,3126  55'262 1           TS      RCSFLAGS        ZERO BIT 13
 03971  REF   3  LAST  221    05,3127  3 4733 1           CAF     POSMAX          DISABLE TIME6 CLOCK.  JUST IN CASE A T6
 03972  REF   1               05,3130  55'466 0           TS      T6NEXT            RUPT IS ALREADY IN THE PRIORITY CHAIN,
 03973                        05,3131  0 0006 1           EXTEND                    ENSURE THAT IT'S INPUTS WILL RENDER IT
 03974  REF   2  LAST  214    05,3132  03 013 0           WAND    CHAN13            INEFFECTUAL.
 0398   REF  13  LAST  217    05,3133  3 4755 1           CAF     ZERO
 0399   REF   1               05,3134  55'465 0           TS      NXT6ADR
 0400   REF   3  LAST  131    05,3135  55'472 0           TS      NEXTP

 0401   REF   1               05,3136  4 4751 1           CS      ACCSOKAY
 0402   REF   2  LAST  214    05,3137  7 0111 1           MASK    DAPBOOLS
 0403   REF   3  LAST  221    05,3140  54 111 1           TS      DAPBOOLS

 0404                         05,3141  0 0006 1           EXTEND                  SET T5RUPT FOR DAPIDLER PROGRAM.
 0405   REF   1               05,3142  3 3360 1           DCA     IDLEADR
 0406   REF   2  LAST  155    05,3143  53'264 1           DXCH    T5ADR

 04061  REF   1               05,3144  4 0107 0           CS      FLGWRD11        IF R12 IS PERMITTED, ENSURE THAT NEXT
 04062  REF   1               05,3145  7 4735 0           MASK    LRBYBIT          RADAR READS ARE NOT USED
 04063                        05,3146  0 0006 1           EXTEND
 040635 REF   2  LAST  218    05,3147  1 3157 0           BZF     STARTSB2        R12 OFF

 04064  REF  10  LAST  156    05,3150  24 006 1           INCR    BBANK           SET EBANK TO 7
 04065  REF   2  LAST  152    E7,1674                     EBANK=  STILBADH
 04066  REF   3  LAST  221    05,3151  11'674 1           CCS     STILBADH        IF STILBADH>0,NEXT READ WILL BE IGNORED
 04067                            05,3152  1 3154 0             TCF      +2
 040675 REF    4  LAST   221      05,3153  25'674 0             INCR     STIL8ADH         SET STIL8ADH TO IGNORE NEXT READ

 04068  REF    2  LAST   152      05,3154  11'675 0   +2        CCS      STIL8ADV
 04069  REF    3  LAST   221      05,3155  1 3157 0             TCF      STARTS82         IF STIL8ADV >0,NEXT READ WILL BE IGNORED
 040695 REF    3  LAST   222      05,3156  25'675 1             INCR     STIL8ADV         SET STIL8ADV TO IGNORE NEXT READ

 0407   REF    1                  05,3157  3 3371 1  STARTS82   CAF      OCT30001         DURING SOFTWARE RESTART, DO NOT DISTURB
 0408                             05,3160  0 0006 1             EXTEND                    ENGINE ON, OFF AND ISS WARNING.
 0409   REF   10  LAST   218      05,3161  03 011 1             WAND     DSALMOUT

 04092  REF    1                  05,3162  4 4743 1             CS       READRBIT         CLEAR READRFLG FOR R29.
 04093  REF    2  LAST   208      05,3163  7 0077 0             MASK     FLAGWRD3
 04094  REF    3  LAST   222      05,3164  54 077 0             TS       FLAGWRD3

 0410   REF    4  LAST   222      05,3165  4 0077 0             CS       FLAGWRD3         DURING SOFTWARE RESTART,CLEAR TURNON,
 0411   REF    1                  05,3166  7 4741 0             MASK     NR29FBIT         REPOSITION,CDU ZERO AND REMODE BITS
 0412                             05,3167  0 0006 1             EXTEND                    IN RADMODES,SINCE TASKS ASSOCIATED
 0413                             05,3170  1 3172 1             BZF      +2               WITH THESE BITS HAVE BEEN KILLED
 0414   REF   16  LAST   181      05,3171  3 4742 1             CAF      BIT10            ALSO IF R29 HAD BEEN REQUESTED,
 0415   REF    1                  05,3172  6 3365 1             AD       OCT32001         (NOR29FLG = 0) CLEAR BIT 10 RADMODES
 0416                             05,3173  4 0000 0             COM                       TO MAKE R29 FORGET IT HAD STARTED
 0417   REF   16  LAST   221      05,3174  7 0110 0             MASK     RADMODES         DESIGNATING
 0418   REF   17  LAST   222      05,3175  54 110 0             TS       RADMODES
 0419   REF    1                  05,3176  3 3367 0             CAF      OCT27470         DURING SOFTWARE RESTART, DO NOT DISTURB
 0420                             05,3177  0 0006 1             EXTEND                    IMU FLAGS. (COURSE ALIGN ENABLE, ZERO
 0421   REF   17  LAST   217      05,3200  03 012 1             WAND     CHAN12           IMU CDUS, ENABLE IMU COUNTER) AND GIMBAL
A0422                                                                                     TRIM DRIVES. LEAVE RR LOCKON ENABLE
A0423                                                                                     ALONE.

 04232  REF    2  LAST   188      05,3201  4 4750 0             CS       NORRMBIT         ENABLE R25.
 04234  REF    6  LAST   218      05,3202  7 0101 0             MASK     FLAGWRD5
 04236  REF    7  LAST   222      05,3203  54 101 0             TS       FLAGWRD5

 04237  REF    1                  05,3204  4 4741 0             CS       R77FLBIT         CLEAR R77FLAG
 04238  REF    8  LAST   222      05,3205  7 0101 0             MASK     FLAGWRD5
 04239  REF    9  LAST   222      05,3206  54 101 0             TS       FLAGWRD5
 0424   REF    1                  05,3207  3 3370 0             CAF      OCT74160         DURING SOFTWARE RESTART, DO NOT DUSTURB
 0425                             05,3210  0 0006 1             EXTEND                    TELEMETRY FLAGS, RESET TRAP FLAGS, AND
 0426   REF    3  LAST   221      05,3211  03 013 0             WAND     CHAN13           ENABLE T6RUPT FLAG.

 0427   REF   14  LAST    87      05,3212  3 4740 0             CAF      BIT12            REENABLE RUPT10 (RUPT QUICKLY
 0428                             05,3213  0 0006 1             EXTEND                      RESUMES EXCEPT DURING P64)
 0429   REF    4  LAST   222      05,3214  05 013 0             WOR      CHAN13

 0430   REF   26  LAST   221      05,3215  3 4746 0             CAF      BIT6             DURING SOFTWARE RESTART, DO NOT DISTURB
 0431                             05,3216  0 0006 1             EXTEND                    GYRO ENABLE FLAG.
 0432   REF    5  LAST   218      05,3217  03 014 1             WAND     CHAN14

 0433   REF    5  LAST   217      E3,1400                       EBANK=   LST1
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L       FRESH START AND RESTART                                          USER'S PAGE NO. 11      E2 S3

 0434   REF   1               05,3220   3 5007 0          CAF      STARTEB
 0435   REF   4  LAST  221    05,3221  54 003 0           TS       FBANK            SET FOR E3

 0436   REF   1               05,3222   3 4734 0          CAF      NEG1/2           INITIALIZE WAITLIST DELTA-TS.
 0437   REF   6  LAST  222    05,3223  55'407 1           TS       LST1 +7
 0438   REF   7  LAST  223    05,3224  55'406 0           TS       LST1 +6
 0439   REF   8  LAST  223    05,3225  55'405 0           TS       LST1 +5
 0440   REF   9  LAST  223    05,3226  55'404 1           TS       LST1  +4
 0441   REF  10  LAST  223    05,3227  55'403 0           TS       LST1  +3
 0442   REF  11  LAST  223    05,3230  55'402 1           TS       LST1  +2
 0443   REF  12  LAST  223    05,3231  55'401 1           TS       LST1  +1
 0444   REF  13  LAST  223    05,3232  55'400 0           TS       LST1

 0445   REF   1               05,3233   4 5236 1          CS       ENDTASK
 0446   REF   1               05,3234  55'410 1           TS       LST2
 0447   REF   2  LAST  223    05,3235  55'412 0           TS       LST2 +2
 0448   REF   3  LAST  223    05,3236  55'414 0           TS       LST2 +4
 0449   REF   4  LAST  223    05,3237  55'416 1           TS       LST2 +6
 0450   REF   5  LAST  223    05,3240  55'420 1           TS       LST2 +8D
 0451   REF   6  LAST  223    05,3241  55'422 0           TS       LST2 +10D
 0452   REF   7  LAST  223    05,3242  55'424 0           TS       LST2 +12D
 0453   REF   8  LAST  223    05,3243  55'426 1           TS       LST2 +14D
 0454   REF   9  LAST  223    05,3244  55'430 0           TS       LST2 +16D
 0455   REF   2  LAST  223    05,3245   4 5237 0          CS       ENDTASK +1
 0456   REF  10  LAST  223    05,3246  55'411 0           TS       LST2 +1
 0457   REF  11  LAST  223    05,3247  55'413 1           TS       LST2 +3
 0458   REF  12  LAST  223    05,3250  55'415 1           TS       LST2 +5
 0459   REF  13  LAST  223    05,3251  55'417 0           TS       LST2 +7
 0460   REF  14  LAST  223    05,3252  55'421 0           TS       LST2 +9D
 0461   REF  15  LAST  223    05,3253  55'423 1           TS       LST2 +11D
 0462   REF  16  LAST  223    05,3254  55'425 1           TS       LST2 +13D
 0463   REF  17  LAST  223    05,3255  55'427 0           TS       LST2 +15D
 0464   REF  18  LAST  223    05,3256  55'431 1           TS       LST2 +17D

 0465   REF  14  LAST  221    05,3257   4 4755 0          CS       ZERO             MAKE ALL EXECUTIVE REGISTER SETS
 0466   REF   1               05,3260  54 167 0           TS       PRIORITY         AVAILABLE.
 0467   REF   2  LAST  223    05,3261  54 203 1           TS       PRIORITY +12D
 0468   REF   3  LAST  223    05,3262  54 217 1           TS       PRIORITY +24D
 0469   REF   4  LAST  223    05,3263  54 233 1           TS       PRIORITY +36D
 0470   REF   5  LAST  223    05,3264  54 247 1           TS       PRIORITY +48D
 0471   REF   6  LAST  223    05,3265  54 263 1           TS       PRIORITY +60D
 0472   REF   7  LAST  223    05,3266  54 277 1           TS       PRIORITY +72D
 0473   REF   8  LAST  223    05,3267  54 313 1           TS       PRIORITY +84D

 0474   REF  10  LAST  213    05,3270  55'310 0           TS       DSRUPTSW
 0475   REF   1               05,3271  54 067 1           TS       NEWJOB           SHOWS NO ACTIVE JOBS.

 0476   REF   1               05,3272   3 3364 0          CAF      VAC1ADRC         MAKE ALL VAC AREAS AVAILABLE.
 0477   REF   1               05,3273  54 400 1           TS       VAC1USE
 0478   REF   1               05,3274   6 3366 1          AD       LTHVACA
```

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0479  REF   1                05,3275  54 454 0             TS       VAC2USE
0480  REF   2  LAST  223     05,3276   6 3366 1             AD       LTHVACA
0481  REF   1                05,3277  54 530 0             TS       VAC3USE
0482  REF   3  LAST  224     05,3300   6 3366 1             AD       LTHVACA
0483  REF   1                05,3301  54 604 1             TS       VAC4USE
0484  REF   4  LAST  224     05,3302   6 3366 1             AD       LTHVACA
0485  REF   1                05,3303  54 660 0             TS       VAC5USE

0486  REF   3  LAST  215     05,3304   3 4363 0             CAF      TEN
0487  REF  25  LAST  219     05,3305  54 154 0   DSPOFF    TS       MPAC                  R1,R2,R3).
0489  REF  15  LAST  222     05,3306   4 4740 1             CS       BIT12
0490  REF  26  LAST  224     05,3307  50 154 1             INDEX    MPAC
0491  REF  22  LAST  218     05,3310  55'022 1             TS       DSPTAB
0492  REF  27  LAST  224     05,3311  10 154 0             CCS      MPAC
0493  REF   1                05,3312   1 3305 0             TCF      DSPOFF

0494  REF   1                05,3313  55'323 0             TS       DELAYLOC
0495  REF   2  LAST  224     05,3314  55'324 1             TS       DELAYLOC +1
0496  REF   3  LAST  224     05,3315  55'325 0             TS       DELAYLOC +2
0497  REF   1                05,3316  55'073 0             TS       R1SAVE
0498  REF   1                05,3317  54 045 1             TS       INLINK
0499  REF   7  LAST  159     05,3320  54 775 0             TS       DSPCNT
0500  REF   1                05,3321  55'041 1             TS       CADRSTOR
0501  REF   1                05,3322  55'012 1             TS       REQRET
0502  REF   1                05,3323  55'014 1             TS       CLPASS
0503  REF   1                05,3324  55'011 1             TS       DSPLOCK
0504  REF   1                05,3325  55'017 1             TS       MONSAVE               KILL MONITOR
0505  REF   1                05,3326  55'020 0             TS       MONSAVE1
0506  REF   1                05,3327  55'000 1             TS       VERBREG
0507  REF   1                05,3330  55'001 0             TS       NOUNREG
0508  REF   1                05,3331  55'042 1             TS       DSPLIST
0509  REF   1                05,3332  55'307 0             TS       MARKSTAT
0510  REF   1                05,3333  55'043 0             TS       EXTVBACT              MAKE EXTENDED VERBS AVAILABLE
0511  REF   2  LAST  210     05,3334  55'301 0             TS       IMUCADR
0512  REF   1                05,3335  55'302 0             TS       OPTCADR
0513  REF   1                05,3336  55'303 1             TS       RADCADR
0514  REF   2  LAST  106     05,3337  55'304 0             TS       ATTCADR
0515  REF   1                05,3340  55'311 1             TS       LGYRO
0516  REF   1                05,3341  54 100 1             TS       FLAGWRD4              KILL INTERFACE DISPLAYS
0517  REF   1                05,3342   3 4760 1             CAF      NOUTCON
0518  REF   5  LAST  162     05,3343  55'015 0             TS       NOUT

0519  REF   7  LAST  211     05,3344   4 4753 0             CS       ONE
0520  REF   1                05,3345  55'077 1             TS       SAMPLIM
0521  REF  27  LAST  222     05,3346   3 4746 0             CAF      BIT6
0522  REF  17  LAST  215     05,3347   7 1300 1             MASK     IMODES33              LEAVE BIT 6 UNCHANGED
0523  REF   2  LAST  215     05,3350   6 5026 0             AD       IM33INIT              NO PIP OR TM FAILS.BIT6=0 IN THIS WORD.
0524  REF  18  LAST  224     05,3351  55'300 1             TS       IMODES33

0525  REF   1                05,3352   3 3363 1             CAF      LESCHK                SELF CHECK GO-TO REGISTER.
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 0526   REF   2  LAST  108   05,3353  55'361 0            TS       SELFRET

 0527   REF   1              05,3354  4 4360 1            CS       V01
 0528   REF   2  LAST  160   05,3355  54 776 0            TS       OSPCOUNT

 0529   REF  17  LAST  220   05,3356  C 0002 0            TC       Q
 0530   REF   6  LAST  221   E6,1536                      EBANK=   AOSQ
 0531   REF   1              05,3357   02024 0  ICLEADR   2CAOR    DAPIDLER
 0531   REF   1              05,3360   34066 0

 0532                        05,3361   C0435 0  IFAILINH  OCT      435
 0533   REF   1              05,3362   C3522 1  LONPHAS1  GENAOR   ONPHASE1
 0534   REF   1              05,3363   03363 1  LESCHK    GENAOR   SELFCHK
 0535   REF   2  LAST  223   05,3364   C0400 0  VAC1ACRC  AORES    VAC1USE
 0536                        05,3365   32001 1  OCT32001  OCT      32001
 0537                        05,3366   00054 0  LTHVACA   OEC      44

 0538                        05,3367   27470 1  OCT27470  OCT      27470
 0539                        05,3370   74160 0  OCT74160  OCT      74160
 0540                        05,3371   30001 0  OCT30001  OCT      30001
 0541   REF   1                 5007            STARTEB   EQUALS   EBANK3
 0542   REF   1                 4756            NUMGRPS   EQUALS   FIVE
 0543                        05,3372   77755 0  -ELR      OCT      -22              -ERROR LIGHT RESET KEY CODE
 0544                        05,3373   37411 1  IM30INIF  OCT      37411            INHIBITS IMU FAIL FOR 5 SEC AND PIP ISSW
 0545                        05,3374   37000 0  IM30INIR  OCT      37000
 0546   REF   2  LAST  183      5026            IM33INIT  =        PRIO16           NO PIP OR TM FAIL SIGNALS.
 0547                        05,3375   C0450 0  9,6,4     OCT      450
 0548                        05,3376   00102 1  RMODINIT  OCT      00102
 0549                        05,3377   C0000 1  SWINIT    OCT      0
 0550                        05,3400   00000 1            OCT      0
 0551                        05,3401   C0000 1            OCT      0
 0552                        05,3402   02000 0            OCT      02000            BIT 11 = NOR29FLG
 0553                        05,3403   00000 1            OCT      0
 0554                        05,3404   00000 1            OCT      0
 0555                        05,3405   00000 1            OCT      0
 0556                        05,3406   00100 0            OCT      00100

 0557                        05,3407   C0000 1            OCT      0
 0558                        05,3410   00000 1            OCT      0
 0559                        05,3411   C0000 1            OCT      0
 0560                        05,3412   40000 0            OCT      40000            BIT 15 = LRBYPASS.
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R0561   PROGRAM NAME     GOTOPOOH                  ASSEMBLY       SUNDANCE
R0562   LOG SECTION      FRESH START AND RESTART

R0563   FUNCTIONAL DESCRIPTION

R0564          FLASH V 37 ON DSKY "MM CHANGE REQUEST "

R0565   INPUT/OUTPUT INFORMATION

R0566          A. CALLING SEQUENCE        TC GOTOPOOH

R0567          B. ERASABLE INITIALIZATION        NONE

R0568          C. OUTPUT FLASH V 37 ON DSKY

R0569          D. DEBRIS        L

R0570   PROGRAM ANALYSIS

R0571          A. SUBROUTINES CALLED PRIODSPR,  LINUS

R0572          B. NORMAL EXIT        TCF  ENDOFJOB

R0573          C. ALARM AND ABORT EXITS        NONE

 0574                             6001                        BLOCK  03
 0575   REF   2  LAST   40        6000                        SETLOC FFTAG5
 0576                             6001                        BANK

 0577   REF   1                                               COUNT* $$/P00
 0578   REF   1                   6001  3 4764 0  GOTOPOOH CAF    OCT33           4.33SPOT FOR GOPOOFIX
 0579   REF  13  LAST  194        6002  54 001 1           TS     L
 0580                             6003  4 0000 0           COM
 0581   REF   2  LAST  216        6004  52 760 1           DXCH   -PHASE4

 0582   REF   3  LAST  215        6005  0 4635 0           TC     POSTJUMP
 0583   REF   1                   6006   10024 0           CADR   GOPOOFIX
 0584                             6007   00024 1  OCT24    MM     20
 0585                             6010   00031 0  OCT31    MM     25

 0586                          20,2004                     BANK   20
 0587   REF   1                04,2000                     SETLOC VERB37
 0588                          04,2024                     BANK

 0589   REF   1                                            COUNT* $$/P00          VERB 37 AND P00 IN BANK 4
 0590   REF   2  LAST  210     04,2024  0 5516 0  GOPOOFIX TC     DOWNFLAG        ALLOW X-AXIS OVERRIDE
 0591   REF   1                04,2025   00311 1           ADRES  XOVINFLG

 0592   REF   3  LAST  226     04,2026  0 5516 0           TC     DOWNFLAG        INSURE THAT ULLAGE IS OFF
 0593   REF   1                04,2027   00314 1           ADRES  ULLAGFLG
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05935  REF   1              04,2030  0 5476 1           TC      CLEARMRK +2     RELEASE MARK DISPLAY SYSTEM.
0594   REF   1              04,2031  3 2037 1           CAF     V37N99
0595   REF   8  LAST  210   04,2032  0 4616 1           TC      BANKCALL
0596   REF   1              04,2033   20477 1           CADR    GOFLASH
0597                        04,2034  1 2031 0           TCF     -3
0598                        04,2035  1 2031 0           TCF     -4
0599                        04,2036  1 2031 0           TCF     -5

0600                        04,2037   11343 0  V37N99   VN      3799
```

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P0601   PROGRAM NAME    V37                        ASSEMBLY      SUNDANCE

R0602   LOG SECTION     FRESH START AND RESTART

R0603   FUNCTIONAL DESCRIPTION

R0604          1. CHECK IF NEW PROGRAM ALLOWED. IF BIT 1 OF FLAGWRD2(NODOFLAG) IS SET, AN ALARM 1520 IS CALLED.
R0606          2. CHECK FOR VALIDITY OF PROGRAM SELECTED. IF AN INVALID PROGRAM  IS SELECTED, THE OPERATOR ERROR LIGHT IS
R0608             SET AND CURRENT ACTIVITY, IF ANY, CONTINUES.
R0609          3. SERVICER IS TERMINATED IF IT HAS BEEN RUNNING.
R0610          4. INSTALL IS EXECUTED TO AVOID INTERRUPTING INTEGRATION.
R0611          5. THE ENGINE IS TURNED OFF AND THE DAP IS INITIALIZED FOR COAST.
R0612          6. TRACK AND UPDATE FLAGS ARE SET TO ZERO,
R0613          7. DISPLAY SYSTEM IS RELEASED.
R0614          8. THE FOLLOWING ARE PERFORMED FOR EACH OF THE THREE CASES.
R0615             A. PROGRAM SELECTED IS P00.
R0616                1. RENDEZVOUS AND P25 FLAGS ARE RESET.(KILL P20 AND P25)
R0617                2. STATINT1      IS SCHEDULED BY SETTING RESTART GROUP 2.
R0618                3. MAJOR MODE 00 IS STORED IN THE MODE REGISTER(MODREG).
R0619                4. SUPERBANK 3 IS SELECTED.
R0620                5. NODOFLAG IS RESET.
R0621                6. ALL RESTART GROUPS EXCEPT GROUP 2 ARE CLEARED. CONTROL ISTRANSFERRED TO RESTART PROGRAM (GOPROG2)
R0623                   WHICH CAUSES ALL CURRENT ACTIVITY TO BE DISCONTINUED AND A 9 MINUTE INTEGRATION CYCLE TO BE
R0625                   INITIATED.
R0626             B. PROGRAM SELECTED IS P20 OR P25.
R0627                1. IF THE CURRENT MAJOR MODE IS THE SAME AS THE SELECTED NEWPROGRAM, THE PROGRAM IS RE-INITIALIZED
R0629                   VIA V37XEQ, ALL RESTART GROUPS, EXCEPT GROUP 4 ARE CLEARED.
R0631                2. IF THE CURRENT MAJOR MODE IS NOT EQUAL TO THE NEW REQUEST, A CHECK IS MADE TO SEE IF THE REQUEST-
R0633                   ED MAJOR MODE HAS BEEN RUNNING IN THE BACKGROUND,
R0634                   AND IF IT HAS, NO NEW PROGRAM IS SCHEDULED, THE EXISTING
R0635                   P20 OR P25 IS RESTARTED TO CONTINUE, AND ITS M M IS SET.
R0636                3. CONTROL IS TRANSFERRED TO GOPROG2.
R0637             C. PROGRAM SELECTED IS NEITHER P00,P20, NOR P25
R0638                1. V37XEQ IS SCHEDULED (AS A JOB) BY SETTING RESTART GROUP 4
R0639                2. ALL CURRENT ACTIVITY EXCEPT RENDEZVOUS AND TRACKING IS DISCONTINUED BY CLEARING ALL RESTART
R0641                   GROUPS. IF THE RENDEZVOUS OR THE P25 FLAG IS ON, GROUP 2 IS NOT CLEARED, ALLOWING THESE PROGRAMS
R0643                   TO CONTINUE.

R0644   INPUT/OUTPUT INFORMATION

R0645          A. CALLING SEQUENCE

R0646              CONTROL IS DIRECTED TO V37 BY THE VERBFAN ROUTINE.
R0647                 VERBFAN GOES TO C(VERBTAB+C(VERBREG)). VERB 37 = MMCHANG.
R0648                 MMCHANG EXECUTES A   TC POSTJUMP, CADR V37.

R0649          B. ERASABLE INITIALIZATION      NONE

R0650
R0651          C. OUTPUT
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L       FRESH START AND RESTART                                                  USER'S PAGE NO. 17       E3 S3

R0652                  MAJOR MODE CHANGE

R0653           C. DEBRIS
R0654               MMNUMBER, MPAC +1, MINDEX, BASETEMP +C(MINDEX), FLAGWRD0, FLAGWRD1, FLAGWRD2, MODREG, GOLOC -1,
R0656               GOLOC, GOLOC +1, GOLOC +2, BASETEMP, -PHASE2, PHASE2, -PHASE4

R0657   PROGRAM ANALYSIS

R0658           A. SUBROUTINES CALLED
R0659               ALARM, RELDSP, PINBRNCH, INTSTALL, ENGINOF2, ALLCOAST, V37KLEAN, GOPROG2, FALTON, FINDVAC, SUPERSW,
R0661               DSPMM

R0662           B. NORMAL EXIT          TC ENDOFJOB

R0663           C. ALARMS          1520 (MAJOR MODE CHANGE NOT PERMITTED)

 0664   REF   1               04,2040  54 774 1  V37       TS      MMNUMBER        SAVE MAJOR MODE
 0665   REF   4  LAST  220    04,2041   3 4355 0           CAF     PRIO30          RESTART AT PINBALL PRIORITY
 0666   REF   2  LAST  213    04,2042  54 366 0            TS      RESTREG

 0667   REF  41  LAST  218    04,2043   3 1277 1           CA      IMODES30        IS IMU BEING INITIALIZED
 0668   REF  28  LAST  224    04,2044   7 4746 1           MASK    BIT6
 0669   REF  43  LAST  219    04,2045  10 000 0            CCS     A
 0670   REF   1               04,2046   1 2065 1           TCF     CANTR00

 0671   REF   2  LAST  229    04,2047   4 0774 1           CS      MMNUMBER        IS P70 REQUESTED?
 0672   REF   1               04,2050   6 2403 1           AD      DEC70
 0673                         04,2051   0 0006 1           EXTEND
 0674   REF   1               04,2052   1 2376 0           BZF     SETUP70         YES
 0675   REF   8  LAST  224    04,2053   6 4753 1           AD      ONE             IS P71 REQUESTED?
 0676                         04,2054   0 0006 1           EXTEND
 0677   REF   1               04,2055   1 2375 0           BZF     SETUP71         YES

 0678   REF   3  LAST  229    04,2056   3 0774 0           CA      MMNUMBER        IS NEW REQUEST P00
 0679                         04,2057   0 0006 1           EXTEND
 0680   REF   1               04,2060   1 2107 1           BZF     ISSERVON        YES, CHECK SERVICER STATUS

 0681   REF   3  LAST  167    04,2061   4 0076 1           CS      FLAGWRD2        NO, IS NODO V37 FLAG SET
 0682   REF   1               04,2062   7 4753 0           MASK    NODOBIT
 0683   REF  44  LAST  229    04,2063  10 000 0            CCS     A
 0684   REF   1               04,2064   1 2072 1           TCF     CHECKTAB        NO
 0685   REF  10  LAST  219    04,2065   0 5567 0  CANTR00  TC      ALARM
 0686                         04,2066    01520 1           OCT     1520

 0687   REF   1               04,2067   0 4457 0  V37BAD   TC      RELDSP          RELEASES DISPLAY FROM ASTRONAUT

 0688   REF   4  LAST  226    04,2070   0 4635 0           TC      POSTJUMP        BRING BACK LAST NORMAL DISPLAY IF THERE
 0689   REF   1               04,2071    21051 0           CADR    PINBRNCH        WAS ONE. OTHERWISE DO AN EOJ.

 0690   REF   1               04,2072   3 2470 0  CHECKTAB CA      NOV37MM         INDEX FOR MM TABLES.
 0691   REF  28  LAST  224   04,2073  54 155 1  AGAINMM  TS      MPAC +1
 0692   REF  29  LAST  230   04,2074  50 155 0           NDX     MPAC +1
 0693   REF   1              04,2075   3 2437 0          CA      PREMM1         OBTAIN WHICH MM THIS IS FOR
 0694   REF   1              04,2076   7 6077 0          MASK    LOW7
 0695                        04,2077   4 0000 0          COM
 0696   REF   4  LAST  229   04,2100   6 0774 0          AD      MMNUMBER
 0697   REF  45  LAST  229   04,2101  10 000 0           CCS     A
 0698   REF  30  LAST  230   04,2102  10 155 1           CCS     MPAC +1        IF GR, SEE IF ANYMORE IN LIST
 0699   REF   1              04,2103   1 2073 0          TCF     AGAINMM        YES, GET NEXT ONE
 0700   REF   1              04,2104   1 2326 0          TCF     V37NONO        LAST TIME OR PASSED MM

 0701   REF  31  LAST  230   04,2105   3 0155 0          CA      MPAC +1
 0702   REF   1              04,2106  54 773 0           TS      MINDEX         SAVE INDEX FOR LATER

 0703   REF   2  LAST  188   04,2107   4 0103 1 ISSERVON CS      FLAGWRD7       V37 FLAG SET - I.E. IS SERVICER GOING
 0704   REF   1              04,2110   7 4746 1          MASK    V37FLBIT
 0705   REF  46  LAST  230   04,2111  10 000 0           CCS     A
 0706   REF   1              04,2112   1 2132 1          TCF     CANV37         NO

 0707   REF   4  LAST  226   04,2113   0 5516 0          TC      DOWNFLAG       YES,TURN OFF THE AVERAGE FLAG AND
 0708   REF   1              04,2114    00163 0          ADRES   AVEGFLAG       WAIT FOR SERVICER TO RETURN TO V37RET

 0711   REF   1              04,2115   1 5155 1          TCF     ENDOFJOB

 0712   REF   9  LAST  219   04,2116   4 0074 0 V37RET   CS      FLAGWRD0       IS P20 OR P22 RUNNING?
 0713   REF   2  LAST  187   04,2117   7 4745 1          MASK    RNDVZBIT
 0714   REF  47  LAST  230   04,2120  10 000 0           CCS     A
 0715                        04,2121   1 2123 1          TCF     +2             NO. CHECK FOR P25.
 0716   REF   1              04,2122   1 2130 0          TCF     2.7SPT         YES. GO 2.7SPOT
 0717   REF  10  LAST  230   04,2123   4 0074 0          CS      FLAGWRD0       IS P25 RUNNING?
 0718   REF   1              04,2124   7 4743 1          MASK    P25FLBIT
 0719   REF  48  LAST  230   04,2125  10 000 0           CCS     A
 0720   REF   1              04,2126   3 2372 0 2.0SPT   CA      OCT37667
 0721   REF  15  LAST  220   04,2127   6 4747 1 2.11SPT  AD      BIT5
 0722   REF   1              04,2130   6 2373 1 2.7SPT   AD      OCT40072
 0723   REF   1              04,2131   0 5357 0          TC      PHSCHNGA

 0724   REF  15  LAST  223   04,2132   3 4755 1 CANV37   CAF     ZERO
 0725                        04,2133   0 0006 1          EXTEND
 0726   REF   2  LAST  217   04,2134  01 007 1           WRITE   SUPERBNK

 0727   REF   1              04,2135   3 2371 0          CAF     ROOAO
 0728   REF   1              04,2136  54 374 0           TS      TEMPFLSH

 0729   REF   1              04,2137   0 5353 1          TC      PHASCHNG
 0730                        04,2140    00014 1          OCT     14

 0731   REF   3  LAST  209   04,2141   0 6042 1 ROO      TC      INTPRET

 0732                        04,2142    77624 1          CALL                   WAIT FOR INTEGRATION TO FINISH
 0733   REF    1                04,2143   27410 1               INTSTALL
 0734                           04,2144   77776 1  DUMMYAD  EXIT

 0735   REF    5  LAST  230     04,2145  0 5516 0           TC     DOWNFLAG
 0736   REF    1                04,2146   00124 0           ADRES  3AXISFLG          RESET 3-AXIS FLAG

 07362  REF    6  LAST  231     04,2147  0 5516 0           TC     DOWNFLAG
 07364  REF    1                04,2150   00055 1           ADRES  PODHFLAG

 0737   REF    2  LAST  221     04,2151  3 4735 1           CAF    LPBYBIT           CLEAN UP THE R12 FLAGWORD.
 0738   REF    2  LAST  221     04,2152  54 107 0           TS     FLGWRD11

 07382  REF    7  LAST  231     04,2153  0 5516 0           TC     OCWNFLAG          INSURE THAT THE R04FLAG IS CLEAR.
 07384  REF    2  LAST   71     04,2154   00063 1           ADRES  R04FLAG

 073845 REF    8  LAST  231     04,2155  0 5516 0           TC     DOWNFLAG
 07385  REF    1                04,2156   00056 1           ADRES  GLOKFAIL          FLAGWORD 3 BIT 14

 07386  REF    9  LAST  231     04,2157  0 5516 0           TC     DOWNFLAG          INSURE MUNFLAG IS CLEAR.
 07388  REF    1                04,2160   00141 0           ADRES  MUNFLAG

 0738R1 REF   10  LAST  231     04,2161  0 5516 0           TC     DOWNFLAG          RESET ABORT TARGETING FLAG (USE
 073882 PFF    1                04,2162   00217 0           ADRES  ABTTGFLG            PARAMETERS J1 AND KU)

 0739   REF   11  LAST  231     04,2163  0 5516 0           TC     DOWNFLAG          ALLOW X-AXIS OVERRIDE.
 0740   REF    2  LAST  226     04,2164   00311 1           ADRES  XOVINFLG
 0741   REF    5  LAST  230     04,2165  10 774 1           CCS    MMNUMBER          IS THIS A PODH REQUEST
 0742   REF    1                04,2166  1 2314 1           TCF    NOLVEAL           NO, PICK UP NEW PROGRAM

 0743   REF    2  LAST  229     04,2167  0 4457 0  PODH     TC     RELDSP            RELEASE DISPLAY SYSTEM

 0744   REF    1                04,2170  3 5017 1           CAF    PRIC5             SET VARIABLE RESTART PRIORITY FOR
 0745   REF    1                04,2171  55'055 1           TS     PHSPRDT2          P00 INTEGRATION.

 0746   REF    1                04,2172  0 6011 1           TC     CLRADMOD          CLRADMOD DOES AN INHINT.

 0747   REF    2  LAST  229     04,2173  4 4753 0           CS     NODOBIT           TURN OFF NODOFLAG.
 0748   REF    4  LAST  229     04,2174  7 0076 1           MASK   FLAGWRD2
 0749   REF    5  LAST  231     04,2175  54 076 1           TS     FLAGWRD2

 0750   REF    2  LAST  225     04,2176  3 4756 1           CA     FIVE              SET RESTART FOR STATEINT1
 0751   REF   14  LAST  226     04,2177  54 001 1           TS     L
 0752                           04,2200  4 0000 0           COM
 0753   REF    2  LAST  215     04,2201  52 754 0           DXCH   -PHASE2

 0754   REF    1                04,2202  4 2374 1           CS     OCT700            TURN OFF P20,P25,IMU IN USE FLAG
 0755   REF   11  LAST  230     04,2203  7 0074 0           MASK   FLAGWRD0
 0756   REF   12  LAST  231     04,2204  54 074 0           TS     FLAGWRD0                      RENDFLG

 0757   REF    1                04,2205  3 4755 1           CAF    DNLADP00
 0758   REF   6  LAST  218    04,2206  54 333 0  SEUDDFOO TS      DNLSTCOD     SET UP APPROPRIATE OOWNLIST CODE
 0759   REF   4  LAST  218    04,2207  55'321 1           TS      AGSWORO       (CURRENT LIST WILL BE COMPLETEO BEFORE
A0760                                                                             NEW ONE IS STARTED)
 0761   REF   6  LAST  178    04,2210  0 4674 0           TC      IBNKCALL
 0762   REF   1               04,2211   75561 1           CADR    ENGINOF1

 0763   REF   7  LAST  232    04,2212  0 4674 0           TC      IBNKCALL     INSURE ALLCOAST.
 0764   REF   1               04,2213   40205 1           CADR    ALLCOAST     DOES A RESTORDB.

 0765   REF   1               04,2214  4 4775 1           CS      OCT120       TURN OFF TRACK, UPDATE FLAGS
 0766   REF   2  LAST  213    04,2215  55'071 1           TS      EBANKTEM
 0767   REF   5  LAST  219    04,2216  7 0075 1           MASK    FLAGWRD1
 0768   REF   6  LAST  232    04,2217  54 075 1           TS      FLAGWRD1

 0769   REF   8  LAST  232    04,2220  0 4674 0           TC      IBNKCALL     KILL GROUPS 1,3,5,6
 0770   REF   1               04,2221   12650 1           CADR    V37KLEAN

 0771   REF   6  LAST  231    04,2222  10 774 1           CCS     MMNUMBER     IS IT POOH
 0772   REF   1               04,2223  1 2232 1           TCF     RENDVOO      NO
 0773   REF   9  LAST  232    04,2224  0 4674 0  GOMOD    TC      IBNKCALL     REOUNOANT EXCEPT FOR GROUP 4
 0774   REF   1               04,2225   12645 0           CADR    POOKLEAN

 0775   REF   7  LAST  232    04,2226  3 0774 0           CA      MMNUMBER
 0776   REF   3  LAST  219    04,2227  55'010 0           TS      MODREG

 0777   REF   5  LAST  229    04,2230  0 4635 0  GOGOPROG TC      POSTJUMP
 0778   REF   1               04,2231   12766 0           CADR    GOPROG2

 0779   REF   4  LAST  232    04,2232  4 1010 0  RENDVOO  CS      MODREG       IS CURRENT PROGRAM 22
 0780   REF   1               04,2233  6 2332 1           AD      OCT26
 0781                         04,2234  0 0006 1           EXTEND
 0782   REF   1               04,2235  1 2254 1           BZF     RESET22      YES - CLEAR RENDEZVOUS FLAG


 0783   REF   8  LAST  232    04,2236  4 0774 1           CS      MMNUMBER     IS NEW PROGRAM P22
 0784   REF   2  LAST  232    04,2237  6 2332 1           AD      OCT26
 0785                         04,2240  0 0006 1           EXTEND
 0786   REF   2  LAST  232    04,2241  1 2254 1           BZF     RESET22


 0787   REF   1               04,2242  6 7751 0           AD      NEG2         IS NEW PROGRAM = P20 OR P25
 0788                         04,2243  0 0006 1           EXTEND
 0789   REF   1               04,2244  1 2266 0           BZF     RENDNOO      YES
 0790   REF   3  LAST  231    04,2245  6 4756 1           AD      FIVE         25
 0791                         04,2246  0 0006 1           EXTEND
 0792   REF   2  LAST  232    04,2247  1 2266 0           BZF     RENDNOO      YES

 0793   REF   1               04,2250  3 2330 0           CA      OCT500       NO, IS EITHER P20 OR P25 RUNNING
 0794   REF  13  LAST  231    04,2251  7 0074 0           MASK    FLAGWRD0
 0795   REF  49  LAST  230    04,2252  10 000 0           CCS     A
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0796   REF   1               04,2253  1 2263 0            TCF     POOFIZZ     YES, LEAVE GROUP 2 TO PICK UP P20 OR P25

0797   REF   2  LAST  231    04,2254  4 2374 1  RESET22   CS      OCT700      CLEAR RENDEZVOUS,P25
0798   REF  14  LAST  232    04,2255  7 0074 0            MASK    FLAGWRD0    AND IMU IN USE FLAGS
0799   REF  15  LAST  233    04,2256  54 074 0            TS      FLAGWRD0
0800   REF   2  LAST  231    04,2257  0 6011 1            TC      CLRADMOD

0801                         04,2260  0 0006 1  KILL2     EXTEND              NO, KILL 2
0802   REF   8  LAST  216    04,2261  3 4755 1            DCA     NEG0
0803   REF   3  LAST  231    04,2262  52 754 0            DXCH    -PHASE2

0804   REF   1               04,2263  3 2370 1  POOFIZZ   CAF     V37QCAD     RESTART POINT FOR V37XEQ
0805   REF   2  LAST  230    04,2264  54 374 0            TS      TEMPFLSH

0806   REF   1               04,2265  1 2230 0            TCF     GOGOPROG

0807   REF   5  LAST  232    04,2266  4 1010 0  RENDNOD   CS      MODREG
0808   REF   1               04,2267  6 6007 0            AD      OCT24
0809                         04,2270  0 0006 1            EXTEND
0810   REF   1               04,2271  1 2260 0            BZF     KILL2       P20 OR P25 ON TOP OF P20 OR P25 -

0811   REF   4  LAST  232    04,2272  6 4756 1            AD      FIVE
0812                         04,2273  0 0006 1            EXTEND
0813   REF   2  LAST  233    04,2274  1 2260 0            BZF     KILL2

0814   REF   2  LAST  232    04,2275  3 2330 0            CA      OCT500
0815   REF  16  LAST  233    04,2276  7 0074 0            MASK    FLAGWRD0
0816   REF   9  LAST  232    04,2277  6 0774 0            AD      MMNUMBER
0817                         04,2300  4 0000 0            COM
0818   REF   1               04,2301  6 2333 0            AD      P20REC      IS IT 20 AND IS RENDEZVOUS FLAG ON
0819                         04,2302  0 0006 1            EXTEND
0820   REF   1               04,2303  1 2310 0            BZF     STATQUO     YES
0821   REF   1               04,2304  6 2331 1            AD      OCT305      IS IT 25 AND IS P25 BIT ON
0822                         04,2305  0 0006 1            EXTEND
0823   REF   2  LAST  233    04,2306  1 2310 0            BZF     STATQUO     YES, LEAVE AS IS
0824   REF   3  LAST  233    04,2307  1 2260 0            TCF     KILL2

0825   REF   7  LAST  232    04,2310  4 0075 1  STATQUO   CS      FLAGWRD1    SET TRACKFLAG
0826   REF   2  LAST  232    04,2311  7 4775 1            MASK    OCT120          UPDATE FLAG
0827   REF   8  LAST  233    04,2312  26 075 1            ADS     FLAGWRD1

0828   REF   1               04,2313  1 2224 0            TCF     GOMOD

0829   REF   3  LAST  233    04,2314  3 2330 0  NOLVEAU   CAF     OCT500      IS P20 OR P25 FLAG SET
0830   REF  17  LAST  233    04,2315  7 0074 0            MASK    FLAGWRD0
0831   REF  50  LAST  232    04,2316  10 000 0            CCS     A
0832                         04,2317  1 2322 1            TCF     +3          YES
0833   REF  12  LAST  231    04,2320  0 5516 0            TC      DOWNFLAG    NO,RESET IMUINUSE FLAG
0834   REF   1               04,2321    00007 0           ADRES   IMUSE
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 0835   REF   2  LAST  230   04,2322  50 773 1            INDEX   MINDEX
 0836   REF   1              04,2323  3 2471 1            CAF     DNLADMM1        OBTAIN APPROPRIATE DOWNLIST ADDRESS

 0837                        04,2324  0 0004 0            INHINT
 0838   REF   1              04,2325  1 2206 0            TCF     SEUDOPOO

 0839   REF   1              04,2326  0 4364 1  V37NONO   TC      FALTON          COME HERE IF MM REQUESTED DOESNT EXIST

 0840   REF   1              04,2327  1 2067 0            TCF     V37BAD

 0841   REF  17  LAST  218      4750            OCT00010  EQUALS  BIT4
 0842                        04,2330   00500 1  OCT500    OCT     500             BITS 7 AND 9
 0843                        04,2331   00305 1  OCT305    OCT     305
 0844                        04,2332   00026 0  OCT26     OCT     26
 0845                        04,2333   00124 0  P20REG    OCT     124

 0846                        04,2334  0 0004 0  V37XEQ    INHINT
 0847   REF   3  LAST  234   04,2335  50 773 1            INDEX   MINDEX
 0848   REF   2  LAST  230   04,2336  3 2437 0            CAF     PREMM1          OBTAIN PRIO, EBANK, AND MM
 0849   REF   1              04,2337  55'057 0            TS      MMTEMP
 0850   REF   1              04,2340  54 020 1            TS      CYR             SHIFT RIGHT TO BITS 14 - 10

 0851   REF   2  LAST  234   04,2341  3 0020 0            CA      CYR
 0852   REF   1              04,2342  7 7730 0            MASK    PRIO37
 0853   REF   1              04,2343  55'061 0            TS      PHSPRDT4        PRESET GROUP 4 RESTART PRIORITY
 0854   REF   1              04,2344  54 063 0            TS      NEWPRIO         STORE PRIO FOR SRVAC

 0855   REF   2  LAST  234   04,2345  3 1057 1            CA      MMTEMP          OBTAIN EBANK - BITS 8, 9, 10 OF MMTEMP
 0856                        04,2346  0 0006 1            EXTEND
 0857   REF  18  LAST  215   04,2347  7 4744 0            MP      BIT8
 0858   REF   1              04,2350  7 4757 1            MASK    LOW3
 0859   REF  15  LAST  231   04,2351  54 001 1            TS      L

 0860   REF   4  LAST  234   04,2352  50 773 1            INDEX   MINDEX
 0861   REF   1              04,2353  3 2406 1            CAF     FCADRMM1
 0862   REF   1              04,2354  55'060 1            TS      BASETEMP        MAKE BBCON BY ADDING HI5 OF FCADR
 0863   REF   3  LAST  217   04,2355  7 4350 1            MASK    HI5
 0864   REF  16  LAST  234   04,2356  26 001 1            ADS     L

 0865   REF   2  LAST  234   04,2357  3 1060 0            CA      BASETEMP        OBTAIN GENADR PORTION OF 2CADR.
 0866   REF   1              04,2360  7 5012 0            MASK    LOW10
 0867   REF  15  LAST  167   04,2361  6 4741 1            AD      BIT11

 0868   REF   1              04,2362  0 5116 1            TC      SRVAC

 0869   REF   3  LAST  234   04,2363  3 1057 1  V37XEQC   CA      MMTEMP          UPON RETURN FROM FINDVAC PLACE THE
 0870   REF   2  LAST  230   04,2364  7 6077 0            MASK    LOW7            NEW MM IN MODREG (THE LOW 7 BITS OF
 0871   REF   1              04,2365  0 5314 1            TC      NEWMODEA        PHSPRDT1)

 0872   REF   3  LAST  231   04,2366  0 4457 0            TC      RELDSP          RELEASE DISPLAY
 0873   REF   2  LAST  230   04,2367  0 5155 0            TC      ENDOFJOB        AND EXIT

 0874   REF   1                 5650           NEG7       EQUALS  OCT77770

 0875   REF   1                 1057           MMTEMP     EQUALS  PHSPRDT3
 0876   REF   1                 1060           BASETEMP   EQUALS  TBASE4
 0877   REF   1              04,2370   10337 1 V37QCAO    CADR    V37XEQ +3
 0878   REF   1              04,2371   10144 1 RODAD      CADR    DUMMYAD
 0880                        04,2372   37667 1 OCT37667   OCT     37667
 0881                        04,2373   40072 0 OCT40072   OCT     40072
 0882                        04,2374   00700 0 OCT700     OCT     700
R0883
 0884   REF   1              04,2375  3 6250 0 SETUP71    CAF     THREE
 0885   REF  18  LAST  225   04,2376  54 002 1 SETUP70    TS      Q
 0886                        04,2377  0 0006 1            EXTEND
 0887   REF   1              04,2400  3 2405 1            DCA     P70CADR
 0888   REF  19  LAST  235   04,2401  6 0002 0            AD      Q
 0889                        04,2402  52 006 0            DTCB

 0890                        04,2403   00106 0 DEC70      DEC     70
 0891   REF   3  LAST  149   E7,1520                      EBANK=  R
 0892   REF   1              04,2404   02067 1 P70CADR    2CADR   P70
 0892   REF   1              04,2405   42067 0
R0893   FOR VERB 37 TWO TABLES ARE MAINTAINED. EACH TABLE HAS AN ENTRY FOR EACH
R0894   MAJOR MODE THAT CAN BE STARTED FROM THE KEYBOARD. THE ENTRIES ARE PUT
R0895   INTO THE TABLE WITH THE ENTRY FOR THE HIGHEST MAJOR MODE COMING FIRST,

R0896   TO THE LOWEST MAJOR MODE WHICH IS THE LAST ENTRY IN EACH TABLE.

R0897           THE FCADRMM TABLE CONTAINS THE FCADR OF THE STARTING JOB OF
R0898   THE MAJOR MODE.    FOR EXAMPLE,

A0899                                          FCADRMM1   FCADR   P79             START OF P 79
A0900                                                     FCADR   PROG18          START OF P 18
A0901                                                     FCADR   P01             START OF P 01

R0902   NOTE,     THE FIRST ENTRY MUST BE LABLED FCADRMM1.
R0903   ----

 0906   REF   1              04,2406   26207 0 FCADRMM1   FCADR   P76
 0907   REF   1              04,2407   72641 1            FCADR   P75
 0908   REF   1              04,2410   72457 1            FCADR   P74
 0909   REF   1              04,2411   72225 1            FCADR   P73
 0910   REF   1              04,2412   72036 1            FCADR   P72
 0911   REF   1              04,2413   71271 0            FCADR   LANDJUNK
 0912   REF   1              04,2414   65000 1            FCADR   P63LM
 0913   REF   1              04,2415   33277 0            FCADR   P57
 0914   REF   1              04,2416   32050 0            FCADR   PROG52
 0915   REF   1              04,2417   31421 1            FCADR   P51
 0916   REF   1              04,2420   75442 1            FCADR   P47LM
 0917   REF    1                04,2421   75414 1             FCADR   P42LM
 0918   REF    1                04,2422   75276 0             FCADR   P41LM
 0919   REF    1                04,2423   75153 1             FCADR   P40LM
 0922   REF    1                04,2424   72635 1             FCADR   P35
 0923   REF    1                04,2425   72455 0             FCADR   P34
 0924   REF    1                04,2426   72223 1             FCADR   P33
 0925   REF    1                04,2427   72034 0             FCADR   P32
 0927   REF    1                04,2430   72000 1             FCADR   P30
 0928   REF    1                04,2431   50400 0             FCADR   PROG25
 0929   REF    1                04,2432   50000 1             FCADR   PROG22
 0930   REF    1                04,2433   51506 0             FCADR   PROG21
 0931   REF    1                04,2434   50000 1             FCADR   PROG20
 0932   REF    1                04,2435   60061 0             FCADR   P12LM
 0933   REF    1                04,2436   77652 0             FCADR   P06
R0934             THE PREMM TABLE CONTAINS THE E-BANK,MAJOR MODE, AND PRIORITY
R0935   INFORMATION, IT IS IN THE FOLLOWING FORM,

R0936             PPP PPE EEM MMM MMM

R0937             WHERE THE 7 M BITS CONTAIN THE MAJOR MODE NUMBER
R0938                     3 E BITS CONTAIN THE E-BANK NUMBER
R0939                     5 P BITS CONTAIN THE PRIORITY AT WHICH THE JOB IS
R0940                        TO BE STARTED

R0941             FOR EXAMPLE,

A0942                                       PREMM1    OCT     67213               PRIORITY      33
A0943                                                                             E-BANK         5
A0944                                                                             MAJOR MODE    11
A0945                                                 OCT     25437               PRIORITY      12
A0946                                                                             E-BANK         6
A0947                                                                             MAJOR MODE    31

R0948   NOTE,     THE FIRST ENTRY MUST BE LABELED PREMM1
 0951                          04,2437   27714 0  PREMM1    OCT     27714               MM 76   EBANK 7   PRIO 13
 0952                          04,2440   27713 1            OCT     27713               MM 75   EBANK 7   PRIO 13
 0953                          04,2441   27712 0            OCT     27712               MM 74   EBANK 7   PRIO 13
 0954                          04,2442   27711 0            OCT     27711               MM 73   EBANK 7   PRIO 13
 0955                          04,2443   27710 1            OCT     27710               MM 72   EBANK 7   PRIO 13
 0956                          04,2444   27704 1            OCT     27704               MM 68   EBANK 7   PRIO 13
 0957                          04,2445   27677 1            OCT     27677               MM 63   EBANK 7   PRIO 13
 0958                          04,2446   27271 0            OCT     27271               MM 57   EBANK 5   PRIO 13
 0959                          04,2447   27264 1            OCT     27264               MM 52   EBANK 5   PRIO 13
 0960                          04,2450   27263 0            OCT     27263               MM 51   EBANK 5   PRIO 13
 0961                          04,2451   27657 0            OCT     27657               MM 47   EBANK 7   PRIO 13
 0962                          04,2452   27652 0            OCT     27652               MM 42   EBANK 7   PRIO 13
 0963                          04,2453   27651 0            OCT     27651               MM 41   EBANK 7   PRIO 13
 0964                          04,2454   27650 1            OCT     27650               MM 40   EBANK 7   PRIO 13
 0967                          04,2455   27643 0            OCT     27643               MM 35   EBANK 7   PRIO 13
 0968                          04,2456   27642 1            OCT     27642               MM 34   EBANK 7   PRIO 13
 0969                             04,2457   27641 1            OCT      27641               MM 33   EBANK 7   PRIO 13
 0970                             04,2460   27640 0            OCT      27640               MM 32   EBANK 7   PRIO 13
 0972                             04,2461   27636 1            OCT      27636               MM 30   EBANK 7   PRIC 13
 0973                             04,2462   27631 0            OCT      27631               MM 25   EBANK 7   PRIO 13
 0974                             04,2463   27626 0            OCT      27626               MM 22   EBANK 7   PRIC 13
 0975                             04,2464   27625 0            OCT      27625               MM 21   EBANK 7   PRIO 13
 0976                             04,2465   27624 1            OCT      27624               MM 20   EBANK 7   PRIO 13
 0977                             04,2466   27614 1            OCT      27614               MM 12   EBANK 7   PRIO 13
 0978                             04,2467   27006 1            OCT      27006               MM 06   EBANK 4   PRIO 13
R0979   NCTE,    THE FOLLOWING CONSTANT IS THE NUMBER OF ENTRIES IN EACH OF
R0980   ----     THE ABOVE LISTS-1(IE, THE NUMBER OF MAJOR MODES(EXCEPT P00)
R0981            THAT CAN BE CALLEO FROM THE KEYBOARD MINUS ONE)

 0982                             04,2470   00030 1  NOV37MM   DEC      24                  MM'S -1

 0985   REF   1                   04,2471   00002 0  CNLACMM1  AORES    RENDEZVU            P76
 0986   REF   2  LAST   237       04,2472   00002 0            ADRES    RENDEZVU            P75
 0987   REF   3  LAST   237       04,2473   00002 0            ADRES    RENDEZVU            P74
 0988   REF   4  LAST   237       04,2474   00002 0            ADRES    RENDEZVU            P73
 0989   REF   5  LAST   237       04,2475   00002 0            AORES    RENDEZVU            P72
 0990   REF   1                   04,2476   00004 0            AORES    DESASCNT            P68
 0991   REF   2  LAST   237       04,2477   00004 0            ADRES    DESASCNT            P63
 0992   REF   1                   04,2500   00005 1            AORES    LUNRSALN            P57
 0993   REF   1                   04,2501   00000 1            ACRES    COSTALIN            P52
 0994   REF   2  LAST   237       04,2502   00000 1            AORES    COSTALIN            P51
 0995   REF   1                   04,2503   00003 1            ADRES    ORBMANUV            P47
 0996   REF   2  LAST   237       04,2504   00003 1            AORES    ORBMANUV            P42
 0997   REF   3  LAST   237       04,2505   00003 1            AORES    ORBMANUV            P41
 0998   REF   4  LAST   237       04,2506   00003 1            AORES    ORBMANUV            P40
 1001   REF   6  LAST   237       04,2507   00002 0            AORES    RENOEZVU            P35
 1002   REF   7  LAST   237       04,2510   00002 0            ADRES    RENOEZVU            P34
 1003   REF   8  LAST   237       04,2511   00002 0            AORES    RENOEZVU            P33
 1004   REF   9  LAST   237       04,2512   00002 0            AORES    RENDEZVU            P32
 1006   REF  10  LAST   237       04,2513   00002 0            AORES    RENDEZVU            P30
 1007   REF  11  LAST   237       04,2514   00002 0            AORES    RENDEZVU            P25
 1008   REF   2  LAST   237       04,2515   00005 1            AORES    LUNRSALN            P22
 1009   REF  12  LAST   237       04,2516   00002 0            AORES    RENDEZVU            P21
 1010   REF  13  LAST   237       04,2517   00002 0            ADRES    RENOEZVU            P20
 1011   REF   3  LAST   237       04,2520   00004 0            ADRES    DESASCNT            P12
 1012   REF   3  LAST   237       04,2521   00000 1            ADRES    COSTALIN            P06
 1013   REF  16  LAST   230          4755            ONLADP00 =         ZERC
 1014                                0000            COSTALIN =         0
 1015                                0001            AGSUPOAT =         1
 1016                                0002            RENDEZVU =         2
 1017                                0003            ORBMANUV =         3
 1018                                0004            OESASCNT =         4
 1019                                0005            LUNRSALN =         5
 1020                             13,2026                      BANK     13
 1021   REF   2  LAST    46       13,2000                      SETLOC   INTINIT
 1022                             13,2026                      BANK
 1023   REF   2 LAST   46 TO   46:      2      2*            COUNT* $$/INTIN

 1024   REF   2  LAST  111   E3,1554                         EBANK= RRECTCSM

R1025   THIS ROUTINE DOES THE PDD INTEGRATION

 1026                         13,2026   43014 0  STATEUP  SET    BOF               EXTRAPOLATE CM STATE VECTOR
 1027   REF   1               13,2027   01474 1                  VINTFLAG
 1028   REF   1               13,2030   04347 0                  SURFFLAG          ALSO 6X6 W-MATRIX IF LM ON LUNAR
 1029   REF   1               13,2031   26036 0                  DOINT                  SURFACE AND W-MATRIX VALID
 1030                         13,2032   43014 0           BOF    SET                    FOR RENDEZVOUS NAVIGATION.
 1031   REF   1               13,2033   02756 1                  RENDWFLG
 1032   REF   2  LAST  238    13,2034   26036 0                  DOINT
 1033   REF   1               13,2035   01476 0                  DIMOFLAG
 1034                         13,2036   45014 0  DOINT    CLEAR  CALL
 1035   REF   1               13,2037   01667 1                  PRECIFLG          ENGAGES 4-TIME STEP LOGIC IN INTEGRATION
 1036   REF   1               13,2040   27133 0                  INTEGRV           WHEN MODREG = 0

 1037                         13,2041   71214 0           BON    DLOAD
 1038   REF   2  LAST  238    13,2042   04307 1                  SURFFLAG
 1039   REF   1               13,2043   26063 0                  NO-INT
 1040   REF   3  LAST  112    13,2044   01571 0                  TETCSM
 1041   REF   3  LAST  209    13,2045   34041 0           STCALL TDEC1
 1042   REF   2  LAST  231    13,2046   27410 1                  INTSTALL
 1043                         13,2047   45014 0           CLEAR  CALL              EXTRAPOLATE LM STATE VECTOR
 1044   REF   2  LAST  238    13,2050   01674 0                  VINTFLAG
 1045   REF   1               13,2051   26643 1                  SETIFLGS
 1046                         13,2052   77614 1           BOF                      ALSO 9X9 W-MATRIX IF W IS VALID
 1047   REF   2  LAST  238    13,2053   02756 1                  RENDWFLG
 1048   REF   1               13,2054   26060 0                  DOINT2
 1049                         13,2055   43014 0           SET    SET
 1050   REF   2  LAST  238    13,2056   01476 0                  DIMOFLAG
 1051   REF   1               13,2057   01475 0                  D6OR9FLG
 1052                         13,2060   45014 0  DOINT2   SET    CALL
 1053   REF   2  LAST  238    13,2061   01467 0                  PRECIFLG          DISENGAGE 4 TIME STEP LOGIC IN INTEG.
 1054   REF   2  LAST  238    13,2062   27133 0                  INTEGRV
 1055                         13,2063   77614 1  NO-INT   CLRGO
 1056   REF   3  LAST  210    13,2064   01236 1                  NODOFLAG
 1057   REF   1               13,2065   26631 1                  ENDINT


R1058    THISVINT IS CALLED BY MIDTOAV1 AND2

 1059                         13,2066   43414 1  THISVINT CLEAR  RVQ
 1060   REF   3  LAST  238    13,2067   01674 0                  VINTFLAG
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L       RESTART TABLES                                                                  USER'S PAGE NO.   1       FC  S3

P0001   RESTART TABLES

R0002   ------------------ .

R0003   THERE ARE TWO FORMS OF RESTART TABLES FOR EACH GROUP.  THEY ARE KNOWN AS THE EVEN RESTART TABLES AND THE ODD
R0005   RESTART TABLES.  THE ODD TABLES HAVE ONLY ONE ENTRY OF THREE LOCATIONS WHILE THE EVEN TABLES HAVE TWO ENTRIES
R0007   EACH USING THREE LOCATIONS. THE INFORMATION AS TO WHETHER IT IS A JOB, WAITLIST, OR A LONGCALL IS GIVEN BY THE
R0009   WAY THINGS ARE PUT INTO THE TABLES.
R0010        A JOB HAS ITS PRIORITY STORED IN PROTTAB OF THE CORRECT PHASE SPOT - A POSITIVE PRIORITY INDICATES A
R0012   FINDVAC JOB, A NEGATIVE PRIORITY A NOVAC.  THE 2CADR OF THE JOB IS STORED IN THE CADRTAB.
R0014   FOR EXAMPLE,

A0015                                                  5.7SPOT  OCT     23000
A0016                                                           2CADR   SOMEJOB

R0017   A RESTART OF GROUP 5 WITH PHASE SEVEN WOULD THEN CAUSE SOMEJOB TO BE RESTARTED AS A FINDVAC WITH PRIORITY 23

A0019                                                  5.5SPOT  OCT     -23000
A0020                                                           2CADR   ANYJOB

R0021   HERE A RESTART OF GROUP 5 WITH PHASE 7 WOULD CAUSE ANYJOB TO BE RESTARTED AS A NOVAC WITH PRIORITY 23.
R0023   A LONGCALL HAS ITS GENADR OF ITS 2CADR STORED NEGATIVELY AND ITS BBCON STORED POSITIVELY.  IN ITS PROTTAB IS
R0025   PLACED THE LOCATION OF A DP REGISTER THAT CONTAINS THE DELTA TIME THAT LONGCALL HAD BEEN ORIGINALLY STARTED
R0027   WITH.  EXAMPLE,

A0028                                                  3.6SPOT  GENADR  DELTAT
A0029                                                          -GENADR  LONGTASK
A0030                                                           BBCON   LONGTASK

A0031                                                           OCT     31000
A0032                                                           2CADR   JOBAGAIN

R0033   THIS WOULD START UP LONGTASK AT THE APPROPRIATE TIME, OR IMMEDIATELY IF THE TIME HAD ALREADY PASSED. IT SHOULD
R0035   BE NOTED THAT IF DELTAT IS IN A SWITCHED E BANK, THIS INFORMATOIN SHOULD BE IN THE BBCON OFTHE 2CADR OF THE
R0037   TASK.  FROM ABOVE, WE SEE THAT THE SECOND PART OF THIS PHASE WOULD BE STARTED AS A JOB WITH A PRIORITY OF 31.

R0039   WAITLIST CALLS ARE IDENTIFIED BY THE FACT THAT THEIR 2CADR IS STORED NEGATIVELY. IF PROTTAB OF THE PHASE SPOT
R0041   IS POSITIVE, THEN IT CONTAINS THE DELTA TIME, IF PROTTAB IS NEGATIVE THEN IT IS THE -GENADR OF AN ERASABLE
R0043   LOCATION CONTAINING THE DELTA TIME, THAT IS, THE TIME IS STORED INDIRECTLY.  IT SHOULD BE NOTED AS ABOVE, THAT
R0045   IF THE TIME IS STORED INDIRECTLY, THE BBCON MUST CONTAIN THE NECESSARY E BANK INFORMATION IF APPLICABLE   WITH
R0047   WAITLIST WE HAVE ONE FURTHER OPTION, IF -0 IS STORED IN PROTTAB, IT WILL CAUSE AN IMMEDIATE RESTART OF THE
R0049   TASK.  EXAMPLES,

A0050                                                           OCT     77777           THIS WILL CAUSE AN IMMEDIATE RESTART
A0051                                                          -2CADR   ATASK           OF THE TASK :ATASK:

A0052                                                           DEC     200             IF THE TIME OF THE 2 SECONDS SINCE DUMMY
A0053                                                          -2CADR   DUMMY           WAS PUT ON WAITLIST IS UP, IT WILL BEGIN
A0054                                                                                   IN 10 MS, OTHERWISE IT WILL BEGIN WHEN
A0055                                                                                   IT NORMALLY WOULD HAVE BEGUN.
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L       RESTART TABLES                                                      USER'S PAGE NO.   2       EO S3

A0056                                                    -GENADR DTIME           WHERE OTIME CONTAINS THE DELTA TIME
A0057                                                    -2CADR  TASKTASK        OTHERWISE THIS IS AS ABOVE

R0058   *****   NOW THE TABLES THEMSELVES *****

 0059                          01,2002                    BANK    01
 0060   REF   1                01,2000                    SETLOC  RESTART
 0061                          01,2002                    BANK

 0062                          01,2000           PRDTTAB  EQUALS 12000           USED TO FIND THE PRIORITY OR DELTATIME
 0063                          01,2001           CADRTAB  EQUALS 12001           THIS AND THE NEXT RELATIVE LOC CONTAIN
A0064                                                                            RESTART 2CADR

 0065   REF   1                                           COUNT* $$/RSTAB        TABLES IN BANK 1.
 0066   REF   1                01,2002  0 0010 0  SIZETAB TC      1.2SPOT -12006
 0067   REF   1                01,2003  0 0020 0          TC      1.3SPOT -12004
 0068   REF   1                01,2004  0 0010 0          TC      2.2SPOT -12006
 0069   REF   1                01,2005  0 0026 0          TC      2.3SPOT -12004
 0070   REF   1                01,2006  0 0010 0          TC      3.2SPOT -12006
 0071   REF   1                01,2007  0 0056 1          TC      3.3SPOT -12004
 0072   REF   1                01,2010  0 0062 0          TC      4.2SPOT -12006
 0073   REF   1                01,2011  0 0072 1          TC      4.3SPOT -12004
 0074   REF   1                01,2012  0 0145 1          TC      5.2SPOT -12006
 0075   REF   1                01,2013  0 0163 0          TC      5.3SPOT -12004
 0076   REF   1                01,2014  0 0010 0          TC      6.2SPOT -12006
 0077   REF   1                01,2015  0 0174 0          TC      6.3SPOT -12004
 0078                          01,2016    21000 1 1.2SPOT OCT     21000          A DUMMY EXAMPLE TO BE REPLACED AS SOON
 0079   REF  29  LAST  215        0074                    EBANK=  STATE
 0080   REF   3  LAST  235     01,2017    05155 0         2CADR   ENDOFJOB       AS THERE IS A LEGITIMATE 1.2SPOT
 0080                          01,2020    04060 0
 0081                          01,2021    00144 0         DEC     100
 0082   REF  30  LAST  240        0074                    EBANK=  STATE
 0083   REF   3  LAST  168     01,2022    05261 1         2CADR   TASKOVER
 0083                          01,2023    04060 0
R0084   ANY MORE GROUP 1.EVEN RESTART VALUES SHOULD GO HERE

 0085   REF   2  LAST  149     01,2024    76300 0 1.3SPOT -GENADR SAVET-30
 0086   REF   2  LAST  149     E7,1515                     EBANK= DVCNTR
 0087   REF   1                01,2025    75427 1         -2CADR  ULLGTASK
 0087   REF   1                01,2026    03710 1
 00872                         01,2027    32000 0 1.5SPOT OCT     32000
 00874  REF   3  LAST  203     E7,1654                    EBANK=  HMEAS
 00876  REF   1                01,2030    03630 1         2CADR   REREPOS
 00876  REF   1                01,2031    66067 0
R0088   ANY MORE GROUP 1.ODD RESTART VALUES SHOULD GO HERE

 0089   REF   2  LAST  240     01,2016            2.2SPOT EQUALS  1.2SPOT
R0090   ANY MORE GROUP 2.EVEN RESTART VALUES SHOULD GO HERE

 0091   REF   1                01,2032    02627 0 2.3SPOT GENADR  600SECS
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L          RESTART TABLES                                                                                USER'S PAGE NO.   3      EO S3

  0092    REF    1                01,2033    75175 0              -GENADR STATEINT
  0093    REF    3   LAST   238   E3,1554                          EBANK= RRECTCSM
  0094    REF    2   LAST   241   01,2034    26063 0               BBCON  STATEINT

  0095                            01,2035    05000 1  2.5SPOT      OCT    05000
  0096    REF    4   LAST   241   E3,1554                          EBANK= RRECTCSM
  0097    REF    1                01,2036    02611 0               2CADR  STATINT1
  0097    REF    1                01,2037    26063 0
  0098                            01,2040    02734 0  2.7SPOT      DEC    1500
  0099    REF    3   LAST   189   E7,1456                          EBANK= LOSCOUNT
  0100    REF    1                01,2041    75533 0              -2CADR  P20LEMC1
  0100    REF    1                01,2042    27710 1

  0101                            01,2043    14000 1  2.11SPOT     OCT    14000
  0102    REF    3   LAST   148   E7,1762                          EBANK= P21TIME
  0103    REF    1                01,2044    02414 1               2CADR  P25LEM1
  0103    REF    1                01,2045    50067 0
  0104                            01,2046    10000 0  2.13SPOT     OCT    10000
  0105    REF    4   LAST   241   E7,1456                          EBANK= LOSCOUNT
  0106    REF    1                01,2047    02223 0               2CADR  RELINUS
  0106    REF    1                01,2050    54067 1
  0107                            01,2051    26000 0  2.15SPOT     OCT    26000
  0108    REF    5   LAST   241   E7,1456                          EBANK= LOSCOUNT
  0109    REF    1                01,2052    02654 1               2CADR  R22RSTRT
  0109    REF    1                01,2053    50067 0
  0110                            01,2054    77777 0  2.17SPOT     OCT    77777
  0111    REF    1                E7,1700                          EBANK= VGPREV
  0112    REF    1                01,2055    75436 1              -2CADR  REDO2.17
  0112    REF    1                01,2056    03710 1
  0113                            01,2057    00031 0  2.21SPOT     DEC    25
  0114    REF    3   LAST   240   E7,1515                          EBANK= DVCNTR
  0115    REF    1                01,2060    75771 1              -2CADR  R10,R11
  0115    REF    1                01,2061    35710 1
 R0116    ANY MORE GROUP 2.ODD RESTART VALUES SHOULD GO HERE.

  0117    REF    3   LAST   240   01,2016             3.2SPOT      EQUALS 1.2SPOT
 R0118    ANY MORE GROUP 3.EVEN RESTART VALUES SHOULD GO HERE

  0119    REF    1                01,2062    76355 0  3.3SPOT     -GENADR ZOOMTIME
  0120    REF    4   LAST   241   E7,1515                          EBANK= DVCNTR
  0121    REF    1                01,2063    74110 1              -2CADR  ZOOM
  0121    REF    1                01,2064    05710 1
  01212                           01,2065    20000 0  3.5SPOT      OCT    20000
  01214   REF    4   LAST   202   E7,1453                          EBANK= TTOGO
  01216   REF    1                01,2066    02540 1               2CADR  S40.13
  01216   REF    1                01,2067    56067 0
 R0122    ANY MORE GROUP 3.ODD RESTART VALUES SHOULD GO HERE

  0123                            01,2070    04704 0  4.2SPOT      DEC    2500
  0124    REF    5   LAST   241   E7,1453                          EBANK= TTOGO
 0125    REF    1                 01,2071    75423 0            -2CADR   TIG-5
 0125    REF    1                 01,2072    03710 1
 0126                             01,2073    77777 0             OCT     77777
 0127    REF    6   LAST   241    E7,1453                        EBANK=  TTOGO
 0128    REF    1                 01,2074    75433 1            -2CADR   REOC4.2
 0128    REF    1                 01,2075    03710 1
R0129    ANY MORE GROUP 4.EVEN RESTART VALUES SHOULD GO HERE

 0130                             01,2076    25000 0  4.3SPOT    OCT     25000
 0131    REF    5   LAST   241    E7,1515                        EBANK=  DVCNTR
 0132    REF    1                 01,2077    03533 1             2CADR   GOABORT
 0132    REF    1                 01,2100    64067 1
 0133                             01,2101    00062 0  4.5SPOT    DEC     50
 0134    REF    7   LAST   242    E7,1453                        EBANK=  TTOGO
 0135    REF    1                 01,2102    75211 1            -2CADR   ULLAGOFF
 0135    REF    1                 01,2103    03710 1
 0136                             01,2104    00764 1  4.7SPOT    DEC     500
 0137    REF    6   LAST   242    E7,1515                        EBANK=  DVCNTR
 0138    REF    1                 01,2105    75370 1            -2CADR   TIG-0
 0138    REF    1                 01,2106    03710 1

 0139    REF    3   LAST   196    01,2107    76260 1  4.11SPOT-GENADR   TGO +1
 0140    REF    7   LAST   242    E7,1515                        EBANK=  DVCNTR
 0141    REF    1                 01,2110    74231 1            -2CADR   ENGOFTSK
 0141    REF    1                 01,2111    03710 1
 0142                             01,2112    12000 1  4.13SPOT   OCT     12000
 0143    REF    2   LAST   141    E7,1462                        EBANK=  TRKMKCNT
 0144    REF    1                 01,2113    03227 0             2CADR   POSTBURN
 0144    REF    1                 01,2114    74067 0

 0145                             01,2115    00764 1  4.15SPOT   DEC     500
 0146    REF    8   LAST   242    E7,1453                        EBANK=  TTOGO
 0147    REF    1                 01,2116    75477 1            -2CADR   TIG-30
 0147    REF    1                 01,2117    03710 1
 0148                             01,2120    77777 0  4.17SPOT   OCT     77777
 0149    REF    8   LAST   242    E7,1515                        EBANK=  DVCNTR
 0150    REF    2   LAST   242    01,2121    75423 0            -2CADR   TIG-5
 0150                             01,2122    03710 1
 0151                             01,2123    13000 0  4.21SPOT   OCT     13000
 0152    REF    2   LAST   124    E5,1730                        EBANK=  STAR
 0153    REF    1                 01,2124    03012 1             2CADR   R51.1 +1
 0153    REF    1                 01,2125    30065 1
 0154                             01,2126    77777 0  4.23SPOT   OCT     77777
 0155    REF    9   LAST   242    E7,1515                        EBANK=  DVCNTR
 0156    REF    1                 01,2127    75345 1            -2CADR   IGNITION
 0156    REF    1                 01,2130    03710 1
 0157    REF    3   LAST   240    01,2131    01477 1  4.25SPOT   GENADR  SAVET-30
 0158    REF    1                 01,2132    75535 0            -GENADR  TIG-35
 0159    REF    4   LAST   242    E7,1477                        EBANK=  SAVET-30
 0160    REF    2   LAST   242    01,2133    74067 0             BBCON   TIG-35
 0161                           01,2134   52777 1  4.27SPOT OCT     52777
 0162   REF  10  LAST  242      E7,1515                     EBANK=  DVCNTR
 0163   REF   1                 01,2135   02070 1           2CADR   P70A
 0163   REF   1                 01,2136   42067 0
 0164                           01,2137   52777 1  4.31SPOT OCT     52777
 0165   REF  11  LAST  243      E7,1515                     EBANK=  DVCNTR
 0166   REF   1                 01,2140   02073 1           2CADR   P71A
 0166   REF   1                 01,2141   42067 0
 0167                           01,2142   46777 1  4.33SPOT OCT     46777
 0168   REF  12  LAST  243      E7,1515                     EBANK=  DVCNTR
 0169   REF   2  LAST  226      01,2143   02024 0           2CADR   GOPOOFIX
 0169                           01,2144   10067 1
 0170                           01,2145   46777 1  4.35SPOT OCT     46777
 0171   REF  13  LAST  243      E7,1515                     EBANK=  DVCNTR
 0172   REF   1                 01,2146   05655 1           2CADR   GOPODODO
 0172   REF   1                 01,2147   04067 1
 0173                           01,2150   52777 1  4.37SPOT OCT     52777
 0174   REF   1                 E7,1455                     EBANK=  WHICH
 0175   REF   1                 01,2151   02575 1           2CADR   COMFAIL
 0175   REF   1                 01,2152   74067 0
R0176   ANY MORE 4.000 RESTART VALUES SHOULD GO HERE.

 0177                           01,2153   22000 1  5.2SPOT  OCT     22000
 0178   REF  14  LAST  243      E7,1515                     EBANK=  DVCNTR
 0179   REF   1                 01,2154   02463 1           2CADR   NORMLIZE
 0179   REF   1                 01,2155   46067 1
 0180                           01,2156   00310 0           DEC     200
 0181   REF  15  LAST  243      E7,1515                     EBANK=  DVCNTR
 0182   REF   1                 01,2157   74166 0          -2CADR   REREADAC
 0182   REF   1                 01,2160   01710 0

 0183                           01,2161   00310 0  5.4SPOT  DEC     200
 0184   REF  16  LAST  243      E7,1515                     EBANK=  DVCNTR
 0185   REF   2  LAST  243      01,2162   74166 0          -2CADR   REREADAC
 0185                           01,2163   01710 0

 0186                           01,2164   20000 0           OCT     20000
 0187   REF  17  LAST  243      E7,1515                     EBANK=  DVCNTR
 0188   REF   1                 01,2165   02206 1           2CADR   SERVICER
 0188   REF   1                 01,2166   66067 0
R0189   ANY MORE GROUP 5.EVEN RESTART VALUES SHOULD GO HERE

 0190                           01,2167   00310 0  5.3SPOT  DEC     200
 0191   REF  18  LAST  243      E7,1515                     EBANK=  DVCNTR
 0192   REF   3  LAST  243      01,2170   74166 0          -2CADR   REREADAC
 0192                           01,2171   01710 0

 0193                           01,2172   77777 0  5.5SPOT  OCT     77777
 0194   REF  19  LAST  243      E7,1515                     EBANK=  DVCNTR
 0195   REF   1                 01,2173   74326 0          -2CADR   REDO5.5
 0195   REF   1                 01,2174   01710 0
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L         RESTART TABLES                                                                                USER'S PAGE NO.   6       EC S3

 0196                              01,2175   77777 0  5.7SPOT   OCT      77777
 0197     REF  20  LAST  243       E7,1515                       EBANK=  OVCNTR
 0198     REF   1                  01,2176   74361 0           -2CADR   BIBIBIAS
 0198     REF   1                  01,2177   01710 0
R0199     ANY MORE GROUP 5.ODD RESTART VALUES SHOULD GO HERE

 0200     REF   4  LAST  241       01,2016            6.2SPOT   EQUALS 1.2SPOT
 0201                              01,2200   00144 0  6.3SPOT   DEC     100
 0202     REF   6  LAST  204       E7,1441                       EBANK=  TIG
 0203     REF   1                  01,2201   75054 1           -2CADR   CLOKTASK
 0203     REF   1                  01,2202   03710 1

 0204                              01,2203   30000 1  6.5SPOT   OCT      30000           PROTECT INCREMENTING OF TIME2,TIME1 BY
 0205     REF   2  LAST  113       E3,1706                       EBANK=  TEPHEM          P27(UPDATE PROGRAM) VIA V70 OR V73
 0206     REF   1                  01,2204   03557 0            2CADR   TIMEDIDR
 0206     REF   1                  01,2205   10063 0
 0207                              01,2206   17000 1  6.7SPOT   OCT      17000
 0208     REF   2  LAST  241       E7,1700                       EBANK=  VGPREV
 0209     REF   1                  01,2207   03354 0            2CADR   RE006.7
 0209     REF   1                  01,2210   74067 0
 0001                         12,2000                     BANK     12
 0002   REF   1               07,2000                     SETLOC   AOTMARKI
 0003                         07,2000                     BANK

 0004   REF   2  LAST  147    E7,1551                     EBANK=   XYMARK
 0005   REF   1                                           COUNT*   $$/MARK

 0006                         07,2000  0 0004 0  AOTMARK  INHINT
 0007   REF   2  LAST  224    07,2001  11'307 0           CCS      MARKSTAT      SEE IF AOTMARK BUSY
 0008                         07,2002  0 2004 1           TC       +2            MARK SYSTEM BUSY-DO ALARM
 0009   REF   1               07,2003  0 2006 0           TC       EXTVBCHK
 0010   REF   1               07,2004  0 5642 1           TC       POODOO
 0011                         07,2005   20105 1           OCT      20105

 0013   REF   2  LAST  171    07,2006  3 6245 1  EXTVBCHK CAF      SIX           SEE IF EXT. VERB WORKING
 0014   REF   2  LAST  224    07,2007  7 1043 0           MASK     EXTVBACT
 0015   REF  51  LAST  233    07,2010  10 000 0           CCS      A
 0016   REF   1               07,2011  1 2044 1           TCF      MKABORT       YES-ABORT

 0017   REF  20  LAST  186    07,2012  3 4752 0           CAF      BIT2          NO-DISALLOW SOME EXTENDED VERB ACTION
 0018   REF   3  LAST  245    07,2013  27'043 0           ADS      EXTVBACT      BIT2 RESET IN ENDMARK
 0019   REF   3  LAST  225    07,2014  10 400 1  MKVAC    CCS      VAC1USE       LOOK FOR A VAC AREA-DO ABORT IF
 0020   REF   1               07,2015  1 2031 0           TCF      MKVACFND      NONE AVAILABLE
 0021   REF   2  LAST  224    07,2016  10 454 0           CCS      VAC2USE
 0022   REF   2  LAST  245    07,2017  1 2031 0           TCF      MKVACFND
 0023   REF   2  LAST  224    07,2020  10 530 0           CCS      VAC3USE
 0024   REF   3  LAST  245    07,2021  1 2031 0           TCF      MKVACFND
 0025   REF   2  LAST  224    07,2022  10 604 1           CCS      VAC4USE
 0026   REF   4  LAST  245    07,2023  1 2031 0           TCF      MKVACFND
 0027   REF   2  LAST  224    07,2024  10 660 0           CCS      VAC5USE
 0028   REF   5  LAST  245    07,2025  1 2031 0           TCF      MKVACFND
 0029   REF   1               07,2026  52 134 0           DXCH     BUF2
 00292  REF   1               07,2027  0 5706 0           TC       BAILOUT1      ALL VAC AREAS OCCUPIED - ABORT.
 0030                         07,2030   31207 0           OCT      31207

 0031   REF   3  LAST  189    07,2031  6 4752 0  MKVACFND AD       TWO
 0032   REF   3  LAST  245    07,2032  55'307 0           TS       MARKSTAT      STORE VAC ADR IN LOW 9 OF MARKSTAT

 0033   REF  17  LAST  237    07,2033  3 4755 1           CAF      ZERO
 0034   REF   4  LAST  245    07,2034  51'307 1           INDEX    MARKSTAT
 0035                         07,2035  53'777 0           TS       0 -1          ZERO IN VACUSE REG TO SHOW VAC  OCCUPIED

 0036   REF   2  LAST  183    07,2036  3 5025 0           CAF      PRIO15
 0037   REF   2  LAST  213    07,2037  0 5105 0           TC       FINDVAC       SET UP JOB FOR GETDAT
 0038   REF   3  LAST  245    E7,1551                     EBANK=   XYMARK
 0039   REF   1               07,2040   02063 0           2CADR    GETDAT
 0039   REF   1               07,2041   16067 1

 0040                         07,2042  0 0003 1           RELINT
 0041   REF   1               07,2043  1 4631 0           TCF      SWRETURN
 0042   REF   2  LAST  245   07,2044  52 134 0  MKABORT  DXCH   BUF2
 00422  REF   2  LAST  245   07,2045  0 5706 0           TC     BAILOUT1       CONFLICT WITH EXTENDED VERB
 0043                        07,2046   31211 1           OCT    31211

 0044   REF  18  LAST  245   07,2047  3 4755 1  MKRELEAS CAF    ZERO
 0045   REF   5  LAST  245   07,2050  57'307 1           XCH    MARKSTAT       SET MARKSTAT TO ZERO
 0046   REF   1              07,2051  7 5004 1           MASK   LOW9           PICK UP VAC AREA ADR
 0047   REF  52  LAST  245   07,2052  10 000 0           CCS    A
 0048   REF  53  LAST  246   07,2053  50 000 1           INDEX  A
 0049                        07,2054  54 000 0           TS     0              SHOW MKVAC AREA AVAILABLE
 0050   REF   9  LAST  229   07,2055  3 4753 1           CAF    ONE
 0051   REF  10  LAST  232   07,2056  0 4674 0           TC     IBNKCALL
 0052   REF   1              07,2057   17656 1           CADR   GOODEND        GO WAKE UP CALLING JOB
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L        AOTMARK                                                                             USER'S PAGE NO.  2       E7 S3

 00521  REF  19  LAST  246    07,2060   3 4755 1  KILLAOT   CAF    ZERO
 00522  REF   4  LAST  245    07,2061  55'043 0             TS     EXTVBACT         TERMINATE AOTMARK-ALLOW EXT VERB
 00523  REF   2  LAST  219    07,2062   0 6001 0            TC     GOTOPOOH
 0053   REF   6  LAST  246    07,2063   4 1307 0  GETDAT    CS     MARKSTAT         SET BIT12 TO DISCOURAGE MARKRUPT
 00531  REF  16  LAST  224    07,2064   7 4740 1            MASK   BIT12              BIT12 RESET AT GETMARK
 00532  REF   7  LAST  247    07,2065  27'307 0             ADS    MARKSTAT

 00533  REF   1               07,2066   3 2330 0            CAF    V01N71           DISPLAY DETENT AND STAR CODE
 0054   REF   9  LAST  227    07,2067   0 4616 1            TC     BANKCALL
 0055   REF   2  LAST  209    07,2070    20334 1            CADR   GOMARKF

 0056   REF   1               07,2071   1 2060 1            TCF    KILLAOT          V34-DOES GOTOPOOH
 0057   REF   1               07,2072   1 2074 1            TCF    DODAT            V33-PROCEED-USE THIS STAR FOR MARKS
 0058   REF   2  LAST  245    07,2073   1 2063 1  ENTERDAT  TCF    GETDAT           ENTER-REDISPLAY STAR CODE

 0069   REF   1               07,2074   3 7747 1  DODAT     CAF    HIGH9            PICK DETENT CODE FROM BITS7-9 OF AOTCODE
 0070   REF   2  LAST  198    07,2075   7 0734 0            MASK   AOTCODE          AND SEE IF CODE 1 TO 6
 0071                         07,2076   0 0006 1            EXTEND
 0072   REF  15  LAST  166    07,2077   7 4743 1            MP     BIT9
 0073   REF   4  LAST  245    07,2100  55'551 0             TS     XYMARK           STORE DETENT

 0074                         07,2101   0 0006 1            EXTEND
 0075   REF   3  LAST  247    07,2102   6 2063 0            BZMF   GETDAT           COAS CALIBRATION CODE-NO GOOD HERE

 0076   REF   1               07,2103   6 5650 1            AD     NEG7             SEE IF DETENT 7 FOR COAS
 0077                         07,2104   0 0006 1            EXTEND
 0078   REF   1               07,2105   1 2107 1            BZF    CODE7

 00785  REF   1               07,2106   1 2123 1            TCF    CODE1TO6

 0079   REF   1               07,2107   3 2331 1  CODE7     CAF    V06N87*          CODE 7, COAS SIGHTING, GET OPTIC AXIS
 0080   REF  10  LAST  247    07,2110   0 4616 1            TC     BANKCALL         AZ AND EL OF SIGHTING DEVICE FROM ASTRO
 0081   REF   3  LAST  247    07,2111    20334 1            CADR   GOMARKF

 0082   REF   2  LAST  247    07,2112   1 2060 1            TCF    KILLAOT          V34-DOES GOTOPOOH
 0083                         07,2113   1 2115 1            TCF    +2               PROCEED
 0084   REF   2  LAST  247    07,2114   1 2107 1            TCF    CODE7            ON ENTER, RECYCLE
 00841                        07,2115   0 0006 1            EXTEND
 0085   REF   2  LAST  108    07,2116   3 1345 1            DCA    AZ               PICK UP AZ AND EL IN SP 2S COMP
 0086   REF   1               07,2117  50 120 1             INDEX  FIXLOC
 0087                         07,2120  52 011 0             DXCH   8D               STORE IN 8D AND 9D OF LOCAL VAC
 0095   REF  20  LAST  247    07,2121   3 4755 1            CAF    ZERO             BACKUP SYSTEM TO BE USED
 0096   REF   1               07,2122   1 2137 1            TCF    COASCODE         ZERO APPARENT ROTATION

 0097   REF   5  LAST  247    07,2123  51'551 1   CODE1TO6  INDEX  XYMARK           INDEX AOT POSITION BY DET CODE
 0098   REF   1               07,2124   3 1411 1            CA     AOTEL -1
 0099   REF   2  LAST  247    07,2125  50 120 1             INDEX  FIXLOC
 0100                         07,2126  54 011 0             TS     9D               STORE ELEVATION IN VAC+9D

 0101   REF   6  LAST  247    07,2127  51'551 1             INDEX  XYMARK           INDEX DET CODE 1,2 OR 3
 0102   REF   2  LAST  156    07,2130   3 1403 1               CA      AOTAZ -1
 0103   REF   3  LAST  247    07,2131  50 120  1               INDEX   FIXLOC
 0104                         07,2132  54 010  1               TS      8D              STORE AZIMUTH IN VAC+80

 0105   REF   3  LAST  248    07,2133   3 1405 1               CA      AOTAZ +1        COMPENSATION FOR APPARENT ROTATION OF
 0106                         07,2134   0 0006 1               EXTEND                  AOT FIELD OF VIEW IN LEFT AND RIGTHT
 0107   REF   4  LAST  248    07,2135   5 0120 1               INDEX   FIXLOC          DETENTS IS STORED IN VAC +100 IN SP
 0108                         07,2136  20 010  1               MSU     8D              PRECISION ONES COMPLEMENT
 0109   REF   5  LAST  248    07,2137  50 120  1    COASCODE   INDEX   FIXLOC
 0110                         07,2140  54 012  0               TS      10D             ROT ANGLE

 0111   REF   4  LAST  230    07,2141   0 6042 1               TC      INTPRET         COMPUTE X AND Y PLANE VECTORS
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R0112    THE OPTAXIS SUBROUTINE COMPUTES THE X AND Y MARK PLANE VECS AND
R0113    AND ROTATES THEM THRU THE APPARENT FIELD OF VIEW ROTATION UNIQUE TO AOT
R0114    OPTAXIS USES OANB TO COMPUTE THE OPTIC AXIS
R0115     INPUT-AZIMUTH ANGLE IN SINGLE PREC AT CDU SCALE IN 8D OF JOB VAC
R0116           ELEVATION ANGLE IN SINGLE PREC AT CDU SCALE IN 9D OF JOB VAC
R0117           ROTATION ANGLE IN SINGLE PREC 1S COMP SCALED BY PI IN 10D OF VAC
R0118     OUTPUT-OPTIC AXIS VEC IN NB COORDS IN SCAXIS
R0119            X-MARK PLANE 1/4VEC IN NB COORDS AT 18D OF JOB VAC
R0120            Y-MARK PLANE 1/4VEC IN NB COORDS AT 12D OF JOB VAC

 0121                            07,2142   77624 1  OPTAXIS  CALL                        GO COMPUTE OA AND X AND Y PLANE VECS
 0122    REF   1                 07,2143   10522 0                  OANB
 0123                            07,2144   70535 0           SLOAD  SR1                  LOAD APP ROTATION IN ONES COMP
 0124                            07,2145   00013 0                  10D                  RESCALE BY 2PI
 0125                            07,2146   73406 1           PUSH   SIN                  1/2SIN(ROT)  0-1
 0126                            07,2147   71525 0           PDDL   COS
 0127                            07,2150   74206 0           PUSH   VXSC                 1/2COS(ROT)  2-3
 0128                            07,2151   00023 0                  18D
 0129                            07,2152   74325 0           PDDL   VXSC                 1/4COS(ROT)UYP    4-9
 0130                            07,2153   00001 0                  0
 0131                            07,2154   00031 0                  24D                  1/4SIN(ROT)UXP
 0132                            07,2155   45445 0           BVSU   STADR                UP 4-9
 0133                            07,2156   63762 1           STODL  12D                  YPNB=1/4(COS(ROT)UYP-SIN(ROT)UXP)
 0134                            07,2157   65361 0           VXSC   PDDL                 UP 2-3  UP 0-1  FOR EXCHANGE
 0135                            07,2160   00031 0                  24D                  1/4COS(ROT)UXP  PUSH 0-5
 0137                            07,2161   53361 0           VXSC   VAD                  1/4SIN(ROT)UYP
 0138                            07,2162   00023 0                  18D                  UP 0-5
 01381                           07,2163   77626 0           STADR
 0139                            07,2164   53754 1           STOVL  18D                  XPNB=1/4(COS(ROT)UXP+SIN(ROT)UYP)
 0140    REF   1                 07,2165   24007 0                  LO6ZEROS             INITIALIZE AVE STAR VEC ACCUMULATOR
 0141    REF   7  LAST  125      07,2166   02715 0           STORE  STARAD +6
 0142                            07,2167   77776 1           EXIT
 0143    REF   1                 07,2170 1 2202 1            TCF    GETMKS
```

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L       ACTMARK                                                                          USER'S PAGE NO.   6        E7 S3

R0144   THE OAN8 SUBROUTINE COMPUTES THE OPTIC AXIS OF THE SIGHTING INSTRUMENT
R0145   FROM AZIMUTH AND ELEVATION INPUT FROM THE ASTRONAUT.
R0146      INPUT- AZIMUTH ANGLE IN SINGLE PREC 2S COMP IN 8D OF JOB VAC
R0147             ELEVATION ANGLE IN SINGLE PREC 2S COMP IN 9D OF VAC
R0148      OUTPUT-OPTIC AXIS IN NB COORDS. IN SCAXIS
R0149             X-PLANE 1/2VEC IN NB COORDS AT 24D OF VAC
R0150             Y-PLANE 1/2VEC IN NB COORDS AT 18D OF VAC

 01501                       05,3413                         BANK    05
 01502  REF   1              04,2000                         SETLOC ACTMARK2
 01504                       04,2522                         BANK

 01506  REF   1                                              COUNT* $$/MARK

 0151                        04,2522   44001 0  OAN8         SETPD  STQ
 0152                        04,2523   00001 0                      0
 0153   REF   2  LAST  124   04,2524   02736 1                      GCTR            STORE RETURN
 0154                        04,2525   47135 0               SLOAD  RTB
 0155                        04,2526   00012 1                      9D              PICK UP SP ELV
 0156   REF   1              04,2527   21577 1                      CDULOGIC
 0157                        04,2530   71406 0               PUSH   COS
 0158                        04,2531   73525 1               PDDL   SIN             1/2COS(ELV)  PD 0-1
 01581                       04,2532   77626 0               STADR
 0159   REF   4  LAST  148   04,2533   60012 1               STODL  SCAXIS         OAX=1/2SIN(ELV)
 0160                        04,2534   00011 1                      8D              PICK UP AZ SP
 0161                        04,2535   77634 0               RTB
 0162   REF   2  LAST  250   04,2536   21577 1                      CDULOGIC
 0163                        04,2537   71406 0               PUSH   COS
 0164                        04,2540   00025 0               STORE  20D             STORE UYP(Y) 20-21
 0165                        04,2541   73525 1               PDDL   SIN             1/2COS(AZ) PD 2-3
 0166                        04,2542   57406 1               PUSH   DCOMP           PUSH 1/2SIN(AZ) 4-5
 0167                        04,2543   14027 1               STODL  22D             STORE UYP(Z) 22-23
 0168   REF   2  LAST  249   04,2544   24007 0                      LO6ZEROS
 0169                        04,2545   14023 0               STODL  18D             STORE UYP(X) 18-19   UP 4-5
 0170                        04,2546   72405 0               DMP    SL1
 0171                        04,2547   00001 0                      0
 0172   REF   5  LAST  250   04,2550   17767 1               STODL  SCAXIS +2      OAY=1/2COS(ELV)SIN(AZ)
 0173                        04,2551   72405 0               DMP    SL1            UP 2-3
 0174                        04,2552   77626 0               STADR                 UP 0-1
 0175   REF   6  LAST  250   04,2553   50006 1               STOVL  SCAXIS +4      OAZ=1/2COS(ELV)COS(AZ)
 0176                        04,2554   00023 0                      18D            LOAD UYP VEC
 0177                        04,2555   53435 0               VXV    UNIT
 0178   REF   7  LAST  250   04,2556   03765 0                      SCAXIS         UXP VEC=UYP X OA
 0179                        04,2557   00031 0               STORE  24D            STORE UXP
 0180                        04,2560   77650 1               GOTO
 0181   REF   3  LAST  250   04,2561   02736 1                      GCTR
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R0182      SURFSTAR COMPUTES A STAR VECTOR IN SM COORDINATES FOR LUNAR
R0183      SURFACE ALIGNMENT AND EXITS TO AVEIT TO AVERAGE STAR VECTORS.
R0184      GIVEN X-MARK PLANE 1/4 VEC IN NB AT 18D OF LOCAL VAC
R0185            Y-MARK PLANE 1/4 VEC IN NB AT 12D OF LOCAL VAC
R0186            CURSOR SP 2COMP AT POSITION 1 OF INDEXED MARKVAC
R0187            SPIRAL SP 2COMP AT POSITION 3 OF INDEXED MARKVAC
R0188            CDUY,Z,X AT POSITIONS 0,2,4 OF INDEXED MARKVAC
 0189                          15,2000                     BANK    15
 0190   REF   1                15,2000                     SETLOC  P50S
 0191                          15,2000                     BANK
 0192   REF   1                                            COUNT*  $$/R59

 01921                         15,2000  77773 1  SURFSTAR  VLOAD*
 01922                         15,2001  00001 0                    0,1            PUT X-MARK CDUS IN CDUSPOT FOR TRG*NBSM
 01923  REF   4  LAST  101     15,2002  00766 0            STORE   CDUSPOT
 0193                          15,2003  47133 0            SLOAD*  RTB
 0194                          15,2004  00002 0                    1,0            PICK UP YROT
 0195   REF   3  LAST  250     15,2005  21577 1                    CDULOGIC
 0196                          15,2006  00031 0            STORE   24D            STORE CURSOR FOR SPIRAL COMP (REVS)
 01961                         15,2007  77654 0            BZE
 01962  REF   1                15,2010  16171 1                    YZCHK          IF YROT ZERO-SEE IF SPOT ZERO
 0197                          15,2011  71406 0  JUSTZY    PUSH    COS
 0198                          15,2012  73525 1            PDDL    SIN            1/2COS(YROT) 0-1
 0199                          15,2013  65361 0            VXSC    PDDL           UP 0-1  1/8SIN(YROT)UXP  0-5
 0200                          15,2014  00023 0                    18D
 0201                          15,2015  52361 1            VXSC    VSU            UP   0-5
 02011                         15,2016  00015 0                    12D            UYP
 0202                          15,2017  47256 0            UNIT    VXV
 0203   REF   8  LAST  250     15,2020  03765 0                    SCAXIS
 0204                          15,2021  41456 0            UNIT    PUSH
 0205                          15,2022  47133 0            SLOAD*  RTB
 0206                          15,2023  00004 0                    3,1            PICK UP SPIRAL
 0207   REF   4  LAST  251     15,2024  21577 1                    CDULOGIC
 0208                          15,2025  00033 1            STORE   26D            STORE SPIRAL (REVS)
 0209                          15,2026  43225 0            DSU     DAD
 0210                          15,2027  00031 0                    24D
 0211   REF   1                15,2030  32047 0                    ABOUTONE
 0212                          15,2031  77605 1            DMP
 0213   REF   1                15,2032  32466 1                    DP1/12
 0214                          15,2033  00033 1            STORE   26D            SEP=(360 + SPIRAL - CURSOR)/12
 0215                          15,2034  74356 1            SIN     VXSC           UP  0-5
 0216                          15,2035  65372 1            VSL1    PDDL           1/2SIN(SEP)(UPP X CA)  0-5
 0217                          15,2036  00033 1                    26D
 0218                          15,2037  74346 0            COS     VXSC
 0219   REF   9  LAST  251     15,2040  03765 0                    SCAXIS
 0220                          15,2041  53372 1            VSL1    VAD            UP  0-5
 0221                          15,2042  45056 0  JUSTOA    UNIT    CALL
 0222   REF   1                15,2043  47666 1                    TRG*NBSM
 0224                          15,2044  34031 1            STCALL  24D            STAR VEC IN SM
 0225   REF   1                15,2045  16276 0                    AVEIT          GO AVERAGE
 0226                           15,2046    37777 1  ABOUTONE 2DEC    .99999999
 0226                           15,2047    37775 0
 0227    REF    1               15,2465             DP1/12   EQUALS DEG30           .08333333
 0228                           07,2171                      BANK   7
 0229    REF    2  LAST  245    07,2000                      SETLOC AOTMARK1
 0230                           07,2171                      BANK
 0231    REF    2 LAST   245 TO  250:    121   121*          COUNT* $$/MARK
 02311                          07,2171    53133 0  YZCHK    SLOAD* BZE             YROT ZERO AND IF SROT ZERO FORCE STAR
 02312                          07,2172    00004 0                  3,1             ALONG OPTIC AXIS
 02313   REF    1               07,2173    16177 1                  YSZERO
 02314                          07,2174    52145 0           DLOAD  GOTO
 02315                          07,2175    00031 0                  24D
 02316   REF    1               07,2176    32011 0                  JUSTZY          SROT NOT ZERO-CONTINUE NORMALLY
 02317                          07,2177    52175 0  YSZERO   VLOAD  GOTO
 02318   REF   10  LAST  251    07,2200    03765 0                  SCAXIS
 02319   REF    1               07,2201    32042 0                  JUSTOA
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P0232    THE GETMKS ROUTINE INITIALIZES THE SIGHTING MARK PROCEDURE

 0233    REF  21  LAST  247   07,2202  3 4755 1  GETMKS    CAF    ZERO             INITIALIZE MARK ID REGISTER AND MARK CNT
 0234    REF   7  LAST  247   07,2203  55'551 0            TS     XYMARK
 0235    REF   2  LAST  147   07,2204  55'550 1            TS     MARKCNTR
 0236    REF   2  LAST  246   07,2205  3 5004 0            CAF    LOW9             ZERO BITS10 TO 15 RETAINING MKVAC ADR
 0237    REF   8  LAST  247   07,2206  7 1307 0            MASK   MARKSTAT
 0238    REF   9  LAST  253   07,2207  55'307 0            TS     MARKSTAT
 0241    REF   1              07,2210  3 2620 1            CAF    MKV854*          DISPLAY V854 INITIALLY
 0242    REF  11  LAST  247   07,2211  0 4616 1  PASTIT    TC     BANKCALL
 0243    REF   1              07,2212   20345 1            CADR   GOMARK4

 0244    REF   3  LAST  247   07,2213  1 2060 1            TCF    KILLAOT          V34-DOES GOTOPOOH
 0245    REF   1              07,2214  1 2216 1            TCF    MARKCHEX         V033-PROCEED, GOT MARKS, COMPUTE LOS
 0246    REF   4  LAST  247   07,2215  1 2063 1            TCF    GETDAT           ENTER-RECYCLE TO V01N71

 0251    REF  10  LAST  253   07,2216  4 1307 0  MARKCHEX  CS     MARKSTAT         SET BIT12 TO DISCOURAGE MARKRUPT
 0252    REF  17  LAST  247   07,2217  7 4740 1            MASK   BIT12
 0253    REF  11  LAST  253   07,2220  27'307 0            ADS    MARKSTAT
 0254    REF   3  LAST  253   07,2221  7 5004 1            MASK   LOW9
 0255    REF   8  LAST  253   07,2222  55'551 0            TS     XYMARK           JAM MARK VAC ADR IN XYMARK FOR AVESTAR
 0256    REF  22  LAST  253   07,2223  3 4755 1            CAF    ZERO
 0257    REF   2  LAST  147   07,2224  55'552 0            TS     MKDEX            SET MKDEX ZERO FOR LOS VEC CNTR
 0258    REF  12  LAST  253   07,2225  3 1307 1            CA     MARKSTAT
 0259    REF   1              07,2226  7 5015 1            MASK   PRIO3            SEE IF LAST MK PAIR COMPLETE
 0260    REF  17  LAST  234   07,2227  54 001 1            TS     L
 0261    REF   2  LAST  253   07,2230  3 5015 0            CAF    PRIO3            BITS10 AND 11
 0262                         07,2231  0 0006 1            EXTEND
 0263    REF   8  LAST  218   07,2232  06 001 0            RXOR   LCHAN
 0264                         07,2233  0 0006 1            EXTEND
 0265    REF   1              07,2234  1 2241 0            BZF    AVESTAR          LAST PAIR COMPLETE-GO COMPUTE LOS
 0266    REF   3  LAST  253   07,2235  11'550 1  CNTCHK    CCS    MARKCNTR         NO PAIR SHOWING-SEE IF PAIR IN HOLD
 0267                         07,2236  1 2240 1            TCF    +2               PAIR BURIED-DECREMENT COUNTER
 0268    REF   1              07,2237  1 2325 0            TCF    MKALARM          NO PAIR-ALARM
 0269    REF   4  LAST  253   07,2240  55'550 1            TS     MARKCNTR         STORE DECREMENTED COUNTER

 0270    REF  18  LAST  253   07,2241  3 4740 0  AVESTAR   CAF    BIT12            INITIALIZE MKDEX FOR STAR LOS COUNTER
 0271    REF   3  LAST  253   07,2242  27'552 0            ADS    MKDEX            MKDEX WAS INITIALIZED ZERO IN MARKCHEX
 0272    REF   5  LAST  253   07,2243  4 1550 1            CS     MARKCNTR
 0273                         07,2244  0 0006 1            EXTEND
 0274    REF   3  LAST  245   07,2245  7 6245 0            MP     SIX              GET C(L) = - 6 MARKCNTR
 0275    REF   9  LAST  253   07,2246  4 1551 0            CS     XYMARK
 0276    REF  18  LAST  253   07,2247  6 0001 0            AD     L                ADD - MARK VAC ADR SET IN MARKCHEX
 0277    REF   6  LAST  248   07,2250  50 120 1            INDEX  FIXLOC
 0278    REF   1              07,2251  54 046 1            TS     X1               JAM - CDU ADR OF X-MARK IN X1

 0279    REF   7  LAST  253   07,2252  3 0120 1            CA     FIXLOC           SET PD POINTER TO ZERO
 0280    REF   1              07,2253  54 166 1            TS     PUSHLOC

 0281    REF   5  LAST  248   07,2254  0 6042 1            TC     INTPRET
 0282                          07,2255   76614 0           BON     VLOAD*
 0283   REF   3  LAST  238     07,2256   04307 1                   SURFFLAG        IF ON SURFACE COMPUTE VEC AT SURFSTAR
 0284   REF   1                07,2257   32000 0                   SURFSTAR
 0285                          07,2260   00002 0                   1,1             PUT Y-MARK CDUS IN CDUSPOT FOR TRG*NBSM
 0286   REF   5  LAST  251     07,2261   24766 0           STOVL   COUSPOT
 0287                          07,2262   00015 0                   120             LOAD Y-PLANE VECTOR IN NB
 0288                          07,2263   77624 1           CALL
 0289   REF   2  LAST  251     07,2264   47666 1                   TRG*NBSM        CONVERT IT TO STABLE MEMBER
 0290                          07,2265   76606 0           PUSH    VLOAD*
 0291                          07,2266   00001 0                   0,1             PUT X-MARK CDUS IN CDUSPOT FOR TRG*NBSM
 0292   REF   6  LAST  254     07,2267   24766 0           STOVL   COUSPOT
 0293                          07,2270   00023 0                   180             LOAD X-PLANE VECTOR IN NB
 0294                          07,2271   77624 1           CALL
 0295   REF   3  LAST  254     07,2272   47666 1                   TRG*NBSM        CONVERT IT TO STABLE-MEMBER
 0296                          07,2273   53435 0           VXV     UNIT            UNIT(XPSM * YPSM)
 0297                          07,2274   77626 0           STADR
 0298                          07,2275   77746 1           STORE   240

 0301                          07,2276   63335 1  AVEIT    SLOAD   ROVL            N(NUMBER OF VECS) IN 0-1
 0302   REF   4  LAST  253     07,2277   03553 1                   MKOEX
 0303                          07,2300   00031 0                   24D             LOAD CURRENT VECTOR
 0304                          07,2301   70322 0           VSR3    V/SC
 0305                          07,2302   00001 0                   0
 0306                          07,2303   14031 0           STCOL   24D             VEC/N
 0307                          07,2304   00001 0                   0
 0308                          07,2305   56225 1           OSU     DOV
 0309   REF   1                07,2306   16622 0                   DP1/8           (N-1)/N
 0310                          07,2307   53361 0           VXSC    VAO
 0311   REF   8  LAST  249     07,2310   02715 0                   STARAO +6       ADD VEC TO PREVIOUSLY AVERAGED VECTOR
 0312                          07,2311   00031 0                   240             (N-1)/N AVESTVEC + VEC/N
 0313   REF   9  LAST  254     07,2312   02715 0           STORE   STARAO +6       AVERAGE STAR VECTOR
 0314   REF   4  LAST  198     07,2313   02767 0           STORE   STARSAV2
 0315                          07,2314   77776 1           EXIT
 0316   REF   6  LAST  253     07,2315   11550 1           CCS     MARKCNTP        SEE IF ANOTHER MARK PAIR IN MKVAC
 0317   REF   2  LAST  253     07,2316  1 2240 1           TCF     AVESTAR -1      THERE IS-GO GET IT-DECREMENT COUNTER
 0318   REF   5  LAST  233     07,2317  3 4756 1  ENDMARKS CAF     FIVE            NO MORE MARKS-TERMINATE ACTMARK
 0319                          07,2320  0 0004 0           INHINT
 0320   REF   7  LAST  189     07,2321  0 5203 0           TC      WAITLIST
 0321   REF  10  LAST  253     E7,1551                     EBANK=  XYMARK
 0322   REF   1                07,2322   02047 0           2CAOR   MKRELEAS
 0322   REF   1                07,2323   16067 1

 0323   REF   1                07,2324  0 5472 0           TC      ENOMARK

 0324   REF  11  LAST  229     07,2325  0 5567 0  MKALARM  TC      ALARM           NOT A PAIR TO PROCESS-DO GETMKS
 0325                          07,2326   00111 0           OCT     111
 0326   REF   2  LAST  249     07,2327  1 2202 1           TCF     GETMKS

 0327                          07,2330   00307 0  V01N71   VN      171
 0328                          07,2331   01527 0  V06N87*  VN      687
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R0329   MARKRUPT IS ENTERED FROM INTERUPT LEAD-INS AND PROCESSES CHANNEL 16
R0330   CAUSED BY X,Y MARK OR MARK REJECT OR BY THE RATE OF DESCENT SWITCH

 0331   REF   2  LAST  157    07,2332  54 016 1  MARKRUPT TS      BANKRUPT
 0332   REF   1               07,2333  3 0033 1           CA      CDUY           STORE CDUS AND TIME NOW-THEN SEE IF
 0333   REF   5  LAST  138    07,2334  54 063 0           TS      ITEMP3         WE NEED THEM
 0334   REF   4  LAST  190    07,2335  3 0034 0           CA      CDUZ
 0335   REF   3  LAST   95    07,2336  54 064 1           TS      ITEMP4
 0336   REF   5  LAST  197    07,2337  3 0032 0           CA      CDUX
 0337   REF   2  LAST   95    07,2340  54 065 0           TS      ITEMP5
 0338                         07,2341  0 0006 1           EXTEND
 0339   REF   7  LAST  206    07,2342  3 0025 0           DCA     TIME2
 0340   REF   4  LAST  138    07,2343  52 062 1           DXCH    ITEMP1
 0341   REF  20  LAST  235    07,2344  56 002 0           XCH     Q
 0342   REF   2  LAST  157    07,2345  54 012 0           TS      QRUPT

 0343   REF   1               07,2346  3 4776 0           CAF     OCT140         SEE IF ROD INPUT HAS BEEN MADE
 0344                         07,2347  0 0006 1           EXTEND
 0345   REF   2  LAST  220    07,2350  02 016 1           RAND    NAVKEYIN
 0346   REF  54  LAST  246    07,2351  10 000 0           CCS     A
 0347   REF   1               07,2352  1 2403 0           TCF     SOMEKEY        YES

 0349   REF  19  LAST  253    07,2353  3 4740 0           CAF     BIT12          ARE WE ASKING FOR A MARK
 0350   REF  13  LAST  253    07,2354  7 1307 0           MASK    MARKSTAT
 0351   REF  55  LAST  255    07,2355  10 000 0           CCS     A
 0352   REF   8  LAST  192    07,2356  0 5270 1           TC      RESUME         DONT WANT MARK OR MKREJECT-DO NOTHING

 0353   REF  14  LAST  255    07,2357  11 307 0           CCS     MARKSTAT       ARE MARKS BEING ACCEPTED
 0354   REF   1               07,2360  1 2364 0           TCF     FINDKEY        THEY ARE-WHICH ONE IS IT
 0355   REF  12  LAST  254    07,2361  0 5567 0           TC      ALARM          MARKS NOT BEING ACCEPTED-DO ALARM
 0356                         07,2362   00112 0           OCT     112
 0357   REF   9  LAST  255    07,2363  0 5270 1           TC      RESUME

 0358   REF  16  LAST  230    07,2364  3 4747 1  FINDKEY  CAF     BIT5           SEE IF MARK REJECT
 0359                         07,2365  0 0006 1           EXTEND
 0360   REF   3  LAST  255    07,2366  02 016 1           RAND    NAVKEYIN
 0361   REF  56  LAST  255    07,2367  10 000 0           CCS     A
 0362   REF   1               07,2370  1 2460 0           TCF     MKREJ          ITS A MARK REJECT

 0363   REF  18  LAST  234    07,2371  3 4750 1           CAF     BIT4           SEE IF Y MARK
 0364                         07,2372  0 0006 1           EXTEND
 0365   REF   4  LAST  255    07,2373  02 016 1           RAND    NAVKEYIN
 0366   REF  57  LAST  255    07,2374  10 000 0           CCS     A

 0367   REF   1               07,2375  1 2421 0           TCF     YMKRUPT        ITS A Y MARK

 0368   REF  13  LAST   88    07,2376  3 4751 0           CAF     BIT3           SEE IF X MARK
 0369                         07,2377  0 0006 1           EXTEND
 0370   REF   5  LAST  255    07,2400  02 016 1           RAND    NAVKEYIN
 0371   REF  58  LAST  255    07,2401  10 000 0           CCS     A
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L        AOTMARK                                                                         USER'S PAGE NO. 12        E7 S3

 0372  REF   1              07,2402  1 2415 1            TCF     XMKRUPT        ITS A X MARK

 0373  REF   2  LAST  255   07,2403  3 4776 0  SOMEKEY   CAF     OCT140         NOT MARK OR MKREJECT-SEE IF DESCENT BITS
 0374                       07,2404  0 0006 1            EXTEND
 0375  REF   6  LAST  255   07,2405  02 016 1            RAND    NAVKEYIN
 0376                       07,2406  0 0006 1            EXTEND
 0377                       07,2407  1 2412 0            BZF     +3             IF NO BITS

 0378  REF   6  LAST  232   07,2410  0 4635 0            TC      POSTJUMP       IF DESCENT BITS
 0379  REF   1              07,2411    46455 1           CADR    DESCBITS

 0380  REF  13  LAST  255   07,2412  0 5567 0            TC      ALARM          NO INBITS IN CHANNEL 16
 0381                       07,2413    00113 1           OCT     113

 0382  REF  10  LAST  255   07,2414  0 5270 1            TC      RESUME

 0383  REF  23  LAST  253   07,2415  3 4755 1  XMKRUPT   CAF     ZERO
 0384  REF  13  LAST  170   07,2416  54 070 1            TS      RUPTREG1       SET X MARK STORE INDEX TO ZERO
 0385  REF  17  LAST  222   07,2417  3 4742 1            CAF     BIT10
 0386                       07,2420  1 2424 0            TCF     +4
 0387  REF  10  LAST  246   07,2421  3 4753 1  YMKRUPT   CAF     ONE
 0388  REF  14  LAST  256   07,2422  54 070 1            TS      RUPTREG1       SET Y MARK STORE INDEX TO ONE
 0389  REF  16  LAST  234   07,2423  3 4741 1            CAF     BIT11
 0390  REF  11  LAST  254   07,2424  55 551 0            TS      XYMARK         SET MARK IDENTIFICATION

 03901 REF   1              07,2425  0 2513 1            TC      MARKTYPE       SEE IF SURFACE MARK
 03902 REF   1              07,2426  1 2520 0            TCF     SURFSTOR       SURFACE MARK-JUST STORE CDUS

 0391  REF  25  LAST  218   07,2427  3 4736 1            CAF     BIT14          GOT A MARK-SEE IF MARK PAIR MADE
 0392  REF  15  LAST  255   07,2430  7 1307 0            MASK    MARKSTAT
 0393                       07,2431  0 0006 1            EXTEND
 0394  REF   1              07,2432  1 2443 1            BZF     VERIFYMK       NOT A PAIR, NORMAL PROCEDURE
 0395  REF   7  LAST  254   07,2433  4 1550 1            CS      MARKCNTR       GOT A PAIR, SEE IF ANOTHER CAN BE MADE
 0396  REF   3  LAST  214   07,2434  6 4751 0            AD      FOUR           IF SO, INCREMENT POINTER,CLEAR BITS10,11
 0397                       07,2435  0 0006 1            EXTEND
 0398  REF   1              07,2436  6 2453 1            BZMF    5MKALARM       HAVE FIVE MARK PAIRS-DONT ALLOW MARK
 0399  REF   8  LAST  256   07,2437  25 550 0            INCR    MARKCNTR       OK FOR ANOTHER PAIR, INCR POINTER
 0400  REF   1              07,2440  4 7714 0            CS      PRIO23         CLEAR BITS10,11,14 FOR NEXT PAIR
 0401  REF  16  LAST  256   07,2441  7 1307 0            MASK    MARKSTAT
 0402  REF  17  LAST  256   07,2442  55 307 0            TS      MARKSTAT

 0403  REF  12  LAST  256   07,2443  3 1551 1  VERIFYMK  CA      XYMARK
 0404  REF  18  LAST  256   07,2444  7 1307 0            MASK    MARKSTAT
 0405  REF  59  LAST  255   07,2445  10 000 0            CCS     A
 0406                       07,2446  1 2450 0            TCF     +2             THIS MARK NOT DESIRED
 0407  REF   1              07,2447  1 2525 0            TCF     VACSTOR        MARK DESIRED - STORE CDUS
 0408  REF  14  LAST  256   07,2450  0 5567 0            TC      ALARM
 0409                       07,2451    00114 0           OCT     114
 0410  REF  11  LAST  256   07,2452  0 5270 1            TC      RESUME         RESUME-DISPLAY UNCHANGED-WAIT FOR ACTION
 0411    REF  15  LAST  256    07,2453  0 5567 0  5MKALARM TC      ALARM          ATTEMPTING TO MAKE MORE THAN 5 MK PAIRS
 0412                          07,2454   00107 1           CCT     107
 04121   REF   2  LAST  256    07,2455  0 2513 1           TC      MARKTYPE       SEE IF SURFACE MARK
 04122   REF   1               07,2456  1 2626 0           TCF     DSPV6N79       IT IS
 0413    REF  12  LAST  256    07,2457  0 5270 1           TC      RESUME         DONT CHANGE DISPLAY-DO NOTHING
 0414    REF    3  LAST   257    07,2460   0 2513 1  MKREJ     TC       MARKTYPE         SEE IF SURFACE
 04141   REF    1                07,2461   1 2506 1            TCF      SURFREJ          SURFACE-JUST CHECK MARK COUNTER

 04142   REF    3  LAST   253    07,2462   3 5015 0            CAF      PRIO3            INFLIGHT-SEE IF MARKS MADE
 0415    REF   19  LAST   256    07,2463   7 1307 0            MASK     MARKSTAT
 0416    REF   60  LAST   256    07,2464  10 000  0            CCS      A
 0417    REF    1                07,2465   1 2471 0            TCF      REJECT           MARKS MADE-REJECT ONE
 0418    REF   16  LAST   257    07,2466   0 5567 0  REJALM    TC       ALARM            NO MARK TO REJECT-BAD PROCEDURE-ALARM
 0419                            07,2467    00115 1            OCT      115
 0420    REF   13  LAST   257    07,2470   0 5270 1            TC       RESUME           DESIRED ACTION DISPLAYED

 0421    REF    5  LAST   229    07,2471   4 4355 1  REJECT    CS       PRIO30           ZERO BIT14,SHOW REJ.,SEE IF MARK SINCE
 0422    REF   20  LAST   258    07,2472   7 1307 0            MASK     MARKSTAT         LAST REJECT
 0423    REF   19  LAST   221    07,2473   6 4737 0            AD       BIT13
 0424    REF   21  LAST   258    07,2474  57'307 1            XCH      MARKSTAT
 0425    REF   20  LAST   258    07,2475   7 4737 1            MASK     BIT13
 0426    REF   61  LAST   258    07,2476  10 000  0            CCS      A
 0427    REF    1                07,2477   1 2504 0            TCF      REJECT2          ANOTHER REJECT SET BIT 10+11 TO ZERO

 0428    REF   13  LAST   256    07,2500   4 1551 0            CS       XYMARK           MARK MADE SINCE REJECT-REJECT MARK IN 1D
 0429    REF   22  LAST   258    07,2501   7 1307 0  RENEWMK   MASK     MARKSTAT
 0430    REF   23  LAST   258    07,2502  55'307 0            TS       MARKSTAT
 0431    REF    1                07,2503   1 2576 0            TCF      REMARK           GO REQUEST NEW MARK ACTION

 0432    REF    4  LAST   258    07,2504   4 5015 1  REJECT2   CS       PRIO3            ON SECOND REJECT-DISPLAY VB53 AGAIN
 0433    REF    1                07,2505   1 2501 0            TCF      RENEWMK

 04331   REF    9  LAST   256    07,2506  11'550 1  SURFREJ   CCS      MARKCNTR         IF MARK DECREMENT COUNTER
 04332                           07,2507   1 2511 1            TCF      +2
 04333   REF    1                07,2510   1 2466 0            TCF      REJALM           NO MARKS TO REJECT-ALARM
 04334   REF   10  LAST   258    07,2511  55'550 1            TS       MARKCNTR
 04335   REF   14  LAST   258    07,2512   0 5270 1            TC       RESUME
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R0434

R0435   MARKTYPE TESTS TO SEE IF LEM ON LUNAR SURFACE. IF IT IS RETURN TC LOC+1

 0436   REF  1              07,2513  4 0104 0  MARKTYPE CS     FLAGWRD8       SURFFLAG*******TEMPORAPY*****
 0437   REF 19  LAST  234   07,2514  7 4744 0           MASK   BIT8
 0438   REF 62  LAST  258   07,2515  10 000 0           CCS    A
 0439   REF 21  LAST  255   07,2516  24 002 0           INCR   Q              IF SURFACE MARK REUTNR TC LOC +1
 0440   REF 22  LAST  259   07,2517  0 0002 0           TC     Q              IF INFLIGHT MARK RETURN TO LOC +2

 04401  REF 24  LAST  256   07,2520  3 4755 1  SURFSTOR CAF    ZERO           FOR SURFACE MARK ZERO MARK KINO INDEX
 04402  REF 15  LAST  256   07,2521  54 070 1           TS     RUPTREG1

 04403  REF 24  LAST  256   07,2522  4 1307 0           CS     MARKSTAT       SET BITS10,11 TO SHOW SURFACE MARK
 04404  REF  5  LAST  258   07,2523  7 5015 1           MASK   PRIO3          FOR MARKCHEX
 04405  REF 25  LAST  259   07,2524  27'307 0           AOS    MARKSTAT

 0441   REF  4  LAST  253   07,2525  3 5004 0  VACSTOR  CAF    LOW9
 0442   REF 26  LAST  259   07,2526  7 1307 0           MASK   MARKSTAT       STORE MARK VAC AOR IN RUPTREG2
 0443   REF  6  LAST  173   07,2527  54 071 0           TS     RUPTREG2
 0444                       07,2530  0 0006 1           EXTEND
 0445   REF  5  LAST  255   07,2531  3 0062 0           DCA    ITEMP1         PICK UP MARKTIME
 0446   REF  1              07,2532  53'562 0           DXCH   TSIGHT         STORE LAST MARK TIME
 0447   REF 11  LAST  258   07,2533  3 1550 0           CA     MARKCNTR       6 X MARKCNTR FOR STORE INDEX
 0448                       07,2534  0 0006 1           EXTEND
 0449   REF  4  LAST  253   07,2535  7 6245 0           MP     SIX
 0450   REF 19  LAST  253   07,2536  56 001 0           XCH    L              GET INOEX FROM LOW ORDER PART
 0451   REF  7  LAST  259   07,2537  6 0071 1           AD     RUPTREG2       SET CDU STORE INDEX TO MARKVAC
 04511  REF 16  LAST  259   07,2540  26 070 1           AOS    RUPTREG1       INCREMENT VAC PICKUP BY MARK FOR FLIGHT
 0452   REF  5  LAST  254   07,2541  55'552 0           TS     MKDEX          STORE HERE IN CASE OF SURFACE MARK
 0453   REF  6  LAST  255   07,2542  3 0063 1           CA     ITEMP3
 0454   REF 17  LAST  259   07,2543  50 070 0           INDEX  RUPTREG1
 0455                       07,2544  54 000 0           TS     0              STORE CDUY
 0456   REF  4  LAST  255   07,2545  3 0064 0           CA     ITEMP4
 0457   REF 18  LAST  259   07,2546  50 070 0           INDEX  RUPTREG1
 0458                       07,2547  54 002 1           TS     2              STORE CDUZ
 0459   REF  3  LAST  255   07,2550  3 0065 1           CA     ITEMP5
 0460   REF 19  LAST  259   07,2551  50 070 0           INDEX  RUPTREG1
 0461                       07,2552  54 004 1           TS     4              STORE CDUX
 04611  REF  4  LAST  258   07,2553  0 2513 1           TC     MARKTYPE       IF SURFACE MARK-JUST DO SURFJOB
 04612  REF  1              07,2554  1 2603 1           TCF    SURFJOB

 0462   REF 21  LAST  258   07,2555  3 4737 0           CAF    BIT13          CLEAR BIT13 TO SHOW MARK MADE
 0463   REF 14  LAST  258   07,2556  6 1551 1           AD     XYMARK         SET MARK ID IN MARKSTAT
 0464                       07,2557  4 0000 0           COM
 0465   REF 27  LAST  259   07,2560  7 1307 0           MASK   MARKSTAT
 0466   REF 15  LAST  259   07,2561  6 1551 1           AD     XYMARK
 0467   REF 28  LAST  259   07,2562  55'307 0           TS     MARKSTAT
 0468   REF  6  LAST  259   07,2563  7 5015 1           MASK   PRIO3          SEE IF X, Y MARK MADE
 0469   REF 20  LAST  259   07,2564  54 001 1           TS     L
 0470   REF    7  LAST  259   07,2565   3 5015 0           CA       PRIO3
 0471                         07,2566   0 0006 1           EXTEND
 0472   REF    9  LAST  253   07,2567   06 001 0           RXOR     LCHAN
 0473   REF   63  LAST  259   07,2570   10 000 0           CCS      A
 0474   REF    2  LAST  258   07,2571   1 2576 0           TCF      REMARK          NOT PAIR YET, DISPLAY MARK ACTION
 0475   REF   29  LAST  259   07,2572   4 1307 0           CS       MARKSTAT        MARK PAIR COMPLETE-SET BIT14
 0476   REF   26  LAST  256   07,2573   7 4736 0           MASK     BIT14
 0477   REF   30  LAST  260   07,2574   27'307 0           ADS      MARKSTAT
 0478   REF    3  LAST  260   07,2575   1 2576 0           TCF      REMARK          GO DISPLAY V54
 0481   REF   8  LAST  260   07,2576  3 5015 0  REMARK    CAF      PRIO3             BITS 10 AND 11
 0482   REF  31  LAST  260   07,2577  7 1307 0            MASK     MARKSTAT
 0483                        07,2600  0 0006 1            EXTEND
 0484   REF  29  LAST  229   07,2601  7 4746 1            MP       BIT6              SHIFT MARK IDS TO BE 0 TO 3 FOR INDEX
 0485   REF   6  LAST  259   07,2602  55'552 0            TS       MKDEX             STORE VERB INDEX
 0486   REF   3  LAST  245   07,2603  3 5025 0  SURFJOB   CAF      PRIO15
 0487   REF   3  LAST  194   07,2604  0 5072 1            TC       NOVAC             ENTER JOB TO CHANGE DISPLAY TO
 0488   REF  16  LAST  259   E7,1551                      EBANK=   XYMARK            REQUEST NEXT ACTION
 0489   REF   1              07,2605   02610 1            2CADR    CHANGEVB
 0489   REF   1              07,2606   16067 1

 0490   REF  15  LAST  258   07,2607  0 5270 1            TC       RESUME

 0491   REF   5  LAST  259   07,2610  0 2513 1  CHANGEVB  TC       MARKTYPE
 0492   REF   2  LAST  257   07,2611  1 2626 0            TCF      DSPV6N79          SURFACE-DISPLAY V 06 N 79
 0493   REF   7  LAST  261   07,2612  51'552 1            INDEX    MKDEX             INFLIGHT-PICK UP MARK VB INDEX
 0494   REF   1              07,2613  3 2615 1            CAF      MKVB54
 04941  REF   1              07,2614  0 2211 1            TC       PASTIT            PASTE UP NEXT MK VERB DISPLAY

R0496   THE FOUR MKVBS ARE INDEXED-THEIR ORDER CANNOT BE CHANGED

 0497                        07,2615   15507 1  MKVB54    VN       5471              MAKE X OR Y MARK
 0498                        07,2616   15307 1  MKVB53    VN       5371              MAKE Y MARK
 0499                        07,2617   15107 0  MKVB52    VN       5271              MAKE X MARK
 0500                        07,2620   15507 1  MKVB54*   VN       5471              MAKE X OR Y MARK
 0501                        07,2621   04000 0  DP1/8     2DEC     .125
 0501                        07,2622   00000 1
 0502                        07,2623   00034 0  OCT34     OCT      34
 0503                        07,2624   01507 1  V06N71    VN       671
 05031                       07,2625   01517 0  V06N79*   VN       679
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P0504   ROUTINE TO REQUEST CURSOR AND SPIRAL MEASUREMENTS
 0505   REF    1                                           COUNT* $$/R59

 0506   REF    1                07,2626  3 2625 1  OSPV6N79 CAF    V06N79*        CURSOR-SPIRAL DISPLAY
 0507   REF   12  LAST   253    07,2627  0 4616 1           TC     BANKCALL
 0508   REF    4  LAST   247    07,2630   20334 1           CADR   GOMARKF

 0509   REF    4  LAST   253    07,2631  1 2060 1           TCF    KILLACT        V34-DOES GOTOPOOH
 0510   REF    1                07,2632  1 2640 0           TCF    SURFEND        V33-PROCEED, END MARKING
 0511   REF   30  LAST   261    07,2633  3 4746 0           CAF    BIT6           IF V32(OCT40) IN MPAC DO RECYCLE
 05111  REF   32  LAST   230    07,2634  7 0154 0           MASK   MPAC           OTHERWISE IT IS LOAD VB ENTER SO
 05112  REF   64  LAST   260    07,2635 10 000 0            CCS    A              RE-DISPLAY V06N79
 05113  REF    1                07,2636  1 2644 1           TCF    SURFAGAN       VB32-RECYCLE
 05114  REF    3  LAST   261    07,2637  1 2626 0           TCF    OSPV6N79       ENTER

 0512   REF   27  LAST   260    07,2640  4 4736 0  SURFEND  CS     BIT14          SET BIT14 TO SHOW MARK END
 0513   REF   32  LAST   261    07,2641  7 1307 0           MASK   MARKSTAT
 05131  REF   28  LAST   262    07,2642  6 4736 1           AD     BIT14
 0514   REF   33  LAST   262    07,2643 55'307 0            TS     MARKSTAT

 0515   REF    1                07,2644  3 1235 1  SURFAGAN CA     CURSOR
 0516   REF    8  LAST   261    07,2645 51'552 1            INDEX  MKDEX          HOLDS VAC AREA POINTER FOR SURF MARKING
 0517                           07,2646 54 001 1            TS     1              STORE CURSOR SP 2COMP
 0518   REF    1                07,2647  3 1237 0           CA     SPIRAL
 0519   REF    9  LAST   262    07,2650 51'552 1            INDEX  MKDEX
 0520                           07,2651 54 003 0            TS     3              STORE SPIRAL

 0521   REF   34  LAST   262    07,2652  4 1307 0           CS     MARKSTAT       IF BIT 14 SET-END MARKING
 0522   REF   29  LAST   262    07,2653  7 4736 0           MASK   BIT14
 0523                           07,2654  0 0006 1           EXTEND
 0524   REF    2  LAST   253    07,2655  1 2216 1           BZF    MARKCHEX
 0525   REF   12  LAST   259    07,2656  3 1550 0           CA     MARKCNTR       THIS IS RECYCLE-SEE IF 5 MARKS ALREADY
 0526   REF   11  LAST   256    07,2657  6 4753 1           AD     ONE
 0527                           07,2660  4 0000 0           COM
 0528   REF    6  LAST   254    07,2661  6 4756 1           AD     FIVE
 0529                           07,2662  0 0006 1           EXTEND
 0530   REF    2  LAST   256    07,2663  6 2453 1           BZMF   5MKALARM       CANT RECYCLE-TO MANY MARKS-ALARM
 0531   REF   13  LAST   262    07,2664 25'550 0            INCR   MARKCNTR       OF FOR RECYCLE-INCR COUNTER
 0532   REF    3  LAST   254    07,2665  1 2205 0           TCF    GETMKS +3      GO DISPLAY MARK VB
 0001                            07,2666                          BANK     7
 0002   REF    1                 43,2000                          SETLOC   EXTVERBS
 0003                            43,2000                          BANK

 0004   REF    3  LAST   198     E5,1737                          EBANK=   OGC

 0005   REF    1                                                  COUNT*   $$/EXTVB
R0006   FAN-OUT

 0007   REF   33  LAST   262     43,2000   50 154 1   GOEXTVB     INDEX    MPAC          VERB-40 IS IN MPAC
 0008   REF    1                 43,2001   0 2002 1               TC       LST2FAN       FAN AS BEFORE.

 0009   REF    1                 43,2002   0 2126 0   LST2FAN     TC       VBZERO        VB40 ZERO (USED WITH NOUN 20 OR 72 ONLY)
 0010   REF    1                 43,2003   0 2200 1               TC       VBCOARK       VB41 COARSE ALIGN (USED WITH NOUN 20 OR
A0011                                                                                                                  72 ONLY)
 0012   REF    1                 43,2004   0 2371 0               TC       IMUFINEK      VB42 FINE ALIGN IMU
 0013   REF    1                 43,2005   0 2733 1               TC       IMUATTCK      VB43  LOAD IMU ATTITUDE ERROR METERS
 0014   REF    1                 43,2006   0 2305 0               TC       RRDESEND      VB44 TERMINATE CONTINUOUS DESIGNATE
 0015   REF    1                 43,2007   0 2116 0               TC       ALM/END       VB45 SPARE
 0016   REF    2  LAST   263     43,2010   0 2116 0               TC       ALM/END       VB46 SPARE
 0017   REF    1                 43,2011   0 2430 1               TC       V47TXACT      VB47 AGS INITIALIZATION
 0018   REF    1                 43,2012   0 3156 0               TC       DAPDISP       VB48  LOAD A/P DATA
 0019   REF    1                 43,2013   1 3036 0               TCF      CREWMANU      VB49 START AUTOMATIC ATTITUDE MANEUVER
 0020   REF    1                 43,2014   0 2422 1               TC       GOLOADLV      VB50 PLEASE PERFORM
 0021   REF    3  LAST   263     43,2015   0 2116 0               TC       ALM/END       VB51 SPARE
 0022   REF    2  LAST   263     43,2016   0 2422 1               TC       GOLOADLV      VB52 PLEASE MARK X - RETICLE.
 0023   REF    3  LAST   263     43,2017   0 2422 1               TC       GOLOADLV      VB53 PLEASE MARK Y - RETICLE.
 0024   REF    4  LAST   263     43,2020   0 2422 1               TC       GOLOADLV      VB54 PLEASE MARK X OR Y - RETICLE
 0025   REF    1                 43,2021   0 2442 1               TC       ALINTIME      VB55 ALIGN TIME
 0026   REF    1                 43,2022   0 3045 0               TC       TRMTRACK      VB56 TERMINATE TRACKING - P20 + P25
 0027   REF    1                 43,2023   0 2325 1               TC       LRON          VB57 PERMIT  LANDING RADAR UPDATES
 0028   REF    1                 43,2024   0 2366 0               TC       LROFF         VB58 INHIBIT LANDING RADAR UPDATES
 0029   REF    1                 43,2025   0 2147 1               TC       LRPOS2K       VB59 COMMAND LR TO POSITION 2
 0030   REF    1                 43,2026   0 2175 0               TC       RATEDISP      VB60 DISPLAY DAP ESTIMATED RATES
 0031   REF    1                 43,2027   0 2165 1               TC       DAPATTER      VB61 DISPLAY DAP ATTITUDE ERROR
 0032   REF    1                 43,2030   0 2170 0               TC       TOTATTER      VB62 DISPLAY TOTAL ATTITUDE ERROR
 0033   REF    1                 43,2031   0 2455 1               TC       R04           VB63 SAMPLE RADAR ONCE PER SECOND
 0034   REF    1                 43,2032   0 2725 0               TC       VB64          VB64 CALCULATE,DISPLAY S-BAND ANT ANGLES
 0035   REF    1                 43,2033   0 3246 1               TC       SNUFFOUT      VB65 DISABLE U,V JETS DURING DPS BURNS.
 0036   REF    1                 43,2034   0 3163 0               TC       ATTACHED      VB66 ATTACHED   MOVE THIS TO OTHER STATE
 0037   REF    1                 43,2035   0 3240 1               TC       V67           VB67 W MATRIX MONITOR
 0038   REF    4  LAST   263     43,2036   0 2116 0               TC       ALM/END       VB68 SPARE
 0039   REF    1                 43,2037   0 2037 1   VERB69      TC       VERB69        VB69 FORCE A HARDWARE RESTART
 0040   REF    1                 43,2040   0 3751 1               TC       V70UPDAT      VB70 UPDATE LIFTOFF TIME.
 0041   REF    1                 43,2041   0 3753 0               TC       V71UPDAT      VB71 UNIVERSAL UPDATE - BLOCK ADDRESS.
 0042   REF    1                 43,2042   0 3755 0               TC       V72UPDAT      VB72 UNIVERSAL UPDATE - SINGLE ADDRESS.
 0043   REF    1                 43,2043   0 3757 1               TC       V73UPDAT      VB73 UPDATE AGC TIME (OCTAL).
 0044   REF    1                 43,2044   0 3066 1               TC       DNEDUMP       VB74 INITIALIZE DOWN-TELEMETRY PROGRAM
A0045                                                                                             FOR ERASABLE DUMP.
 0046   REF    1                 43,2045   0 3251 1               TC       OUTSNUFF      VB75 ENABLE U,V JETS DURING DPS BURNS.
 0047    REF    1                43,2046   0 3025 0                 TC       MINIMP               VB76 MINIMUM IMPULSE MODE
 0048    REF    1                43,2047   0 3030 1                 TC       NOMINIMP             VB77 RATE COMMAND MODE
 0049    REF    1                43,2050   0 2445 0                 TC       R77                  VB78 START LR SPURIOUS RETURN TEST
 0050    REF    1                43,2051   0 2655 0                 TC       R77END               VB79 TERMINATE LR SPURIOUS RETURN TEST
 0051    REF    1                43,2052   0 3072 1                 TC       LEMVEC               VB80 UPDATE LEM STATE VECTOR
 0052    REF    1                43,2053   0 3075 0                 TC       CSMVEC               VB81 UPDATE CSM STATE VECTOR
 0053    REF    1                43,2054   0 2772 1                 TC       V82PERF              VB82 REQUEST ORBIT PARAM DISPLAY (R30)
 0054    REF    1                43,2055   0 3002 0                 TC       V83PERF              VB83 REQUEST REND PARAM DISPLAY (R31)
 0055    REF    5  LAST   263    43,2056   0 2116 0                 TC       ALM/END              VB84 SPARE
 0056    REF    1                43,2057   0 3254 1                 TC       VERB85               VB85 DISPLAY RR LOS AZ AND ELEV
 0057    REF    6  LAST   264    43,2060   0 2116 0                 TC       ALM/END              VB86 SPARE
 0058    REF    7  LAST   264    43,2061   0 2116 0                 TC       ALM/END              VB87 SPARE
 0059    REF    8  LAST   264    43,2062   0 2116 0                 TC       ALM/END              VB88 SPARE
 0060    REF    1                43,2063   0 3010 0                 TC       V89PERF              VB89 ALIGN XORZ LEM AXIS ALONG LOS (R63)
 0061    REF    1                43,2064   0 3017 1                 TC       V90PERF              VB90 OUT OF PLANE RENDEZVOUS DISPLAY
 0062    REF    1                43,2065   0 3121 0                 TC       GOSHOSUM             VB91 DISPLAY BANK SUM.
 0063    REF    1                43,2066   0 3105 0                 TC       SYSTEST              VB92 OPERATE IMU PERFORMANCE TEST.
 0064    REF    1                43,2067   0 3114 0                 TC       WMATRXNG             VB93 CLEAR RENDWFLG
 0065    REF    9  LAST   264    43,2070   0 2116 0                 TC       ALM/END              VB94 SPARE
 0066    REF    1                43,2071   0 3102 1                 TC       UPDATOFF             VB95 NO STATE VECTOR UPDATE ALLOWED
 0067    REF    1                43,2072   0 3233 0                 TC       VERB96               VB96 INTERRUPT INTEGRATION AND GO TO P00
 0068    REF    5  LAST   263    43,2073   0 2422 1                 TC       GOLOADLV             VB97 PLEASE VERIFY ENGINE FAILURE
 0069    REF   10  LAST   264    43,2074   0 2116 0                 TC       ALM/END              VB98 SPARE
 0070    REF    6  LAST   264    43,2075   0 2422 1                 TC       GOLOADLV             VB99 PLEASE ENABLE ENGINE

R0071    END OF EXTENDED VERB FAN


 0072    REF    5  LAST   247    43,2076  11'043 0    TESTXACT CCS      FXTVBACT             ARE EXTENDED VERBS BUSY
 0073    REF   11  LAST   264    43,2077   0 2116 0                 TC       ALM/END              YES, TURN ON OPERATOR LIGHT
 0074    REF    2  LAST   224    43,2100   3 0100 0                 CA       FLAGWRD4             ARE PRIORITY DISPLAYS USING DSKY
 0075    REF    1                43,2101   7 2125 1                 MASK     OC24100
 00751   REF   65  LAST   262    43,2102  10 000 0                  CCS      A
 00752   REF   12  LAST   264    43,2103   0 2116 0                 TC       ALM/END              YES
 0076    REF    1                43,2104   3 4362 1                 CAF      OCT25                SET BITS 1, 3, AND 5
 0077    REF    6  LAST   264    43,2105  54'043 0    SETXTACT TS       FXTVBACT             NO. SET FLAG TO SHOW EXT VERB DISPLAY
A0078                                                                                          SYSTEM BUSY

 0079    REF   23  LAST   259    43,2106   3 0002 0                 CA       0
 0080    REF   34  LAST   263    43,2107  54 155 1                  TS       MPAC +1

 0081    REF    4  LAST   245    43,2110   4 4752 1                 CS       TWO                  BLANK EVERYTHING EXCEPT MM AND VERB
 0082    REF    1                43,2111   0 4154 0                 TC       NVSUB
 0083                            43,2112   0 2113 0                 TC       +1
 00835   REF    2  LAST   223    43,2113  10 067 1                  CCS      NEWJOB
 00836   REF    1                43,2114   0 5122 0                 TC       CHANG1

 0084    REF   35  LAST   264    43,2115   0 0155 0                 TC       MPAC +1

 0087    REF    6  LAST   210       5472                TERMEXTV EQUALS   ENDEXT
 0088   REF   7  LAST  264        5472              ENDEXTVB EQUALS ENDEXT

 0091   REF   2  LAST  234    43,2116  0 4364 1  ALM/END  TC      FALTON         TURN ON OPERATOR ERROR LIGHT
 0092   REF   7  LAST  256    43,2117  0 4635 0  GOPIN    TC      POSTJUMP
 0093   REF   2  LAST  229    43,2120    21051 0           CADR    PINBRNCH

 0094   REF   6  LAST  233    43,2121  3 1010 1  CHKPOOH  CA      MODREG         CHECK FOR P00 OR P00-,
 0095                         43,2122  0 0006 1           EXTEND
 0096   REF   1               43,2123  1 6745 0           BZF     TCQ
 0097   REF  13  LAST  264    43,2124  0 2116 0           TC      ALM/END

 00971                        43,2125    24100 0  OCT24100 OCT     24100
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R0098             VBZERO         VERB 40             DESCRIPTION
R0099
R0100                   1. REQUIRE NOUN 20 (ICDU ANGLES) OR NOUN 72 (RCDU ANGLES).
R0101                  2. FOR N20, CHECK IMUCADR IN AN EFFORT TO AVOID A 1210 RESTART.
R0102                     FOR N72, CHECK IF EITHER RADAR IS IN USE.
R0103                   3. EXECUTE THE CDU ZERO.
R0104                   4. STALL UNTILL THE ZERO IS DONE.
R0105                   5. DON'T DIFFERENTIATE BETWEEN A BAD OR GOOD RETURN.
R0106                   6. EXIT, RE-ESTABLISHING THE INTERRUPTED DISPLAY (IF ANY).

 0110   REF   1               43,2126  0 2203 1  VBZERO    TC      CP/INERT
 0111   REF   1               43,2127  0 2131 0            TC      IMUZEROK          RETURN HERE IF NOUN = ICDU(20)
 0112   REF   1               43,2130  0 2140 0            TC      RRZEROK           RETURN HERE IF NOUN = RCDU(72)
 0113   REF   1               43,2131  0 2436 1  IMUZEROK  TC      CKMODCAD
 01131  REF  13  LAST  202    43,2132  0 4616 1            TC      BANKCALL          KEYBOARD REQ FOR ISS CDUZERO
 0114   REF   2  LAST  210    43,2133   16705 1            CADR    IMUZERO

 0115   REF  14  LAST  266    43,2134  0 4616 1            TC      BANKCALL          STALL
 0116   REF   2  LAST  210    43,2135   17707 1            CADR    IMUSTALL
 0117                         43,2136  0 2137 0            TC      +1

 0118   REF   1               43,2137  0 2117 1            TC      GOPIN             IMUZERO

 0120   REF   1               43,2140  0 2700 1  RRZEROK   TC      RDRUSECK
 01202  REF  15  LAST  266    43,2141  0 4616 1            TC      BANKCALL
 0121   REF   1               43,2142   52354 1            CADR    RRZERO

 0122   REF  16  LAST  266    43,2143  0 4616 1  RWAITK    TC      BANKCALL
 0123   REF   1               43,2144   17705 0            CADR    RADSTALL
 0124                         43,2145  1 2146 1            TCF     +1
 0125   REF   2  LAST  266    43,2146  0 2117 1            TC      GOPIN             RRZERO

R0126             LRPOS2K          VERB 59              DESCRIPTION
R0127                 COMMAND LANDING RADAR TO POSITION 2
R0129                  1. EXIT WITH CP ERROR IF SOMEONE IS USING EITHER RADAR.
R0130                   2. ALARM WITH CODE 523 IF POS 2 IS NOT INDICATED WITHIN
R0131                       THE PRESCRIBED TIME.
R01311                  3. RE-ESTABLISH THE DISPLAYS.

 0132   REF   6  LAST  253    43,2147  0 6042 1  LRPOS2K   TC      INTPRET
 01322                        43,2150   77614 1            BOFF                      IS AVG G ON ?
 01324  REF   2  LAST  220    43,2151   03752 1                    AVEGFLAG
 01326  REF   1               43,2152   66161 1                    LRPOS2K1          NO
 0133                         43,2153   77776 1            EXIT                      YES: IS P63 GOING ?
 01332  REF   1               43,2154  0 5321 1            TC      CHECKMM
 01334                        43,2155   00077 1            DEC     63
 0134   REF   2  LAST  266    43,2156  1 2162 1            TCF     LRPOS2K1 +1       NO: COMMAND LR TO POS2
 01341  REF  17  LAST  266    43,2157  0 4616 1            TC      BANKCALL
 01343  REF   1               43,2160   53541 1            CADR    V59GP63           YES: GO SET UP HIGATE JOB
 01344                        43,2161   77776 1  LRPOS2K1  EXIT
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L       EXTENDED VERBS                                                                       USER'S PAGE NO.   5      E5 S4

 01345  REF   2  LAST  266   43,2162  0 2700 1            TC      ROKUSECK        CHECK USE OF LR
 01346  REF  18  LAST  266   43,2163  0 4616 1            TC      BANKCALL
 01347  REF   1              43,2164   53531 0            CADR    LRP2COMM        COMMAND LR TO POS2
R0135   V61      VERB 61, DISPLAY DAP ATTITUDE ERRORS ON FDAI ATTITUDE ERROR NEEDLES.

 0137   REF  13  LAST  233   43,2165  0 5516 0  DAPATTER  TC      DOWNFLAG
 0138   REF   1              43,2166   00013 0            ADRES   NEEDLFLG
 0139   REF   2  LAST  263   43,2167  1 2172 0            TCF     TOTATTER +2

R0140   V62      VERB 62, DISPLAY TOTAL ATTITUDE ERRORS ON FDAI ATTITUDE ERROR NEEDLES.

 0142   REF   1              43,2170  0 5504 0  TOTATTER  TC      UPFLAG
 0143   REF   2  LAST  267   43,2171   00013 0            ADRES   NEEDLFLG
 01431  REF  14  LAST  267   43,2172  0 5516 0     +2     TC      DOWNFLAG
 01432  REF   1              43,2173   00000 1            ADRES   NEED2FLG
 0144   REF   3  LAST  266   43,2174  0 2117 1            TC      GOPIN

R01441  V60      VERB 60, DISPLAY DAP ESTIMATED RATES ON FDAI ATTITUDE ERROR NEEDLES.

 01443  REF   2  LAST  267   43,2175  0 5504 0  RATEDISP  TC      UPFLAG
 01444  REF   2  LAST  267   43,2176   00000 1            ADRES   NEED2FLG
 01445  REF   4  LAST  267   43,2177  0 2117 1            TC      GOPIN

R0145
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P0146            VBCOARK      VERB 41               DESCRIPTION
R0147               COARSE ALIGN IMU OR RADAR
R0148              1. REQUIRE NOUN 20 OR NOUN 72 OR TURN ON OPERATOR ERROR.
R0149               2. REQUIRE EXT VERB DISPLAY SYS AVAILABLE OR TURN ON OPERATOR ERROR LIGHT AND GO TO PINBRNCH
R0151               CASE 1     NOUN 20      (ICDU ANGLES)
R0152               3. SET EXT VERB DISPLAY ACTIVE FLAG.
R0153               4. DISPLAY FLASHING V25,N22 (LOAD NEW ICDU ANGLES).
R0154                  RESPONSES
R0155                    A. TERMINATE
R0156                       1. RELEASE EXT VERB DISPLAY SYSTEM
R0157                    B. PROCEED
R0158                      1. COARSE ALIGN TO THE EXISTING THETAD'S (ICORK2).
R0168                    C. ENTER
R0169                      1. COARSE ALIGN TO THE LOADED THETAD'S (ICORK2).
R0170               ICORK2
R0171                  1. RE-DISPLAY VERB 41.
R0172                  2. EXECUTE IMUCOARS (IMU COARSE ALIGN).
R0173                  3. EXECUTE IMUSTALL (ALLOW TIME FOR DATA TRANSFER).
R0174                  4. RELEASE EXT VERB DISPLAY SYSTEM.
R0175               CASE 2     NOUN 72      (RCDU ANGLES)
R01755                EXIT WITH OP ERROR IF SOMEONE IS USING EITHER RADAR.
R0176               5. DISPLAY FLASHING V24,N73 (LOAD NEW RR TRUNION ANGLE AND NEW SHAFT ANGLE).
R0178                  RESPONSES
R0179                  A. TERMINATE
R0180                     1. RELEASE EXT VERB DISPLAY SYS.
R0181                  B. PROCEED OR ENTER
R0182                     1. EXECUTE AURLOKON (ASK OPERATOR FOR LOCK-ON REQUIREMENTS).
R0184                     2. RE-DISPLAY VERB 41.
R0185                     3. SCHEDULE RRDESK2 WITH PRIORITY 20.
R0186                     4. RELEASE EXT VERB DISPLAY SYS.

R0187                  AURLOKON

R0188                 1. FLASH V04 N12 R1 = 000C6 R2 = 00002
R0189                      RESPONSES
R0190                      A. TERMINATE
R0194                      B. PROCEED
R0195                         1. RESET LOCK-ON SWITCH
R01951                        2. SET CONTINUOUS DESIGNATE FLAG
R01952                        3. DISABLE R25
R0196                    C. V22 E 1 E, R1 = 00001, PROCEED
R0197                         1. SET LOCK-ON SWITCH
 0198   REF   2  LAST  266    43,2200  0 2203 1  VBCOARK  TC      OP/INERT         RETURN HERE IF NOUN = ICDU(20)
 0199   REF   1               43,2201  0 2214 1           TC      IMUCOARK         RETURN HERE IF NOUN = RCDU(72)
 0200   REF   1               43,2202  0 2236 1           TC      RRDESNBK
R0201             RETURNS TO L+1 IF IMU OR L+2 IF RR.

 0202   REF   2  LAST  233    43,2203  4 6007 1  OP/INERT CS      OCT24
 0203   REF   2  LAST  224    43,2204  6 1001 1           AD      NOUNREG
 0204                         43,2205  0 0006 1           EXTEND
 0205  REF    2  LAST  265    43,2206  1 6745 0           BZF     TCQ          IF = 20.

 0207  REF    1               43,2207  6 2213 0           AD      RRIMUDIF     -52
 0208                         43,2210  0 0006 1           EXTEND
 0209  REF    2  LAST  159    43,2211  1 6742 1           BZF     Q+1

 0210  REF   14  LAST  265    43,2212  0 2116 0           TC      ALM/END      ILLEGAL.

 0211                         43,2213   77713 1  RRIMUDIF DEC     -52          THE IMU
 0213  REF    2  LAST  266    43,2214  0 2436 1  IMUCOARK TC      CKMODCAD
 0214  REF    1               43,2215  0 2076 1           TC      TESTXACT     COARSE ALIGN FROM KEYBOARD.
 0215  REF    1               43,2216  3 2234 0           CAF     VNLODCDU     CALL FOR THETAD LOAD
 0216  REF   19  LAST  267    43,2217  0 4616 1           TC      BANKCALL
 0217  REF    1               43,2220   20334 1           CADR    GOXDSPF
 0218  REF    1               43,2221  0 5472 0           TC      TERMEXTV
 0219                         43,2222  1 2223 1           TCF     +1

 0220  REF    1               43,2223  3 2235 1  ICORK2   CAF     IMUCOARV     RE-DISPLAY COARSE ALIGN VERB.
 0221  REF   20  LAST  269    43,2224  0 4616 1           TC      BANKCALL
 0222  REF    2  LAST  209    43,2225   20621 0           CADR    EXDSPRET

 0223  REF   21  LAST  269    43,2226  0 4616 1           TC      BANKCALL     CALL MODE SWITCHING PROG
 0224  REF    1               43,2227   16771 1           CADR    IMUCOARS

 0225  REF   22  LAST  269    43,2230  0 4616 1           TC      BANKCALL     STALL
 0226  REF    3  LAST  266    43,2231   17707 1           CADR    IMUSTALL
 0227  REF    1               43,2232  0 5472 0           TC      ENDEXTVB
 0228  REF    2  LAST  269    43,2233  0 5472 0           TC      ENDEXTVB

 0229                         43,2234   06226 1  VNLODCDU VN      2522
 0230                         43,2235   12200 0  IMUCOARV VN      4100
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P0231               DESIGNATE TO DESIRED GIMBAL ANGLES.

 0232    REF    3  LAST  267    43,2236   0 2700 1  RRDESNBK TC      RDRUSECK
 0234    REF    2  LAST  269    43,2237   0 2076 1           TC      TESTXACT
 0239    REF    1               43,2240   4 2324 1           CS      OCT41000        TERMINATE PRESENT DESIGNATION
 0240                           43,2241   0 0004 0           INHINT                  RELINT DONE IN GOXDSPF
 0241    REF   18  LAST  222    43,2242   7 0110 0           MASK    RADMODES
 0242    REF   19  LAST  270    43,2243   54 110 0           TS      RADMODES

 0243    REF    1               43,2244   3 2263 1           CAF     VNLODCDU        ASK FOR GIMBAL ANGLES,
 0244    REF   23  LAST  269    43;2245   0 4616 1           TC      BANKCALL
 0245    REF    2  LAST  269    43,2246    20334 1           CADR    GOXDSPF
 0246    REF    2  LAST  269    43,2247   0 5472 0           TC      TERMEXTV
 0247                           43,2250   1 2244 0           TCF     -4              V33

 0248    REF   24  LAST  270    43,2251   0 4616 1           TC      BANKCALL        ASK OP FOR LOCK ON REQUIREMENTS.
 0249    REF    1               43,2252    46000 0           CADR    AURLCKON

 0250    REF    1               43,2253   3 2235 1           CAF     OPTCOARV        RE-DISPLAY OUR OWN VERB
 0251    REF   25  LAST  270    43,2254   0 4616 1           TC      BANKCALL
 0252    REF    3  LAST  269    43,2255    20621 0           CADR    EXDSPRET

 0253    REF    1               43,2256   3 4736 1           CAF     PRIO20
 0254    REF    3  LAST  245    43,2257   0 5105 0           TC      FINDVAC
 0255    REF    6  LAST  241    E7,1456                      EBANK=  LOSCOUNT
 0256    REF    1               43,2260    02264 0           2CADR   RRDESK2
 0256    REF    1               43,2261    66107 1

 0257    REF    3  LAST  270    43,2262   1 5472 1           TCF     TERMEXTV        FREES DISPLAY.

 0258                           43,2263    06111 0  VNLODCDU VN      2473
 0259    REF    2  LAST  269    43,2235             OPTCOARV EQUALS  IMUCOARV        DIFFERENT NOUNS.

 0260    REF   26  LAST  270    43,2264   0 4616 1  RRDESK2  TC      BANKCALL
 0261    REF    1               43,2265    52506 0           CADR    RRDESNB

 0262                           43,2266   0 2267 0           TC      +1              DUMMY NEEDED SINCE DESRETRN DOES INCR
 02621   REF    9  LAST  223    43,2267   3 0167 1           CA      PRIORITY
 02622   REF    5  LAST  259    43,2270   7 5004 1           MASK    LOW9
 02623   REF   66  LAST  264    43,2271   10 000 0           CCS     A
 02624   REF   67  LAST  270    43,2272   50 000 1           INDEX   A
 02625   REF   68  LAST  270    43,2273   54 000 0           TS      A               RELEASE THIS JOBS VAC AREA.
 02626                          43,2274   4 0000 0           COM                     INSURE ENDOFJOB DOES A NOVAC END (BZMF)
 02627   REF   10  LAST  270    43,2275   26 167 0           AOS     PRIORITY
 0263    REF   27  LAST  270    43,2276   0 4616 1           TC      BANKCALL        WAIT FOR COMPLETION OF DESIGNATE
 0264    REF    2  LAST  266    43,2277    17705 0           CADR    RADSTALL
 0265                           43,2300   0 2302 1           TC      +2              BADEND-NO LOCKON OR OUT OF LIMITS
 0266    REF    4  LAST  240    43,2301   0 5155 0           TC      ENDOFJOB        GOODEND-LOCKON ACHIEVED
 0267    REF   17  LAST  258    43,2302   0 5567 0           TC      ALARM
 0268                           43,2303    00503 1           OCT     503             TURN ON ALARM LIGHT -503 DESIGNATE FAIL
```

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L        EXTENDED VERBS                                                                              USER'S PAGE NO.   9      E5 S4

 0269   REF   5  LAST  270   43,2304  0 5155 0            TC      ENDOFJOB


 0270   REF  20  LAST  270   43,2305  10 110 0  RRDESEND CCS     RADMODES        TERMINATE CONTINUOUS DESIGNATE ONLY
 0271   REF   5  LAST  267   43,2306  1 2117 0            TCF     GOPIN
 0272   REF   6  LAST  271   43,2307  1 2117 0            TCF     GOPIN
 0273                        43,2310  1 2311 1            TCF     +1
 0274   REF   2  LAST  270   43,2311  4 2324 1            CS      OCT41000        BEGDES GOES TO ENDRADAR
 0275                        43,2312  0 0004 0            INHINT                  RELINT DONE IN DOWNFLAG
 0276   REF  21  LAST  271   43,2313  7 0110 0            MASK    RADMODES
 0277   REF  22  LAST  271   43,2314  54 110 0            TS      RADMODES
 02771  REF   3  LAST  233   43,2315  0 6011 1            TC      CLRADMOD
 02773  REF   1              43,2316  3 4777 1            CAF     1SEC
 02774  REF  28  LAST  270   43,2317  0 4616 1            TC      BANKCALL
 02775  REF   3  LAST  210   43,2320   01736 1            CADR    DELAYJOB
 0278   REF  15  LAST  267   43,2321  0 5516 0            TC      DOWNFLAG        ENABLE R25 GIMBAL MONITOR
 0279   REF   1              43,2322   00126 1            ADRES   NORRMON
 0280   REF   7  LAST  271   43,2323  1 2117 0            TCF     GOPIN
 0281                        43,2324   41000 1  OCT41000 OCT     41000           CONTINUOUS DESIGNATE - DESIGNATE
```

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L        EXTENDED VERBS                                                                        USER'S PAGE NO.  10       E5 S4

 02812                         23,2000                               BANK    23
 02814  REF    1               23,2000                               SETLOC  EXTVB1
 02816                         23,2000                               BANK
 02818  REF    1                                                     COUNT*  $$/EXTVB

 0282   REF    1               23,2000  0 4645 1  AURLOKON TC        MAKECADR
 0283   REF    2  LAST   103   23,2001  55'112 0           TS        DESRET
 0284   REF    5  LAST   264   23,2002  3 4752 0           CAF       TWO
 0285   REF    1               23,2003  55'051 0           TS        OPTIONX +1
 0286   REF    5  LAST   259   23,2004  3 6245 1           CAF       SIX             OPTION CODE FOR V04N12
 02862  REF    2  LAST   272   23,2005  55'050 1           TS        OPTIONX

 02864  REF    1               23,2006  3 2037 1     -5    CAF       V04N1272
 02866  REF   29  LAST   271   23,2007  0 4616 1           TC        BANKCALL              R2    00001   LOCK-ON
 02868  REF    1               23,2010   20353 0           CADR      GOMARKFR
 02869  REF    8  LAST   265   23,2011  1 5472 1           TCF       ENDEXT          V34
 0287                          23,2012  1 2017 1           TCF       +5              V33
 0288                          23,2013  1 2006 1           TCF       -5              V32
 0289   REF   14  LAST   255   23,2014  3 4751 0           CAF       BIT3
 0290   REF    1               23,2015  0 5464 1           TC        BLANKET
 0291   REF    6  LAST   271   23,2016  0 5155 0           TC        ENDOFJOB

 0292   REF    3  LAST   272   23,2017  3 1051 1     +5    CA        OPTIONX +1
 0293   REF   21  LAST   245   23,2020  7 4752 1           MASK      BIT2
 0294   REF   69  LAST   270   23,2021  10 000 0           CCS       A
 0295   REF    1               23,2022  1 2026 0           TCF       NOLOKON
 0296   REF    3  LAST   267   23,2023  0 5504 0           TC        UPFLAG
 0297   REF    1               23,2024   00012 1           ADRES     LOKONSW
 0298   REF    1               23,2025  1 2034 0           TCF       AURLKON1

 0299   REF   16  LAST   271   23,2026  0 5516 0  NOLOKON  TC        DOWNFLAG        IF NO LOCK-ON, SET BIT15 OF RADMODES TO
 02991  REF    2  LAST   272   23,2027   00012 1           ADRES     LOKONSW         INDICATE THAT CONTINUOUS DESIGNATION IS
 02992  REF    4  LAST   272   23,2030  0 5504 0           TC        UPFLAG          WANTED (TO BE TERMINATED BY V44.)
 02993  REF    1               23,2031   00264 1           ADRES     CDESFLAG
 0302   REF    5  LAST   272   23,2032  0 5504 0           TC        UPFLAG          SET NO RR ANGLE MONITOR FLAG,
 0303   REF    2  LAST   271   23,2033   00126 1           ADRES     NORRMON         (DISABLE R25 RR GIMBAL MONITOR IN T4RUPT
 0304                          23,2034  0 0003 1  AURLKON1 RELINT
 0305   REF    3  LAST   272   23,2035  3 1112 1           CA        DESRET
 0306   REF    1               23,2036  1 4640 0           TCF       BANKJUMP


 03064                         23,2037   01014 0  V04N1272 VN        412
 03065                         23,2040   77757 1  -LCKONFG OCT       -20

 03066                         43,2325                               BANK    43
 03067  REF    2  LAST   263   43,2000                               SETLOC  EXTVERBS
 03068                         43,2325                               BANK
 03069  REF    2 LAST   263 TO  272:    213    213*                  COUNT*  $$/EXTVB

 0307   REF    3  LAST   270   43,2325  0 2076 1  LRON     TC        TESTXACT
```

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L        EXTENDED VERBS                                                                                  USER'S PAGE NO.  11      E5 S4

 0308   REF   1                43,2326   3 2365 0  DSP68     CAF      V06N68
 0309   REF  30   LAST   272   43,2327   0 4616 1            TC       BANKCALL
 0310   REF   2   LAST   272   43,2330    20353 0            CADR     GOMARKFR
 0311   REF   1                43,2331   0 2363 0            TC       B1+5OFF
 0312   REF   1                43,2332   0 2354 1            TC       SET57
 0313   REF   7   LAST   272   43,2333   0 5155 0            TC       ENDOFJOB

 0314   REF  31   LAST   273   43,2334   0 4616 1  WAIT68    TC       BANKCALL
 0315   REF   1                43,2335    01735 1            CADR     2SECDELY

 0316   REF   1                43,2336   3 4361 1            CAF      OCT21
 0317   REF   7   LAST   264   43,2337   7 1043 0            MASK     EXTVBACT
 0318                          43,2340   0 0006 1            EXTEND
 0319   REF   9   LAST   272   43,2341   1 5472 1            BZF      ENDEXT

 0320   REF  17   LAST   255   43,2342   7 4747 0            MASK     BIT5
 0321   REF  70   LAST   272   43,2343   1 0000 0            CCS      A
 0322   REF   1                43,2344   1 2326 0            TCF      DSP68

 0323   REF   1                43,2345   3 2365 0  DSP5068   CAF      V50N68
 0324   REF  32   LAST   273   43,2346   0 4616 1            TC       BANKCALL
 0325   REF   1                43,2347    20361 1            CADR     GOMARK3R -1
 0326   REF   2   LAST   273   43,2350   1 2363 1            TCF      B1+5OFF
 0327   REF   3   LAST   273   43,2351   1 2363 1            TCF      B1+5OFF
 0328   REF   1                43,2352   1 2357 0            TCF      RESET57

 0329   REF   1                43,2353   1 2334 0            TCF      WAIT68

 0330   REF   6   LAST   272   43,2354   0 5504 0  SET57     TC       UPFLAG
 0331   REF   1                43,2355    00254 1            ADRES    LRINH

 0332   REF   1                43,2356   1 5563 0            TCF      B5OFF

 0333   REF  17   LAST   272   43,2357   0 5516 0  RESET57   TC       DOWNFLAG
 0334   REF   2   LAST   273   43,2360    00254 1            ADRES    LRINH

 0335   REF   2   LAST   264   43,2361   3 4362 1            CAF      OCT25
 0336   REF   2   LAST   273   43,2362   0 5565 1            TC       B5OFF +2

 0337   REF   2   LAST   273   43,2363   4 4361 0  B1+5OFF   CS       OCT21
 0338   REF   3   LAST   273   43,2364   1 5564 1            TCF      B5OFF +1

 0339   REF   1                    4361            OCT21     EQUALS   ND1

 0340                          43,2365    01504 1  V06N68    VN       0668
 0341   REF   2   LAST   273   43,2365             V50N68    =        V06N68

 0342   REF  18   LAST   273   43,2366   0 5516 0  LROFF     TC       DOWNFLAG          INHIBIT INCORPORATION OF LR DATA      V58
 0343   REF   3   LAST   273   43,2367    00254 1            ADRES    LRINH
 0344   REF   8   LAST   271   43,2370   1 2117 0            TCF      GOPIN
```

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L        EXTENDED VERBS

 0345    REF    4  LAST  263   E5,1737                    EBANK= OGC
```

```
R0346             IMUFINEK     VERB 42            DESCRIPTION
R0347                FINE ALIGN IMU
R0348                1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG OR TURN ON OPER ERROR AND GO TO PINBRNCH
R0350                2. DISPLAY FLASHING V25,N93....LOAD DELTA GYRO ANGLES....
R0351                   RESPONSES
R0352                   A. TERMINATE
R0353                      1. RELEASE EXT VERB DISPLAY SYSTEM.
R0354                   B. PROCEED OR ENTER
R0355                      1. RE-DISPLAY VERB 42
R0356                      2. EXECUTE IMUFINE (IMU FINE ALIGN MODE SWITCHING).
R0357                      3. EXECUTE IMUSTALL (ALLOW FOR DATA TRANSFER)
R0358                         A. FAILED
R0359                            1. RELEASE EXT VERB DISPLAY SYSTEM.
R0360                         B. GOOD
R0361                            1. EXECUTE IMUPULSE (TORQUE IRIGS).
R0362                            2. EXECUTE IMUSTALL AND RELEASE EXT VERB DISPLAY SYSTEM.

 0364  REF   3  LAST  269   43,2371  0 2436 1  IMUFINEK TC     CKMODCAD
 0365  REF   4  LAST  272   43,2372  0 2076 1           TC     TESTXACT           FINE ALIGN WITH GYRO TORQUING.
 0366  REF   1              43,2373  3 2420 0           CAF    VNLODGYR           CALL FOR LOAD OF GYRO COMMANDS
 0367  REF  33  LAST  273   43,2374  0 4616 1           TC     BANKCALL
 0368  REF   3  LAST  270   43,2375   20334 1           CADR   GOXDSPF
 0369  REF   4  LAST  270   43,2376  0 5472 0           TC     TERMEXTV
 0370                       43,2377  0 2400 1           TC     +1                 PROCEED WITHOUT A LOAD

 0371  REF   1              43,2400  3 2421 1           CAF    IMUFINEV           RE-DISPLAY OUR OWN VERB
 0372  REF  34  LAST  275   43,2401  0 4616 1           TC     BANKCALL
 0373  REF   4  LAST  270   43,2402   20621 0           CADR   EXDSPRET

 0374  REF  35  LAST  275   43,2403  0 4616 1           TC     BANKCALL           CALL MODE SWITCH PROG
 0375  REF   1              43,2404   17201 1           CADR   IMUFINE

 0376  REF  36  LAST  275   43,2405  0 4616 1           TC     BANKCALL         * HIBERNATION
 0377  REF   4  LAST  269   43,2406   17707 1           CADR   IMUSTALL
 0378  REF   3  LAST  269   43,2407  0 5472 0           TC     ENDEXTVB

 0379  REF   1              43,2410  3 2417 1  FINEK2   CAF    LGYROBIN           PINBALL LEFT COMMANDS IN OGC REGISTERS
 0380  REF  37  LAST  275   43,2411  0 4616 1           TC     BANKCALL
 0381  REF   1              43,2412   17314 1           CADR   IMUPULSE

 0382  REF  38  LAST  275   43,2413  0 4616 1           TC     BANKCALL           WAIT FOR PULSES TO GET OUT.
 0383  REF   5  LAST  275   43,2414   17707 1           CADR   IMUSTALL
 0384  REF   4  LAST  275   43,2415  0 5472 0           TC     ENDEXTVB
 0385  REF   5  LAST  275   43,2416  0 5472 0           TC     ENDEXTVB

 0386  REF   5  LAST  274   43,2417   02737 0  LGYROBIN ECADR  OGC
 0387                       43,2420   06335 1  VNLODGYR VN     2593
 0388                       43,2421   12400 0  IMUFINEV VN     4200
R0389             GOLOADLV        VERB 50            DESCRIPTION
R0390                             AND OTHER PLEASE
```

```
R0391                         DO SOMETHING VERBS
R0392                   PLEASE PERFORM, MARK, CALIBRATE, ETC.
R0393                   1. PRESSING ENTER ON DSKY INDICATES REQUESTED ACTION HAS BEEN  PERFORMED, AND THE PROGRAM DOES THE
R0395                      SAME RECALL AS A COMPLETED LOAD.
R0396                   2. THE EXECUTION OF A VERB 33 (PROCEED WITHOUT DATA) INDICATES THE REQUESTED ACTION IS NOT DESIRED.

 0398  REF   1                 43,2000                          SBANK= PINSUPER       FOR LOADLV1 AND SHOWSUM CADR'S.

 0399  REF   1                 43,2422  0 4433 1  GOLOADLV TC     FLASHOFF

 0400  REF   1                 43,2423  3 4201 0           CAF    PINSUPBT
 0401                          43,2424  0 0006 1           EXTEND
 0402  REF   3  LAST  230      43,2425  01 007 1           WRITE  SUPERBNK
 0403  REF   8  LAST  265      43,2426  0 4635 0           TC     POSTJUMP
 0404  REF   1                 43,2427   62001 1           CADR   LOADLV1
R0405  VERB 47 - AGS INITIALIZATION - R47.

R0406           SEE LOG SECTION AGS INITIALIZATION FOR OTHER PERTINENT REMARKS.

 0407  REF   5  LAST  275      43,2430  0 2076 1  V47TXACT TC     TESTXACT        NO OTHER EXTVERB.
 0408  REF   1                 43,2431  3 4740 0           CAF    PRIO4
 0409  REF   4  LAST  270      43,2432  0 5105 0           TC     FINDVAC
 0410  REF  14  LAST  210      E4,1600                     EBANK= AGSBUFF
 0411  REF   1                 43,2433   02005 0           2CADR  AGSINIT
 0411  REF   1                 43,2434   64064 1
 0412  REF   8  LAST  273      43,2435  0 5155 0           TC     ENDOFJOB

 0413  REF   4  LAST  196      43,2436  3 1301 1  CKMODCAD CA     MODECADR
 0414                          43,2437  0 0006 1           EXTEND
 0415  REF   3  LAST  269      43,2440  1 6745 0           BZF    TCQ
 0416  REF  15  LAST  269      43,2441  0 2116 0           TC     ALM/END         SOMEBODY IS USING MODECADR SO EXIT
```

```
R0417             ALINTIME    VERB 55          DESCRIPTION
R0418                     REQUIRE POO OR POO-.
R0419                  1. SET EXT VERB DISPLAY BUSY FLAG.
R0420                  2. DISPLAY FLASHING V25,N24 (LOAD DELTA TIME FOR AGC CLOCK.
R0421                  3. REQUIRE EXECUTION OF VERB 23.
R0422                  4. ADD DELTA TIME, RECEIVED FROM INPUT REGISTER, TO THE COMPUTER TIME.
R0424                  5. RELEASE EXT VERB DISPLAY SYSTEM

 0425  REF   6  LAST  276   43,2442  0 2076 1  ALINTIME TC      TESTXACT
 0426  REF   9  LAST  276   43,2443  0 4635 0           TC      POSTJUMP          NO ROOM IN 43
 0427  REF   1              43,2444   64002 1           CADR    R33

 0428                       42,2002                     BANK    42
 0429  REF   2  LAST   46   42,2000                     SETLOC  SBANO
 0430                       42,2002                     BANK
 0431  REF   1                                          COUNT*  $$/R33

 0432  REF   1              42,2002  3 5021 1  R33      CAF     PRIO7
 0433  REF   1              42,2003  0 5146 1           TC      PRIOCHNG
 0434  REF   1              42,2004  3 2034 1           CAF     VNLODDT
 0435  REF  39  LAST  275   42,2005  0 4616 1           TC      BANKCALL
 0436  REF   4  LAST  275   42,2006   20334 1           CADR    GOXDSPF
 0437  REF  10  LAST  273   42,2007  0 5472 0           TC      ENDEXT            TERMINATE
 0438  REF  11  LAST  277   42,2010  0 5472 0           TC      ENDEXT            PROCEED
 0439  REF   1              42,2011  4 2033 1           CS      DEC23             DATA IN OR RESEQUENCE(UNLIKELY)
 0440  REF  36  LAST  264   42,2012  6 0154 1           AD      MPAC              RECALL LEFT VERB IN MPAC
 0441                       42,2013  0 0006 1           EXTEND
 0442  REF   1              42,2014  1 2016 0           BZF     UPDATIME          GO AHEAD WITH UPDATE ONLY IF RECALL
 0443  REF  12  LAST  277   42,2015  0 5472 0           TC      ENDEXT              WITH V23 (DATA IN)

 0444                       42,2016  0 0004 0  UPDATIME INHINT                    DELTA TIME IS IN DSPTEM1, +1.
 0445  REF  25  LAST  259   42,2017  3 4755 1           CAF     ZERO
 0446  REF  37  LAST  277   42,2020  54 156 1           TS      MPAC     +2       NEEDED FOR TP AGREE
 0447  REF  21  LAST  259   42,2021  54 001 1           TS      L                 ZERO T1 + 2 WHILE ALIGNING.
 0448  REF   8  LAST  255   42,2022  52 025 1           DXCH    TIME2
 0449  REF  38  LAST  277   42,2023  52 155 1           DXCH    MPAC
 0450  REF   2  LAST  102   42,2024  52 051 0           DXCH    DSPTEM2 +1        INCREMENT
 0451  REF  39  LAST  277   42,2025  20 155 1           DAS     MPAC

 0452  REF   1              42,2026  0 7262 0           TC      TPAGREE           FORCE SIGN AGREEMENT.
 0453  REF  40  LAST  277   42,2027  52 155 1           DXCH    MPAC              NEW CLOCK.
 0454  REF   9  LAST  277   42,2030  20 025 1           DAS     TIME2
 0455                       42,2031  0 0003 1           RELINT
 0456  REF  13  LAST  277   42,2032  0 5472 0  UPDTMEND TC      ENDEXT

 0457                       42,2033   00027 1  DEC23    DEC     23                V 23

 0458                       42,2034   06230 0  VNLODDT  VN      2524              V25N24 FOR LOAD DELTA TIME
```

```
L        EXTENDED VERBS

R0459              SET UP FOR RADAR  SAMPLING.

 0460                            42,2035                            BANK     42
 0461   REF    3  LAST  272      43,2000                            SETLOC  EXTVERBS
 0462                            43,2445                            BANK

 0463   REF    1                 E4,1600                            EBANK=  RSTACK

 0464   REF    1                                                    COUNT*  $$/R0477

 0465   REF    4  LAST  270      43,2445   0 2700 1   R77           TC       RORUSECK          TRY TO AVOID THE 1210.
 0466   REF    5  LAST  222      43,2446   3 0077 1                 CA       FLAGWRD3          IS R04 RUNNING?
 0467   REF    1                 43,2447   7 4743 1                 MASK     R04FLBIT
 0468   REF   71  LAST  273      43,2450  10 000 0                  CCS      A
 0469   REF   16  LAST  276      43,2451   0 2116 0                 TC       ALM/END           YES.
 0470   REF    7  LAST  273      43,2452   0 5504 0                 TC       URFLAG
 0471   REF    1                 43,2453    00117 0                 ADRES    R77FLAG
 0472   REF    1                 43,2454   1 2461 1                 TCF      R04Z

 0473   REF    5  LAST  278      43,2455   0 2700 1   R04           TC       RORUSECK          TRY TO AVOID THE 1210.
 0474   REF    7  LAST  277      43,2456   0 2076 1                 TC       TESTXACT
 0475   REF    8  LAST  278      43,2457   0 5504 0                 TC       URFLAG
 0476   REF    3  LAST  231      43,2460    00063 1                 ADRES    R04FLAG           SET R04FLAG FOR ALARMS

 0477   REF    1                 43,2461   3 4741 1   R04Z          CAF      EBANK4
 0478   REF    5  LAST  223      43,2462  54 003 0                  TS       EBANK
 0479   REF    1                 43,2463   3 2676 1                 CAF      1SEC+1            SAMPLE ONCE PER SECOND
 0480   REF    1                 43,2464  55'777 0                  TS       RSAMPDT
 0481   REF   26  LAST  277      43,2465   3 4755 1                 CAF      ZERO
 0482   REF    1                 43,2466  55'776 1                  TS       RTSTLOC
 0483   REF    1                 43,2467  55'575 0                  TS       RFAILCNT          ZERO BAD SAMPLE COUNTER

 0484                            43,2470   0 0004 0                 INHINT
 0485   REF    1                 43,2471   4 2677 1                 CS       LRPOSCAL          INITIALIZE
 0486   REF   23  LAST  271      43,2472   7 0110 0                 MASK     RADMODES              BIT9   LR RANGE  LOW SCALE =0
 0487   REF   24  LAST  278      43,2473  54 110 0                  TS       RADMODES              BIT6   LR POS 1 =0
 0488   REF    2  LAST  278      43,2474   3 2677 0                 CAF      LRPOSCAL              BIT3   RR RANGE  LOW SCALE =0
 0489                            43,2475   0 0006 1                 EXTEND
 0490   REF    4  LAST  221      43,2476  02 033 0                  RAND     CHAN33
 0491   REF   25  LAST  278      43,2477  26 110 0                  ADS      RADMODES
 0492                            43,2500   0 0003 1                 RELINT

 0493   REF    6  LAST  278      43,2501   4 0077 0                 CS       FLAGWRD3          CHECK R04FLAG     R04 =1    R77 =0
 0494   REF    2  LAST  278      43,2502   7 4743 1                 MASK     R04FLBIT
 0495   REF   72  LAST  278      43,2503  10 000 0                  CCS      A
 0496   REF    1                 43,2504   1 2633 1                 TCF      R04K

 0497   REF   12  LAST  262      43,2505   3 4753 1                 CAF      ONE               INDICATES RENDEZVOUS DESIRED
 0498   REF    4  LAST  272      43,2506  55'051 0                  TS       OPTIONX +1
 0499   REF   15  LAST  272      43,2507   3 4751 0   R04A          CAF      BIT3              OPTION CODE FOR V04N12
```

```
0500   REF   5  LAST  278    43,2510  55'050 1          TS      OPTIONX
0501   REF   1               43,2511  3 2673 1          CAF     V04N12X
0502   REF  40  LAST  277    43,2512  0 4616 1          TC      BANKCALL              R2    00001  RENDEZVOUS RADAR
0503   REF   3  LAST  273    43,2513   20353 0          CADR    GOMARKFR                    00002  LANDING RADAR
0504   REF   1               43,2514  1 2641 1          TCF     R04END          V34
0505                         43,2515  1 2522 1          TCF     +5              V33
0506   REF   1               43,2516  1 2511 1          TCF     R04A +2         R2
0507   REF  16  LAST  278    43,2517  3 4751 0          CAF     BIT3
0508   REF   2  LAST  272    43,2520  0 5464 1          TC      BLANKET
0509   REF   9  LAST  276    43,2521  0 5155 0          TC      ENDOFJOB

0510   REF   6  LAST  279    43,2522  3 1051 1          CA      OPTIONX +1      SAVE DESIRED OPTION     RR =1     LR =2
0511   REF   1               43,2523  55'773 1          TS      RTSTDEX

0512   REF   6  LAST  272    43,2524  3 6245 1  R04X    CAF     SIX             RR OR LR DESIRED
0513   REF   2  LAST  279    43,2525  7 1773 1          MASK    RTSTDEX
0514   REF  73  LAST  278    43,2526  10 000 0          CCS     A
0515   REF   1               43,2527  1 2635 1          TCF     R04L            LANDING RADAR
0516   REF   1               43,2530  55'775 1          TS      RTSTBASE        FOR RR   BASE = 0, MAX = 1

0517   REF  22  LAST  272    43,2531  3 4752 0  R04B    CAF     BIT2            IS RR AUTO MODE DISCRETE PRESENT
0518                         43,2532  0 0006 1          EXTEND
0519   REF   5  LAST  278    43,2533  02 033 0          RAND    CHAN33
0520                         43,2534  0 0006 1          EXTEND
0521   REF   1               43,2535  1 2546 0          BZF     R04C            YES

0522   REF   1               43,2536  3 2675 1          CAF     201R04          REQUEST SELECTION OF RR AUTO MODE
0523   REF   2  LAST  102    43,2537  55'044 1          TS      DSPTEM1
0524   REF   1               43,2540  3 2674 0          CAF     V50N25X
0525   REF  41  LAST  279    43,2541  0 4616 1          TC      BANKCALL
0526   REF   2  LAST  253    43,2542   20345 1          CADR    GOMARK4
0527   REF   2  LAST  279    43,2543  1 2641 1          TCF     R04END          V34
0528   REF   1               43,2544  1 2531 0          TCF     R04B            V33
0529                         43,2545  1 2536 1          TCF     -7              E

0530   REF  30  LAST  262    43,2546  3 4736 1  R04C    CAF     BIT14           ENABLE RR AUTO TRACKER
0531                         43,2547  0 0006 1          EXTEND
0532   REF  18  LAST  222    43,2550  05 012 1          WOR     CHAN12

0533   REF   6  LAST  272    43,2551  3 4752 0          CAF     TWO
0534   REF   1               43,2552  55'774 0          TS      RTSTMAX         FOR SEQUENTIAL STORAGE

0535   REF   8  LAST  254    43,2553  0 5203 0          TC      WAITLIST
0536   REF   2  LAST  278    E4,1600                    EBANK=  RSTACK
0537   REF   1               43,2554   02003 0          2CADR   RADSAMP
0537   REF   1               43,2555   52104 0
0538                         43,2556  0 0003 1          RELINT

0539   REF   7  LAST  278    43,2557  4 0077 0          CS      FLAGWRD3        CHECK R04FLAG      R04 =1    R77 =0
0540   REF   3  LAST  278    43,2560  7 4743 1          MASK    R04FLBIT
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L       EXTENDED VERBS                                                              USER'S PAGE NO.  18       E4 S4

 0541   REF  74  LAST  279    43,2561  10 000 0              CCS     A
 0542   REF   9  LAST  273    43,2562  1 2117 0              TCF     GOPIN              R77

 0543   REF   7  LAST  279    43,2563  3 6245 1              CAF     SIX                RR OR LR
 0544   REF   3  LAST  279    43,2564  7 1773 1              MASK    RTSTDEX
 0545   REF  75  LAST  280    43,2565  10 000 0              CCS     A
 0546   REF   1               43,2566  1 2603 1              TCF     R04LR              LR

 0547   REF   1               43,2567  3 2667 1  R04RR       CAF     V16N72             DISPLAY RR CDU ANGLES (1/SEC)
 0548   REF  42  LAST  279    43,2570  0 4616 1              TC      BANKCALL                    R1  +  XXX.XX DEG    TRUNNION
 0549   REF   5  LAST  262    43,2571   20334 1              CADR    GOMARKF                     R2  +  XXX.XX DEG    SHAFT
 0550   REF   3  LAST  279    43,2572  1 2641 1              TCF     R04END             V34      R3     BLANK
 0551                         43,2573  1 2575 0              TCF     +2                 V33
 0552   REF   1               43,2574  1 2567 0              TCF     R04RR              V32

 0553   REF   1               43,2575  3 2670 1              CAF     V16N78             DISPLAY RR RANGE AND RANGE RATE (1/SEC)
 0554   REF  43  LAST  280    43,2576  0 4616 1              TC      BANKCALL                    R1  +- XXX.XX NM     RANGE
 0555   REF   6  LAST  280    43,2577   20334 1              CADR    GOMARKF                     R2  +- XXXXX. FPS    RANGE RATE
 0556   REF   4  LAST  280    43,2600  1 2641 1              TCF     R04END             V34      R3     BLANK
 0557   REF   1               43,2601  1 2617 1              TCF     R04Y               V33
 0558   REF   2  LAST  280    43,2602  1 2567 0              TCF     R04RR              V32

 0559   REF   1               43,2603  3 2671 0  R04LR       CAF     V16N66             DISPLAY LR RANGE AND POSITION (1/SEC)
 0560   REF  44  LAST  280    43,2604  0 4616 1              TC      BANKCALL                    R1  +- XXXXX. FT     LR RANGE
 0561   REF   7  LAST  280    43,2605   20334 1              CADR    GOMARKF                     R2  +  0000X.        POS. NO.
 0562   REF   5  LAST  280    43,2606  1 2641 1              TCF     R04END             V34      R3     BLANK
 0563                         43,2607  1 2611 1              TCF     +2                 V33
 0564   REF   2  LAST  280    43,2610  1 2603 1              TCF     R04LR              V32

 0565   REF   1               43,2611  3 2672 0              CAF     V16N67             DISPLAY LR VELX, VELY, VELZ (1/SEC)
 0566   REF  45  LAST  280    43,2612  0 4616 1              TC      BANKCALL                    R1  +- XXXXX. FPS    LR V(X)
 0567   REF   8  LAST  280    43,2613   20334 1              CADR    GOMARKF                     R2  +- XXXXX. FPS    LR V(Y)
 0568   REF   6  LAST  280    43,2614  1 2641 1              TCF     R04END             V34      R3  +- XXXXX  FPS    LR V(Z)
 0569   REF   2  LAST  280    43,2615  1 2617 1              TCF     R04Y               V33
 0570   REF   3  LAST  280    43,2616  1 2603 1              TCF     R04LR              V32

 0571   REF  27  LAST  278    43,2617  3 4755 1  R04Y        CAF     ZERO               TO TERMINATE SAMPLING
 0572   REF   2  LAST  278    43,2620  55'777 0              TS      RSAMPDT
 0573   REF  46  LAST  280    43,2621  0 4616 1              TC      BANKCALL
 0574   REF   2  LAST  273    43,2622   01735 1              CADR    2SECDELY           WAIT FOR LAST RADARUPT
 0575   REF   2  LAST  278    43,2623  3 2676 1              CAF     1SEC+1             SAMPLE ONCE PER SECOND
 0576   REF   3  LAST  280    43,2624  55'777 0              TS      RSAMPDT
 0577   REF  28  LAST  280    43,2625  3 4755 1              CAF     ZERO               FOR STORING RESULTS
 0578   REF   2  LAST  278    43,2626  55'776 1              TS      RTSTLOC
 0579   REF   2  LAST  279    43,2627  11'775 1              CCS     RTSTBASE            CHECK WHICH RADAR HAD BEEN SAMPLED
 0582   REF  13  LAST  278    43,2630  4 4753 0              CS      ONE                WAS LR
 0583   REF   7  LAST  279    43,2631  6 4752 0              AD      TWO                WAS RR
 0584   REF   1               43,2632  1 2523 0              TCF     R04X -1

 0585   REF   1               43,2633  3 4766 1  R04K        CAF     250MS+1            SAMPLE 4 LR COMPONENTS PER SECOND.
 0586   REF   4  LAST  280   43,2634  55'777 0             TS      RSAMPDT

 0587   REF   8  LAST  280   43,2635  3 4752 0  R04L       CAF     TWO
 0588   REF   3  LAST  280   43,2636  55'775 1             TS      RTSTBASE          FOR LR   BASE = 2, MAX = 3
 0589   REF   8  LAST  280   43,2637  3 6245 1             CAF     SIX
 0590   REF   2  LAST  279   43,2640  1 2552 0             TCF     R04C +4
 0591   REF  29  LAST  280   43,2641  3 4755 1  R04END     CAF     ZERO              ZERO RSAMPDT
 0592   REF   5  LAST  281   43,2642  55'777 0             TS      RSAMPDT           TO TERMINATE SAMPLING
 0593   REF  20  LAST  259   43,2643  3 4744 1             CAF     BIT8              WAIT 1.28 SECONDS FOR POSSIBLE
 0594   REF  47  LAST  280   43,2644  0 4616 1             TC      BANKCALL          PENDING RUPT.
 0595   REF   4  LAST  271   43,2645   01736 1             CADR    DELAYJOB

 0596                        43,2646  0 0004 0             INHINT
 0597   REF  31  LAST  279   43,2647  4 4736 0             CS      BIT14             DISABLE RR AUTO TRACKER
 0598                        43,2650  0 0006 1             EXTEND
 0599   REF  19  LAST  279   43,2651  03 012 1             WAND    CHAN12

 0600   REF  19  LAST  273   43,2652  0 5516 0             TC      DOWNFLAG
 0601   REF   4  LAST  278   43,2653   00063 1             ADRES   R04FLAG           SIGNAL END OF R04.

 0602   REF  14  LAST  277   43,2654  0 5472 0             TC      ENDEXT

 0603   REF   2  LAST  278   43,2655  3 4741 1  R77END     CAF     EBANK4            TO TERMINATE SAMPLING
 0604   REF   6  LAST  278   43,2656  54 003 0             TS      EBANK
 0605   REF  30  LAST  281   43,2657  3 4755 1             CAF     ZERO
 0606   REF   6  LAST  281   43,2660  55'777 0             TS      RSAMPDT
 0607   REF  31  LAST  262   43,2661  3 4746 0             CAF     BIT6              WAIT 320 MS FOR POSSIBLE
 0608   REF  48  LAST  281   43,2662  0 4616 1             TC      BANKCALL          PENDING RUPT.
 0609   REF   5  LAST  281   43,2663   01736 1             CADR    DELAYJOB

 0610   REF  20  LAST  281   43,2664  0 5516 0             TC      DOWNFLAG
 0611   REF   2  LAST  278   43,2665   00117 0             ADRES   R77FLAG
 0612   REF  10  LAST  280   43,2666  1 2117 0             TCF     GORIN

 0613                        43,2667   04110 0  V16N72     VN      1672
 0614                        43,2670   04116 0  V16N78     VN      1678
 0615                        43,2671   04102 0  V16N66     VN      1666
 0616                        43,2672   04103 1  V16N67     VN      1667
 0617                        43,2673   01014 0  V04N12X    VN      412
 0618                        43,2674   14431 1  V50N25X    VN      5025
 0619                        43,2675   00201 1  201R04     OCT     00201
 0620                        43,2676   00145 1  1SEC+1     DEC     101
 0621   REF   1                         4766    250MS+1    EQUALS  CALLCODE
 0622                        43,2677   00444 0  LRPOSCAL   OCT     444
 0623   REF   8  LAST  279    43,2700   4 0077 0  RDRUSECK CS      FLAGWRD3        IS R29 ON?
 0624   REF   2  LAST  222    43,2701   7 4741 0           MASK    NR29FBIT
 0625   REF  76  LAST  280    43,2702  10 000 0            CCS     A
 0626   REF  17  LAST  278    43,2703   0 2116 0           TC      ALM/END         YES
 0627   REF  10  LAST  222    43,2704   3 0101 1           CA      FLAGWRD5        IS R77 RUNNING?
 0628   REF   2  LAST  222    43,2705   7 4741 0           MASK    R77FLBIT
 0629   REF  77  LAST  282    43,2706  10 000 0            CCS     A
 0630   REF  18  LAST  282    43,2707   0 2116 0           TC      ALM/END         YES.
 0631   REF   3  LAST  230    43,2710   4 0103 1           CS      FLAGWRD7        IS SERVICER RUNNING AND HENCE POSSIBLY
 0632   REF   2  LAST  230    43,2711   7 4746 1           MASK    V37FLBIT        R12 USING THE LR?
 0633   REF  78  LAST  282    43,2712  10 000 0            CCS     A
 0634   REF   1               43,2713   1 2720 1           TCF     CHECKRR         NO
 0635   REF   3  LAST  231    43,2714   3 0107 1           CA      FLGWRD11        YES, IS R12 ON?
 0636   REF   3  LAST  231    43,2715   7 4735 0           MASK    LRBYBIT         BIT 15
 0637                         43,2716   0 0006 1           EXTEND
 0638   REF  19  LAST  282    43,2717   1 2116 1           BZF     ALM/END         YES
 0639   REF   9  LAST  233    43,2720   4 0075 1  CHECKRR  CS      FLAGWRD1        IS THE TRACK FLAG SET AND HENCE POSSIBLY
 0640   REF   1               43,2721   7 4747 0           MASK    TRACKBIT        P20 USING THE RR?
 0641   REF  79  LAST  282    43,2722  10 000 0            CCS     A
 0642   REF  24  LAST  264    43,2723   0 0002 0           TC      Q               NOT ALLOWED DURING P20
 0643   REF  20  LAST  282    43,2724   0 2116 0           TC      ALM/END         P22 OR P25,  (R65)
 0653   REF   3 LAST  272 TO  277:      BC    293*         COUNT*  $$/EXTVB

 0655   REF   8  LAST  278    43,2725   0 2076 1  VB64     TC      TESTXACT        IF DISPLAY SYS. NOT BUSY,MAKE IT BUSY
 0656   REF   2  LAST  276    43,2726   3 4740 0           CAF     PRIO4
 0657   REF   5  LAST  276    43,2727   0 5105 0           TC      FINDVAC
 0658   REF   3  LAST  119    E4,1600                      EBANK=  ALPHASB
 0659   REF   1               43,2730    03606 1           2CADR   SBANDANT        CALC.,DISPLAY S-BAND ANTENNA ANGLES.
 0659   REF   1               43,2731    64104 0
 0660   REF  10  LAST  279    43,2732   0 5155 0           TC      ENDOFJOB
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P0661               IMUATTCK     VERB 43          DESCRIPTION
R0662                   LOAD IMU ATTITUDE ERROR METERS
R0663                      1. REQUIRE P00 OR FRESH START.
R0664                      2. REQUIRE COARSE ALIGN ENABLE AND ZERO ICDU BITS OFF.
R0665                      3. REQUIRE THAT NEEDLES BE OFF.
R0666                      4. REQUEST LOAD OF N22  (VAUES TO BE DISPLAYED).
R0667                      5. ON PROCEED OR ENTER RE-DISPLAY V43 AND SEND PULSES.

 0668   REF   1                43,2733  0 2121 1  IMUATTCK TC      CHKP00H          VB 76 - LOAD IMU ATT. ERROR METERS

 0669   REF   3  LAST  182     43,2734  3 4763 1           CAF     BITS4&5          SEE IF COARSE ALIGN ENABLE  AND ZERO IMU
 0670                          43,2735  0 0006 1           EXTEND                   CDUS BITS ARE ON
 0671   REF  20  LAST  281     43,2736  02 012 0           RAND    CHAN12
 0672   REF  80  LAST  282     43,2737  10 000 0           CCS     A
 0673   REF  21  LAST  282     43,2740  1 2116 1           TCF     ALM/END          NOT ALLOWED IF IMU COARSE OR IMU ZERO ON

 0674   REF   1                43,2741  3 4355 0           CAF     BIT13-14         BOTH BITS 13 AND 14 MUST BE 1
 0675                          43,2742  0 0006 1           EXTEND                   INDICATING THE MODE SELECTED IS OFF.
 0676   REF   1                43,2743  06 031 0           RXOR    CHAN31
 0677   REF   2  LAST  283     43,2744  7 4355 1           MASK    BIT13-14
 0678                          43,2745  0 0006 1           EXTEND
 0679                          43,2746  1 2750 0           BZF     +2               NEEDLES IS OFF.
 0680   REF  22  LAST  283     43,2747  1 2116 1           TCF     ALM/END          EXIT.  NEEDLES IS ON.

 0681   REF   9  LAST  282     43,2750  0 2076 1           TC      TESTXACT

 0682   REF   2  LAST  269     43,2751  3 2234 0           CAF     VNLODCOL
 0683   REF  49  LAST  281     43,2752  0 4616 1           TC      BANKCALL
 0684   REF   5  LAST  277     43,2753   20334 1           CADR    GOXDSPF
 0685   REF  15  LAST  281     43,2754  0 5472 0           TC      ENDEXT           V34
 0686                          43,2755  0 2756 1           TC      +1
 0687   REF   1                43,2756  3 2771 1           CAF     V43K             REDISPLAY OUR VERB.
 0688   REF  50  LAST  283     43,2757  0 4616 1           TC      BANKCALL
 0689   REF   5  LAST  275     43,2760   20621 0           CADR    EXDSPRET
 0690   REF  32  LAST  281     43,2761  3 4746 0           CAF     BIT6
 0691                          43,2762  0 0006 1           EXTEND
 0692   REF  21  LAST  283     43,2763  05 012 1           WOR     CHAN12           ENABLE ERROR COUNTERS.
 0693   REF   9  LAST  281     43,2764  3 4752 0           CAF     TWO
 0694   REF   9  LAST  279     43,2765  0 5203 0           TC      WAITLIST         PUT OUT COMMANDS IN .32 SECONDS.
 0695   REF   4  LAST   99        0321                     EBANK=  THETAD
 0696   REF   1                43,2766   02035 0           2CADR   ATTCK2
 0696   REF   1                43,2767   64100 1
 0697   REF  16  LAST  283     43,2770  1 5472 1           TCF     ENDEXT

 0698                          42,2035                     BANK    42
 0699   REF   1                42,2000                     SETLOC  PINBALL3         SOMETHING IN B42.
 0700                          42,2035                     BANK

 0701   REF   1                                            COUNT*  $$/EXTVB
 0702  REF  10  LAST  283   42,2035   3 4752 0  ATTCK2   CAF     TWO                  PUT OUT COMMANDS.
 0703  REF  25  LAST  282   42,2036  54 002 1    +1      TS      Q                    CDU WILL LIMIT EXCESS DATA.
 0704  REF  81  LAST  283   42,2037  50 000 1            INDEX   A
 0705  REF   5  LAST  283   42,2040   3 0321 1           CA      THETAD
 0706                       42,2041   0 0006 1           EXTEND
 0707  REF   1              42,2042   7 2053 1           MP      ATTSCALE
 0708  REF  26  LAST  284   42,2043  50 002 0            INDEX   Q
 0709  REF   2  LAST  176   42,2044  56 050 1            XCH     CDUXCMD
 0710  REF  27  LAST  284   42,2045  10 002 1            CCS     Q
 0711  REF   2  LAST  283   42,2046   1 2036 1           TCF     ATTCK2 +1

 0712  REF   1              42,2047   3 7743 0           CAF     13,14,15
 0713                       42,2050   0 0006 1           EXTEND
 0714  REF   6  LAST  222   42,2051  05 014 1            WOR     CHAN14
 0715  REF   4  LAST  240   42,2052   1 5261 0           TCF     TASKOVER             LEAVE ERROR COUNTERS ENABLED.

 0716                       42,2053    03146 1  ATTSCALE DEC     0.1

 0717                       07,2666                      BANK    7
 0718  REF   4  LAST  278   43,2000                      SETLOC  EXTVERBS
 0719                       43,2771                      BANK

 0720  REF   4 LAST  282 TC  283:     36    329*         COUNT*  $$/EXTVB

 0721                       43,2771    12600 1  V43K     VN      4300
R0722             V82PERF   VERB 82             DESCRIPTION
R0723                  REQUEST ORBIT PARAMETERS DISPLAY (R30)
R0724     1. IF AVERAGE G IS OFF:
R0725             FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R0726              TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R0727              CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R0728             SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R0729             CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R0730              RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R0731              HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R0732              HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R0733              INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R0734             FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R0735              NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R0736              ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R0737              DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R0738              ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R0739     2. IF AVERAGE G IS ON:
R0740             CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R0741              FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R0742              OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R0743             FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R0744             IF MODE IS P11, THEN CALL DELRSPL SO ASTRONAUT CAN MONITOR
R0745              RESULTS BY N50E. SPLASH COMPUTATION DONE ONCE PER TWO SECS.
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 0746   REF  10  LAST  283   43,2772  0 2076 1  V82PERF  TC      TESTXACT

 0747   REF   2  LAST  277   43,2773  3 5021 1           CAF     PRIO7          LESS THAN LAMBERT.  R30,V82
 0748   REF   2  LAST  277   43,2774  0 5146 1           TC      PRIOCHNG
 0749                        43,2775  0 0006 1           EXTEND
 0750   REF   1              43,2776  3 3001 0           DCA     V82CON
 0751   REF   1              43,2777  0 5165 0           TC      SUPDXCHZ       V82CALL IN DIFF SUPERBANK FROM V82PERF

 0752   REF   2  LAST  118   E4,1716                     EBANK=  HAPO
 0753   REF   1              43,3000   03242 0  V82CON   2CADR   V82CALL
 0753   REF   1              43,3001   44104 1


R0754                V83PERF      VERB 83                DESCRIPTION
R0755                    REQUEST RENDEZVOUS PARAMETER DISPLAY (R31)
R0756                    1. SET EXT VERB DISPLAY BUSY FLAG.
R0757                    2. SCHEDULE R31CALL WITH PRIORITY 5.
R0758                       A. DISPLAY
R0759                           R1  RANGE
R0760                           R2  RANGE RATE
R0761                           R3  THETA

 0762   REF  11  LAST  285   43,3002  0 2076 1  V83PERF  TC      TESTXACT

 0763   REF  23  LAST  279   43,3003  3 4752 0           CAF     BIT2
 0764   REF  10  LAST  283   43,3004  0 5203 0           TC      WAITLIST
 0765   REF   1              E7,1611                     EBANK=  TSTRT
 0766   REF   1              43,3005   03737 1           2CADR   R31CALL
 0766   REF   1              43,3006   60107 1
 0767   REF  11  LAST  282   43,3007  0 5155 0           TC      ENDOFJOB

R0768   VERB 89 DESCRIPTION     RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)

R0769   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED.  CALCULATES AND
R0770   DISPLAYS FINAL FDAI BALL ANGLES TO POINT LM +X OR +Z AXIS AT CSM.

R0771   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R0772   EXIT R63, OTHERWISE CONTINUE.

R0773   2. IF IN P00, DO IMU STATUS CHECK ROUTINE (R02BOTH). IF IMU ON AND ITS
R0774   ORIENTATION KNOWN TO LGC, CONTINUE.

R0775   3. FLASH DISPLAY V 04 N 06.  R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R0776   BE POINTED AT CSM.  INITIAL CHOICE IS PREFERRED (+Z) AXIS (R2=1).
R0777   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT = 1) BY V 22 E 2 E.  CONTINUE
R0778   AFTER KEYING IN PROCEED.

R0779   4. BOTH VEHICLE STATE VECTORS UPDATED BY CONIC EQS.

R0780   5. HALF MAGNITUDE UNIT LOS VECTOR (IN STABLE MEMBER COORDINATES) AND
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R0781     HALF MAGNITUDE UNIT SPACECRAFT AXIS VECTOR (IN BODY COORDINATES)
R0782     PREPARED FOR VECPOINT.

R0783     6. GIMBAL ANGLES FROM VECPOINT TRANSFORMED INTO FDAI BALL ANGLES BY
R0784     BALLANGS. FLASH DISPLAY V 06 N 18 AND AWAIT RESPONSE.

R0785     7. RECYCLE - RETURN TO STEP 4.
R0786        TERMINATE - EXIT R63.
R0787        PROCEED - RESET 3AXISFLG AND CALL R60LEM FOR ATTITUDE MANEUVER.


 0788     REF   2  LAST  283    43,3010  0 2121 1  V89PERF   TC       CHKPOOH
 0789     REF  12  LAST  285    43,3011  0 2076 1            TC       TESTXACT
 0790     REF   1               43,3012  3 4737 0            CAF      PRIO10
 0791     REF   6  LAST  282    43,3013  0 5105 0            TC       FINDVAC
 0792     REF   3  LAST  118    E4,1606                      EBANK=   RONE
 0793     REF   1               43,3014   02022 0            2CADR    V89CALL
 0793     REF   1               43,3015   54104 0
 0794     REF  12  LAST  285    43,3016  0 5155 0            TC       ENDOFJOB

R0795              V90PERF      VERB 90              DESCRIPTION
R0796                  REQUEST RENDEZVOUS OUT-OF-PLANE DISPLAY (R36)
R0797                  1. SET EXT VERB DISPLAY BUSY FLAG.
R0798                  2. SCHEDULE R36 CALL WITH PRIORITY 10
R0799                     A. DISPLAY
R0800                         TIME OF EVENT - HOURS , MINUTES , SECONDS
R0801                         Y  OUT-OF-PLANE POSITION - NAUTICAL MILES
R0802                         YDOT  OUT-OF-PLANE VELOCITY - FEET/SECOND
R0803                         PSI  ANGLE BTW LINE OF SIGHT AND FORWARD
R0804                               DIRECTION VECTOR IN HORIZONTAL PLANE - DEGREES

 0805     REF  13  LAST  286    43,3017  0 2076 1  V90PERF   TC       TESTXACT
 0806     REF   3  LAST  285    43,3020  3 5021 1            CAF      PRIO7              R36,V90
 0807     REF   7  LAST  286    43,3021  0 5105 0            TC       FINDVAC
 0808     REF   7  LAST  244    E7,1441                      EBANK=   TIG
 0809     REF   1               43,3022   02642 0            2CADR    R36
 0809     REF   1               43,3023   10107 0
 0810     REF  13  LAST  286    43,3024  1 5155 1            TCF      ENDOFJOB
R0811              MINIMP       VERB 76              DESCRIPTION
R0812                  MINIMUM IMPULSE MODE
R0813                  1. SET MINIMUM IMPULSE RHC MODE FLAG TO 1.

 0814     REF   9  LAST  278    43,3025  0 5504 0  MINIMP    TC       UPFLAG             SET PULSES = 1 (MIN. IMPULSE MODE)
 0815     REF   1               43,3026   00303 1            ADRES    PULSEFLG
 0816     REF  11  LAST  281    43,3027  1 2117 0            TCF      GOPIN              RETURN VIA PINBRNCH

R0817              NOMINIMP      VERB 77             DESCRIPTION
R0818                  RATE COMMAND MODE
R0819                  1. SET MINIMUM IMPULSE RHC MODE FLAG TO 0. (ZERO INDICATES NOT MINIMUM IMPULSE MODE.).
R0821                  2. MOVE CDUX,CDUY,CDUZ INTO CDUXD,CDUYD,CDUZD.
```

```
 0822     REF   21  LAST  281     43,3030   0 5516 0  NOMINIMP TC       DOWNFLAG          SET PULSES = 0 (NOT MINIMUM IMPULSE MODE
 0823     REF    2  LAST  286     43,3031    00303 1           ADRES    PULSEFLG
 08235                            43,3032   0 0004 0           INHINT
 0824     REF   11  LAST  246     43,3033   0 4674 0           TC       IBNKCALL
 0825     REF    1                43,3034    40154 0           CADR     ZATTERDR
 0826     REF   12  LAST  286     43,3035   0 2117 1           TC       GOPIN
```

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P0827              CREWMANU      VERB 49              DESCRIPTION
R0828                 START AUTOMATIC ATTITUDE MANEUVER
R0829                 1. REQUIRE PROGRAM 00 ACTIVE.
R0830                 2. SET EXT VERB CISPLAY 8USY FLAG.
R0831                 3. SCHEDULE R62CISP WITH PRIORITY 10.
R0832                 4. RELEASE EXT VERB DISPLAY.

R0833               R62CISP
R0834                 1. DISPLAY FLASHING V06,N22.
R0835                    RESPCNSES
R0836                    A. TERMINATE
R0837                       1. GO TC GCTCPCCH.
R0838                    B. PROCEED
R0839                       1. SET 3AXISFLG TO INDICATE MANEUVER IS SPECIFIED BY 3 AXIS.
R0841                       2. EXECUTE R60LEM (ATTITUDE MANEUVER).
R0842                    C. ENTER
R0843                       1. REPEAT FLASHING V06,N22.

 0844    REF   3  LAST  286    43,3036  C 2121 1  CREWMANU TC      CHKPCCH          DEMAND PCD

 0845    REF  14  LAST  286    43,3037  0 2076 1           TC      TESTXACT

 0846    REF   2  LAST  286    43,3040  3 4737 C           CAF     PRIO10
 0847    REF   8  LAST  286    43,3041  0 5105 0           TC      FINDVAC
 0848    REF   2  LAST  136    E6,1675                     EBANK=  BCOU
 0849    REF   1               43,3042   02103 1           2CADR   R62DISP
 0849    REF   1               43,3043   46106 1
 0850    REF  14  LAST  286    43,3044  0 5155 0           TC      ENDOFJCB
```

```
P0851   TRMTRACK       VERB 56                    DESCRIPTION
R0852                  TERMINATE TRACKING (P20 AND P25).
R0853                  1. KNOCK DOWN RENDEZVOUS, TRACK, AND UPDATE FLAGS.
R0854                  2. REQUIRE P20 OR  P25 NOT RUNNING ALONE OR GO TO GOTOPOOH (REQUEST PROGRAM 00).
R0856                  3. SCHEDULE V56TOVAC WITH PRIORITY 30.

R0857                  V56TOVAC
R0858                  1. EXECUTE INTSTALL (IF INTEGRATION IS RUNNING, STALL UNTIL IT IS FINISHED.).
R0860                  2. ZERO GROUP 2 TO HALT P20.
R0861                  3. TRANSFER CONTROL TO GOPROG2 (SOFTWARE RESTART).

 0862   REF   1                43,3045  3 3065 1  TRMTRACK CA      BITS9+7         IS REND OR P25 FLAG ON
 0863   REF  18  LAST  233     43,3046  7 0074 0           MASK    FLAGWRD0
 0864                          43,3047  0 0006 1           EXTEND
 0865   REF  13  LAST  287     43,3050  1 2117 0           BZF     GOPIN           NO

 0866   REF  22  LAST  287     43,3051  0 5516 0           TC      DOWNFLAG
 0867   REF   1                43,3052   00010 0           ADRES   RNDVZFLG

 0868   REF  23  LAST  289     43,3053  0 5516 0           TC      DOWNFLAG
 0869   REF   1                43,3054   00006 1           ADRES   P25FLAG

 0870   REF  24  LAST  289     43,3055  0 5516 0           TC      DOWNFLAG        ENSURE SEARCH FLAG IS OFF
 0871   REF   1                43,3056   00037 0           ADRES   SRCHOPTN

 0872   REF   2  LAST  282     43,3057  3 4747 1           CA      TRACKBIT        IS TRACK FLAG ON?
 0873   REF  10  LAST  282     43,3060  7 0075 1           MASK    FLAGWRD1
 0874                          43,3061  0 0006 1           EXTEND
 0875   REF  14  LAST  289     43,3062  1 2117 0           BZF     GOPIN

 0876   REF  10  LAST  277     43,3063  0 4635 0           TC      POSTJUMP
 0877   REF   1                43,3064   64054 1           CADR    TRMTRAK1

 0878                          43,3065   00500 1  BITS9+7  OCT     500

 0879   REF   3  LAST  277     42,2000                     SETLOC  SBAND           BANK 42
 0880                          42,2054                     BANK

 0881   REF   2 LAST  283 TO  284:      15     15*         COUNT*  $$/EXTVB

 0882   REF  25  LAST  289     42,2054  0 5516 0  TRMTRAK1 TC      DOWNFLAG
 0883   REF   1                42,2055   00027 1           ADRES   UPDATFLG        UPDATE FLAG DOWN
 0884   REF  26  LAST  289     42,2056  0 5516 0           TC      DOWNFLAG
 0885   REF   1                42,2057   00031 0           ADRES   TRACKFLG        TRACK FLAG DOWN
 0886   REF  27  LAST  289     42,2060  0 5516 0           TC      DOWNFLAG
 0887   REF   2  LAST  233     42,2061   00007 0           ADRES   IMUSE

 0888   REF   7  LAST  266     42,2062  0 6042 1           TC      INTPRET
 0889                          42,2063   77624 1           CALL
 0890   REF   3  LAST  238     42,2064   27410 1                   INTSTALL        DONT INTERRUPT INTEGRATION
 0891                      42,2065   77776 1            EXIT

 0892   REF   2  LAST  230  42,2066  0 5353 1            TC      PHASCHNG
 0893                      42,2067   00002 0            OCT     2                 KILL GROUP 2 TO HALT P20 ACTIVITY

 0894                      42,2070  0 0004 0            INHINT
 0895   REF  12  LAST  287  42,2071  0 4674 0            TC      IBNKCALL          ZERO THE COMMANDED RATES TO STOP
 0896   REF   1             42,2072   40166 1            CADR    STOPRATE          MANEUVER

 0897   REF  13  LAST  290  42,2073  0 4674 0            TC      IBNKCALL
 0898   REF   1             42,2074   40115 0            CADR    RESTORDB

 0899   REF   4  LAST  271  42,2075  0 6011 1            TC      CLRADMOD          CLEAR BITS 10 + 15 OF RADMODES.

 0900   REF  32  LAST  281  42,2076  4 4736 0            CS      BIT14             DISABLE LOCKON
 0901                      42,2077  0 0006 1            EXTEND
 0902   REF  22  LAST  283  42,2100  03 0012 1           WAND    CHAN12
 0903   REF  11  LAST  289  42,2101  0 4635 0            TC      POSTJUMP
 0904   REF   2  LAST  232  42,2102   12766 0            CADR    GOPROG2           CAUSE RESTART.

R0905                ONEDUMP     VERB 74               DESCRIPTION
R0906                    INITIALIZE DOWN-TELEMETRY PROGRAM FOR ERASABLE MEMORY DUMP.
R0907                    1. SET EXT VERB DISPLAY BUSY FLAG.
R0908                    2. REPLACE CURRENT DOWNLIST WITH ERASABLE MEMORY.
R0909                    3. RELEASE EXT VERB DISPLAY.

 0910   REF   5  LAST  284  43,2000                      SETLOC EXTVERBS
 0911                      43,3066                      BANK

 0912   REF   5 LAST  284 TO  289:    61   390*          COUNT* $$/EXTVB

 0913                         0400                      EBANK= 400
 0914   REF   1             43,3066  3 3071 1  ONEDUMP   CAF     LDNDUMPI
 0915   REF   3  LAST  221  43,3067  54 335 0            TS      DNTMGOTO
 0916   REF  15  LAST  289  43,3070  0 2117 1            TC      GOPIN

 0917   REF   2  LAST  263  43,3066            V74       EQUALS ONEDUMP
 0918   REF   1             43,3071   03721 0  LDNDUMPI REMADR DNDUMPI


R0919                LEMVEC     VERB 80                DESCRIPTION
R0920                    UPDATE LEM STATE VECTOR
R0921                        RESET VEHUPFLG TO 0

 0922   REF  28  LAST  289  43,3072  0 5516 0  LEMVEC    TC      DOWNFLAG
 0923   REF   1             43,3073   00026 0            ADRES   VEHUPFLG          VB 80 - VEHUPFLG DOWN INDICATES LEM

 0924   REF   1             43,3074  0 3077 1            TC      NOUPDOWN
R0925                CSMVEC      VERB 81               DESCRIPTION
R0926                    UPDATE CSM STATE VECTOR
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R0927                      SET   VEHUPFLG TC 1

 0928   REF  10  LAST  286    43,3075  0 5504 0  CSMVEC    TC      UPFLAG
 0929   REF   2  LAST  290    43,3076   00026 0            ADRES   VEHUPFLG         VB 81 - VEHUPFLG UP INDICATES CSM

 0930   REF  29  LAST  290    43,3077  0 5516 0  NOUPDOWN  TC      DOWNFLAG
 0931   REF   1               43,3100   00030 1            ADRES   NOUPFLAG

 0932   REF  16  LAST  290    43,3101  1 2117 0            TCF     GOPIN

R0933               UPDATOFF    VERB95         DESCRIPTION
R0934                   INHIBIT STATE VECTOR UPDATES BY INCORP
R0935                      SET NOUPFLAG TC 1

 0936   REF  11  LAST  291    43,3102  0 5504 0  UPDATOFF  TC      UPFLAG           VB 95 SET NOUPFLAG
 0937   REF   2  LAST  291    43,3103   00030 1            ADRES   NOUPFLAG

 0938   REF  17  LAST  291    43,3104  0 2117 1            TC      GOPIN
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P0939               SYSTEST     VERB 92                 OESCRIPTICN
R0940                 OPERATE IMU PERFORMANCE TEST.
R0941                   1. REQUIRE PRCGRAM 00 CR TURN ON OPERATOR ERROR.
R0942                   2. SET EXT VER8 8USY FLAG.
 0943    REF   2  LAST  128    E5,1417                     E8ANK= QPLACE

 0944    REF   4  LAST  288    43,3105  0 2121 1  SYSTEST  TC     CHKPDCH        CEMANO POO

 0945    REF  15  LAST  288    43,3106  C 2076 1           TC     TESTXACT

 0946    REF   1               43,3107  3 7713 0           CAF    PRIO22
 0947    REF   9  LAST  288    43,3110  C 5105 0           TC     FINDVAC
 0948    REF   3  LAST  292    E5,1417                     EBANK= QPLACE
 0949    REF   1               37,2000                     SBANK= IMUSUPER
 0950    REF   1               43,3111   C2002 1           2CAOR  REOO
 0950    REF   1               43,3112   76065 0
 0951    REF  15  LAST  288    43,3113  C 5155 0           TC     ENCDFJC8

R0952    VER8 93          CLEAR RENCWFLG, CAUSES W-MATRIX TO 8E RE-INITIALIZED.

 0953                          43,3114  0 0004 0  WMATRXNG INHINT
 0954    REF   1               43,3115  4 4753 0           CS     RENOW8IT
 0955    REF  11  LAST  282    43,3116  7 0101 0           MASK   FLAGWRD5
 0956    REF  12  LAST  292    43,3117  54 101 0           TS     FLAGWRD5

 0957    REF  18  LAST  291    43,3120  C 2117 1           TC     GOPIN

 0958    REF   1               43,3121            GOSHOSUM EQUALS SHOWSUM

 0959    REF   5  LAST  292    43,3121  C 2121 1  SHCWSUM  TC     CHKPOOH        *
 0960    REF  16  LAST  292    43,3122  C 2076 1           TC     TESTXACT       *
 0961    REF   4  LAST  286    43,3123  3 5021 1           CAF    PRIO7          ALLOW OTHEP CHARINS.
 0962    REF   3  LAST  285    43,3124  C 5146 1           TC     PRIOCHNG
 0963    REF   1               43,3125  3 4753 1           CAF    S+1            *
 0964    REF   2  LAST  109    43,3126  55'376 0           TS     SKEEP6         * SHOWSUM OPTION
 0965    REF   1               43,3127  3 4755 1           CAF    S+ZERO         *
 0966    REF   3  LAST  214    43,3130  55'362 0           TS     SMODE          * TURN OFF SELF-CHECK
 0967    REF   1               43,3131  3 3272 0           CA     SELFAORS       *
 0968    REF   3  LAST  225    43,3132  55'361 0           TS     SELFRET        *
 0969    REF   1               43,3133  0 3547 1           TC     STSHDSUM       * ENTER ROPECHK

 0970    REF   2  LAST  109    43,3134  23'372 0  SDISPLAY LXCH   SKEEP2         * 8ANK # FOR DISPLAY
 0971    REF   2  LAST  109    43,3135  23'373 1           LXCH   SKEEP3         * BUGGER WORD FCR OISPLAY
 0972    REF   1               43,3136  3 3271 0  NCKILL   CA     ADRS1          *
 0973    REF  41  LAST  277    43,3137  54 156 1           TS     MPAC +2        *
 0974    REF   1               43,3140  3 3151 1           CA     VNCON          * 0501
 0975    REF  51  LAST  283    43,3141  C 4616 1           TC     BANKCALL       *
 0976    REF   6  LAST  283    43,3142   20334 1           CADR   GOXDSPF        *
 0977                          43,3143  0 3146 1           TC     +3             *
 0978    REF   1               43,3144  C 3660 1           TC     NXT8NK         *
 0979   REF   1                  43,3145   0 3136 0               TC      NOKILL          *
 0980   REF   2  LAST   292      43,3146   3 3272 0               CA      SELFADRS
 0981   REF   2  LAST   109      43,3147  55'371 1               TS      SKEEP1

 0982   REF  17  LAST   283      43,3150   0 5472 0               TC      ENDEXT          *

 0983                            43,3151    01201 0   VNCON       VN      501             *

 0984   REF   3  LAST   292      43,3152   3 1376 1   ENDSUMS     CA      SKEEP6          *
 0985                            43,3153   0 0006 1               EXTEND                  *
 0986   REF   2  LAST   225      43,3154   1 3363 0               BZF     SELFCHK         * ROPECHK, START SELFCHK AGAIN.
 0987   REF   2  LAST   292      43,3155   0 3547 1               TC      STSHOSUM        * START SHOWSUM AGAIN.
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R0988                DAPDISP     VERB 48              DESCRIPTION
R0989                     LOAD AUTO PILOT  DATA
R0990                     1. REQUIRE EXT VERB DISPLAY AVAILABLE AND SET BUSY FLAG.
R0991                     2. EXECUTE DAPDATA1, DAPDATA2, AND DAPDATA3.
R0992                     3. RELEASE EXT VERB DISPLAY SYSTEM.
R0993   KEY
R0994   THE FOLLOWING IS A KEY TO THE 5 DIGITS OF THE DAP DATA CODE (N46)

R0995   DIGIT A - VEHICLE CONFIGURATION
R0996            1 - LM ALONE, ASCENT
R0997            2 - LM ALONE, DESCENT
R0998            3 - CSM AND LM DOCKED

R0999   DIGIT B - ACCELERATION CODE
R1000            0 - 2 JET TRANSLATION, RCS SYSTEM A PREFERRED
R1001            1 - 2 JET TRANSLATION, RCS SYSTEM B PREFERRED
R1002            2 - 4 JET TRANSLATION, RCS SYSTEM A PREFERRED (NOT MEANINGFUL)
R1003            3 - 4 JET TRANSLATION, RCS SYSTEM B PREFERRED (NOT MEANINGFUL)

R1004   DIGIT C - ACA SCALING
R1005            0 - FINE
R1006            1 - NORMAL

R1007   DIGIT D - DEADBAND
R1008            0 - 0.3 DEG
R1009            1 - 1.0 DEG
R1010            2 - 5.0 DEG
R1011           (3 - 5.0 DEG BY DEFAULT)

R1012   DIGIT E - MANEUVER RATE
R1013            0 - 0.2 DEG/SEC
R1014            1 - 0.5 DEG/SEC
R1015            2 - 2.0 DEG/SEC
R1016            3 -10.0 DEG/SEC

 1017   REF  17  LAST  292   43,3156  0 2076 1  DAPDISP  TC      TESTXACT
 1018   REF   5  LAST  292   43,3157  3 5021 1           CAF     PRIO7           R03
 1019   REF   4  LAST  292   43,3160  0 5146 1           TC      PRIOCHNG
 1020   REF  12  LAST  290   43,3161  0 4635 0           TC      POSTJUMP
 1021   REF   1              43,3162   40004 1           CADR    DAPDATA1
 1022                        34,2000                     BANK    34
 1023   REF   1              20,2000                     SETLOC  LOADDAP
 1024                        20,2004                     BANK

 1025   REF   1                                          COUNT*  $$/R03

 1026   REF   2  LAST  212   30,2000                     SBANK=  LOWSUPER        FOR SUBSEQUENT LOW 2CADR'S.

 1027   REF   1              20,2004  3 2114 1  DAPDATA1 CAF     BOOLSMSK        SET DISPLAY ACCORDING TO DAPBOOLS BITS.
 1028   REF   4  LAST  221   20,2005  7 0111 1           MASK    DAPBOOLS        LM
 1029   REF   1                20,2006  55'340 0            TS      DAPDATR1       LM
 1030   REF   6  LAST  218     20,2007  4 0106 1            CS      FLGWRD10       SET BIT 14 TO BE COMPLEMENT OF APSFLAG.
 1031   REF   2  LAST  215     20,2010  7 4737 1            MASK    APSFLBIT
 1032   REF  82  LAST  284     20,2011  10 000 0            CCS     A
 1033   REF  33  LAST  290     20,2012  3 4736 1            CAF     BIT14
 1034   REF   2  LAST  295     20,2013  27'340 0            ADS     DAPDATR1
 1035   REF   3  LAST  295     20,2014  31'340 1  CHKDATA1  CAE     DAPDATR1       IF BITS 13 AND 14 ARE BOTH ZERO, FORCE
 1036   REF   3  LAST  283     20,2015  7 4355 1            MASK    BIT13-14         A ONE INTO BIT 13.
 1037                          20,2016  0 0006 1            EXTEND
 1038   REF   1                20,2017  1 2034 0            BZF     FORCEONE
 1039   REF   4  LAST  295     20,2020  31'340 1            CAE     DAPDATR1       ENSURE THAT NO ILLEGAL BITS SET BY CREW.
 1040   REF   1                20,2021  7 2113 1  MSKDATR1  MASK    DSPLYMSK
 1041   REF   5  LAST  295     20,2022  55'340 0            TS      DAPDATR1
 1042   REF   1                20,2023  3 2112 1            CAF     V01N46         LM
 1043   REF  52  LAST  292     20,2024  0 4616 1            TC      BANKCALL
 1044   REF   1                20,2025   20353 0            CADR    GOXDSPFR
 1045   REF  18  LAST  293     20,2026  1 5472 1            TCF     ENDEXT         V34E  TERMINATE
 1046   REF   1                20,2027  1 2037 0            TCF     DPDAT1         V33E  PROCEED
 1047   REF   1                20,2030  1 2014 1            TCF     CHKDATA1       E     NEW DATA    CHECK AND REDISPLAY
 1048   REF   1                20,2031  3 6245 1            CAF     REVCNT         BITS 2 & 3:  BLANKS R2 & R3.
 1049   REF   3  LAST  279     20,2032  0 5464 1            TC      BLANKET
 1050   REF  16  LAST  292     20,2033  1 5155 1            TCF     ENDOFJOB
 1051   REF  22  LAST  259     20,2034  3 4737 0  FORCEONE  CAF     BIT13
 1052   REF   6  LAST  295     20,2035  27'340 0            ADS     DAPDATR1
 1053   REF   1                20,2036  1 2021 1            TCF     MSKDATR1

 1054                          20,2037  0 0004 0  DPDAT1    INHINT                 INHINT FOR SETTING OF FLAG BITS AND MASS
 1055   REF   3  LAST  295     20,2040  4 4737 1            CS      APSFLBIT         ON BASIS OF DISPLAYED DAPDATR1.
 1056   REF   7  LAST  295     20,2041  7 0106 1            MASK    FLGWRD10
 1057   REF  22  LAST  277     20,2042  54 001 1            TS      L              SET APSFLAG TO BE COMPLEMENT OF BIT 14.
 1058   REF   7  LAST  295     20,2043  4 1340 0            CS      DAPDATR1
 1059   REF  34  LAST  295     20,2044  7 4736 0            MASK    BIT14
 1060   REF  83  LAST  295     20,2045  10 000 0            CCS     A
 1061   REF   4  LAST  295     20,2046  3 4737 0            CAF     APSFLBIT
 1062   REF  23  LAST  295     20,2047  6 0001 0            AD      L
 1063   REF   8  LAST  295     20,2050  54 106 1            TS      FLGWRD10
 1064   REF   8  LAST  295     20,2051  4 1340 0            CS      DAPDATR1       SET BITS OF DAPBOOLS ON BASIS OF DISPLAY
 1065   REF   4  LAST  295     20,2052  7 4355 1            MASK    BIT13-14         MASK OUT CSMDOCKD (BIT 13) UNLESS BOTH
 1066   REF  84  LAST  295     20,2053  10 000 0            CCS     A                13 AND 14 ARE SET.
 1067   REF   1                20,2054  4 4737 1            CS      CSMDOCKD
 1068   REF   2  LAST  294     20,2055  6 2114 1            AD      BOOLSMSK
 1069   REF   9  LAST  295     20,2056  7 1340 0            MASK    DAPDATR1
 1070   REF  24  LAST  295     20,2057  54 001 1            TS      L
 1071   REF   3  LAST  295     20,2060  4 2114 0            CS      BOOLSMSK
 1072   REF   5  LAST  294     20,2061  7 0111 1            MASK    DAPBOOLS
 1073   REF  25  LAST  295     20,2062  6 0001 0            AD      L
 1074   REF   6  LAST  295     20,2063  54 111 1            TS      DAPBOOLS
 1075   REF   2  LAST  295     20,2064  7 4737 1            MASK    CSMDOCKD       LOAD MASS IN ACCORDANCE WITH CSMDOCKD
 1076   REF  85  LAST  295     20,2065  10 000 0            CCS     A                MASS IS USUALLY ALREADY OKAY, SO DO
 1077   REF   1                20,2066  31'327 0            CAE     CSMMASS          NOT TOUCH ITS LOW-ORDER PART.
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L         EXTENDED VERBS

 1078   REF    7  LAST  206    20,2067   6 1326 1            AD       LEMMASS
 1079   REF    3  LAST  105    20,2070  55'243 1             TS       MASS
 1080   REF    7  LAST  295    20,2071  30 111 0             CAE      DAPBOOLS       2 OR 4 JET X-TRANSLATION
 1081   REF    1               20,2072   7 4741 0            MASK     ACC4OR2X       (BIT ACC4OR2X = 1 FOR 4 JETS)
 1082                          20,2073   0 0006 1            EXTEND
 1083                          20,2074   1 2101 1            BZF      +5
 1084   REF   20  LAST  219    20,2075   4 4735 0            CS       BIT15          CLEAR NJTSFLAG TO 0 FOR 4 JETS
 1085   REF   11  LAST  289    20,2076   7 0075 1            MASK     FLAGWRD1
 1086   REF   12  LAST  296    20,2077  54 075 1             TS       FLAGWRD1
 1087                          20,2100   1 2104 1            TCF      +4             SET NJTSFLAG TO 1 FOR 2 JETS
 1088   REF   13  LAST  296    20,2101   4 0075 1            CS       FLAGWRD1
 1089   REF   21  LAST  296    20,2102   7 4735 0            MASK     BIT15
 1090   REF   14  LAST  296    20,2103  26 075 1             ADS      FLAGWRD1       SELECT DESIRED KALCMANU AUTOMATIC
 1091   REF    8  LAST  296    20,2104   3 0111 0            CA       DAPBOOLS       MANEUVER RATE
 1092   REF    2  LAST  235    20,2105   7 6250 1            MASK     THREE          RATEINDX HAS TO BE 0,2,4,6 SINCE RATES
 1093                          20,2106   6 0000 1            DOUBLE                  ARE DP
 1094   REF    2  LAST  214    20,2107  55'322 1             TS       RATEINDX
 1095   REF   13  LAST  294    20,2110   0 4635 0            TC       POSTJUMP
 1096   REF    1               20,2111    02211 1            CADR     STIKLOAD

 1097                          20,2112    00256 0  V01N46    VN       0146
 1098                          20,2113    33133 0  CSPLYMSK  OCT      33133
 1099                          20,2114    13133 1  BOOLSMSK  OCT      13133
 1100                          01,2211                       BANK     01
 1101   REF    2  LAST   43    01,2000                       SETLOC   LOADDAP1
 1102                          01,2211                       BANK

 1103   REF    2 LAST   43 TO   43:       2       2*         COUNT*   $$/R03

 1104   REF    3  LAST  221    01,2211   3 5015 0  STIKLOAD  CAF      EBANK6
 1105   REF    7  LAST  281    01,2212  54 003 0             TS       EBANK
 1106   REF    2  LAST  214    E6,1444                       EBANK=   STIKSENS
 1107   REF    1               01,2213   3 4745 0            CA       RHCSCALE       SET STICK SENSITIVITY TO CORRESPOND TO A
 1108   REF    9  LAST  296    01,2214   7 0111 1            MASK     DAPBOOLS       MAXIMUM COMMANDED RATE (AT 42 COUNTS) OF
 1109   REF   86  LAST  295    01,2215  10 000 0             CCS      A              20 D/S(NORMAL) OR 4 D/S(FINE), SCALED
 1110   REF    1               01,2216   3 2340 1            CA       NORMAL         AT 45 D/S.
 1111   REF    1               01,2217   6 2341 0            AD       FINE
 1112   REF    3  LAST  296    01,2220  55'444 0             TS       STIKSENS
 1113   REF    1               01,2221   3 2343 1            CA       -0.6D/S        LM-ONLY BREAKOUT LEVEL IS .6 D/S.
 1114   REF    3  LAST  214    01,2222  55'476 1             TS       -RATEDB        IF CSM-DOCKED, DIVIDE STICK SENSITIVITY
 1115   REF    3  LAST  295    01,2223   3 4737 0            CA       CSMDOCKD       BY 10. NORMAL SCALING IS THEN 2 D/S AND
 1116   REF   10  LAST  296    01,2224   7 0111 1            MASK     DAPBOOLS       FINE SCALING IS 0.4 D/S
 1117                          01,2225   0 0006 1            EXTEND                  BRANCH IF CSM IS NOT DOCKED.
 1118                          01,2226   1 2235 0            BZF      +7
 1119   REF    4  LAST  296    01,2227   3 1444 1            CA       STIKSENS
 1120                          01,2230   0 0006 1            EXTEND
 1121   REF    1               01,2231   7 2342 1            MP       1/10
 1122   REF    5  LAST  296    01,2232  55'444 0             TS       STIKSENS
 1123   REF    1               01,2233   3 2344 0            CA       -0.3D/S        CSM-DOCKED BREAKOUT LEVEL IS .3 D/S.
 1124   REF    4  LAST  296    01,2234  55'476 1             TS       -RATEDB
 1125                            01,2235  0 0003 1           RELINT                          PROCEED TO NOUN 47, MASS LOAD,

 1126  REF   1                   01,2236  3 2336 0  DAPDATA2 CAF     V0647
 1127  REF  53  LAST  295        01,2237  0 4616 1           TC      BANKCALL
 1128  REF   2  LAST  295        01,2240   20353 0           CADR    GOXDSPFR
 1129  REF   1                   01,2241  1 2247 0           TCF     ENDR03                  V34E  TERMINATE. FIRST SET DB, DO 1/ACCS
 1130  REF   1                   01,2242  1 2253 0           TCF     DAPDAT2                 V33E  PROCEED
 1131  REF   1                   01,2243  1 2236 0           TCF     DAPDATA2                      LOAD NEW DATA AND RECYCLE
 1132  REF  17  LAST  279        01,2244  3 4751 0           CAF     BIT3                    BLANKS R3
 1133  REF   4  LAST  295        01,2245  0 5464 1           TC      BLANKET                               LM
 1134  REF  17  LAST  295        01,2246  1 5155 1           TCF     ENDOFJOB
 1135                            01,2247  0 0004 0  ENDR03   INHINT
 1136  REF  14  LAST  290        01,2250  0 4674 0           TC      IBNKCALL
 1137  REF   2  LAST  290        01,2251   40115 0           CADR    RESTORDB
 1138  REF  19  LAST  295        01,2252  1 5472 1           TCF     ENDEXT                  DOES RELINT

 1139  REF   9  LAST  295        01,2253  4 0106 1  DAPDAT2  CS      FLGWRD10                DETERMINE STAGE FROM APSFLAG
 1140  REF   5  LAST  295        01,2254  7 4737 1           MASK    APSFLBIT
 1141  REF  87  LAST  296        01,2255  10 000 0           CCS     A
 1142  REF   1                   01,2256  3 2000 0           CA      MINLMD
 1143  REF   1                   01,2257  6 2001 1           AD      MINMINLM
 1144  REF   8  LAST  296        01,2260  6 1326 1           AD      LEMMASS                 LEMMASS MUST BE GREATER THAN EMPTY LEM
 1145                            01,2261  0 0006 1           EXTEND
 1146  REF   2  LAST  297        01,2262  6 2236 1           BZMF    DAPDATA2                ASK FOR NEW MASSES
 1147  REF  11  LAST  296        01,2263  30 111 0           CAE     DAPBOOLS
 1148  REF   4  LAST  296        01,2264  7 4737 1           MASK    CSMDOCKD
 1149                            01,2265  0 0006 1           EXTEND
 1150  REF   1                   01,2266  1 2274 0           BZF     LEMALONE                SKIP TEST ON CSMMASS IF NOT DOCKED.
 1151  REF   1                   01,2267  4 4741 0           CS      MINCSM                  TEST CSM MASS
 1152  REF   2  LAST  295        01,2270  6 1327 0           AD      CSMMASS                 CSMMASS MUST BE GREATER THAN EMPTY CSM
 1153                            01,2271  0 0006 1           EXTEND
 1154  REF   3  LAST  297        01,2272  6 2236 1           BZMF    DAPDATA2                ASK FOR NEW MASSES
 1155  REF   3  LAST  297        01,2273  31'327 0           CAE     CSMMASS                 DOCKED:  MASS = CSMMASS + LEMMASS
 1156  REF   9  LAST  297        01,2274  6 1326 1  LEMALONE AD      LEMMASS                 LEM ALONE:  MASS = LEMMASS
 1157                            01,2275  22 007 0           ZL
 1158  REF   4  LAST  296        01,2276  53'244 0           DXCH    MASS
 1159                            01,2277  0 0004 0           INHINT
 1160  REF  15  LAST  297        01,2300  0 4674 0           TC      IBNKCALL                SET DEADBANK AND COMPUTE MOMENTS OF
 1161  REF   3  LAST  297        01,2301   40115 0           CADR    RESTORDB                  INERTIA.
 1162                            01,2302  0 0003 1           RELINT                          PROCEED TO NOUN 48 (OR END).

 1163  REF  10  LAST  297        01,2303  4 0106 1  DAPDATA3 CS      FLGWRD10
 1164  REF   6  LAST  297        01,2304  7 4737 1           MASK    APSFLBIT
 1165                            01,2305  0 0006 1           EXTEND                          END ROUTINE IF LEM HAS STAGED,
 1166  REF  20  LAST  297        01,2306  1 5472 1           BZF     ENDEXT
 1167  REF   1                   01,2307  3 2337 1           CAF     V06N48                  DISPLAY TRIM ANGLES AND REQUEST RESPONSE
 1168  REF  54  LAST  297        01,2310  0 4616 1           TC      BANKCALL
 1169  REF   3  LAST  297        01,2311   20353 0           CADR    GOXDSPFR
 1170  REF  21  LAST  297        01,2312  0 5472 0           TC      ENDEXT
 1171  REF   1                   01,2313  1 2320 0           TCF     DPDAT3                  V33E GO DO TRIM (WAITLIST TO TRIMGIMB)
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L        EXTENDED VERBS                                                                        USER'S PAGE NO.  36      E6 S3

 1172                            01,2314  1 2307 0           TCF      -5                       LOAD NEW DATA AND RECYCLE
 1173  REF  18  LAST  297        01,2315  3 4751 0           CAF     BIT3
 1174  REF   5  LAST  297        01,2316  0 5464 1           TC      BLANKET             BLANK R3
 1175  REF  18  LAST  297        01,2317  1 5155 1           TCF     ENDOFJOB
 1176  REF  18  LAST  183        01,2320  3 4753 1  DPCAT3   CAF     BIT1
 1177  REF  11  LAST  285        01,2321  0 5203 0           TC      WAITLIST
 1178  REF   1                   E6,1401                     EBANK=  ROLLTIME
 1179  REF   1                   01,2322   03217 0           2CADR   TRIMGIMB
 1179  REF   1                   01,2323   56066 1
 1180  REF  19  LAST  298        01,2324  1 5155 1           TCF     ENDOFJOB            DOES A RELINT
 1181  REF   1                   01,2325  3 2337 1  TRIMDONE CAF     V50N48
 1182  REF  55  LAST  297        01,2326  0 4616 1           TC      BANKCALL            TRIM IS FINISHED; PLEASE TERMINATE R03
 1183  REF   2  LAST  273        01,2327   20361 1           CADR    GOMARK3R -1
 1184  REF  22  LAST  297        01,2330  0 5472 0           TC      ENDEXT              V34E TERMINATE
 1185  REF  23  LAST  298        01,2331  0 5472 0           TC      ENDEXT
 1186  REF  24  LAST  298        01,2332  0 5472 0           TC      ENDEXT
 1187  REF   3  LAST  268        01,2333  3 6007 0           CAF     OCT24               BITS TO CHANGE TO PERFORM, 3 TO BLANK R3
 1188  REF   6  LAST  298        01,2334  0 5464 1           TC      BLANKET
 1189  REF  20  LAST  298        01,2335  1 5155 1           TCF     ENDOFJOB

 1190                            01,2336   01457 0  V0647    VN      0647
 1191                            01,2337   01460 1  V06N48   VN      0648

 1192  REF   2  LAST  297        01,2337            V50N48   =       V06N48

 1193                            01,2340   25101 0  NORMAL   DEC     .660214
A1194                                                                                    NORMAL SCALING IS 20 D/S
 1195                            01,2341   05220 1  FINE     DEC     .165054             FINE STICK SCALING (4 D/S).
 1196                            01,2342   03146 1  1/10     DEC     .1                  FACTOR FOR CSM-DOCKED SCALING
 1197                            01,2343   77445 1  -0.6D/S  DEC     -218
 1198                            01,2344   77622 1  -0.3D/S  DEC     -109
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P1199   VERB 66.  VEHICLES ARE ATTACHED.  MOVE THIS VEHICLE STATE VECTOR TO
R1200             OTHER VEHICLE STATE VECTOR.

R1201       USE SUBROUTINE GENTRAN.

 1202                              07,2666                       BANK    7
 1203   REF   6  LAST  290         43,2000                       SETLOC  EXTVERBS
 1204                              43,3163                       BANK

 1205   REF   6 LAST  290 TO  294:     61   451*                 COUNT*  $$/EXTVB

 1206   REF   1                    E3,1626                       EBANK=  RRECTHIS

 1207   REF   2  LAST  259         43,3163  4 0104 0   ATTACHED  CS      FLAGWRD8
 1208   REF   2  LAST  215         43,3164  7 4744 0             MASK    SURFFBIT
 1209                              43,3165  0 0006 1             EXTEND
 1210   REF  23  LAST  283         43,3166  1 2116 1             BZF     ALM/END       TURN ON OE AND EXIT IF SURFFLAG SET.
 1211   REF   3  LAST  288         43,3167  3 4737 0             CAF     PRIO10
 1212   REF  10  LAST  292         43,3170  0 5105 0             TC      FINDVAC
 1213   REF   2  LAST  299         E3,1626                       EBANK=  RRECTHIS

 1214   REF   1                    43,3171   03174 0             2CADR   ATTACHIT
 1214   REF   1                    43,3172   66103 0
 1215   REF  21  LAST  298         43,3173  0 5155 0             TC      ENDOFJOB

 1216   REF   9  LAST  289         43,3174  0 6042 1   ATTACHIT  TC      INTPRET
 1217                              43,3175   77624 1             CALL
 1218   REF   4  LAST  289         43,3176   27410 1                     INTSTALL
 1219                              43,3177   43014 0             SET     BON
 1220   REF   1                    43,3200   04063 0                     MOONOTH
 1221   REF   1                    43,3201   04304 1                     MOONTHIS
 1222                              43,3202   67205 1                     +3
 1223                              43,3203   77614 1             CLEAR
 1224   REF   2  LAST  299         43,3204   04263 1                     MOONOTH
 1225                              43,3205   77776 1             EXIT
 1226   REF   1                    43,3206  3 3231 1             CAF     OCT51
 1227   REF   1                    43,3207  0 5544 1             TC      GENTRAN
 1228   REF   3  LAST  299         43,3210   01626 1             ADRES   RRECTHIS      OUR STATE VECTOR INTO OTHER VIA GENTRAN
 1229   REF   1                    43,3211   01554 1             ADRES   RRECTOTH

 1230                              43,3212  0 0003 1             RELINT
 1231   REF   9  LAST  299         43,3213  0 6042 1             TC      INTPRET
 1232                              43,3214   77624 1             CALL                  UPDATE R-OTHER, V-OTHER
 1233   REF   1                    43,3215   26757 0                     PTOALEM
 1234                              43,3216   45154 0             LXA,2   CALL
 1235   REF   3  LAST  120         43,3217   02030 0                     PBODY
 1236   REF   1                    43,3220   26114 1                     SVDWN1
 1237                              43,3221   77776 1             EXIT

 1238   REF   1                    43,3222  3 3232 1             CAF     TCPINAD
 1239   REF    8  LAST  253    43,3223   50 120 1             INDEX   FIXLOC
 1240   REF    1               43,3224   54 C52 1             TS      QPRET
 1241   REF   14  LAST  296    43,3225   0 4635 0             TC      POSTJUMP
 1242   REF    1               43,3226    27421 0             CADR    INTWAKE           FREE INTEGRATION AND EXIT

 1243                          43,3227    77634 0  TCPIN      RTB
 1244   REF    3  LAST  265    43,3230    21051 0                     PINBRNCH

 1245                          43,3231    00051 0  OCT51      OCT     51
 1246   REF    1               43,3232    67227 1  TCPINAD    CADR    TCPIN

R1247   VERB 96  SET QUITFLAG TO STOP INTEGRATION.

R1248            GO TO V37 WITH ZERO TO CAUSE P00.
R1249            STATEINT WILL CHECK QUITFLAG AND SKIP 1ST PASS,
R1250                   THUS ALLOWING A 10 MINUTE PERIOD WITHOUT INTEGRATION.

 1251   REF   12  LAST  291    43,3233   0 5504 0  VERB96     TC      UPFLAG            QUITFLAG WILL CAUSE INTEGRATION TO EXIT
 1252   REF    1               43,3234    00221 0             ADRES   QUITFLAG             AT NEXT TIMESTEP

 1253   REF   31  LAST  281    43,3235   3 4755 1             CAF     ZERO
 1254   REF   15  LAST  300    43,3236   0 4635 0             TC      POSTJUMP
 1255   REF    1               43,3237    10040 1             CADR    V37               GO TO P00

R1256
R1257   VERB 67 :   DISPLAY OF W MATRIX

 1258   REF   18  LAST  294    43,3240   0 2076 1  V67        TC      TESTXACT
 1259   REF    2  LAST  231    43,3241   3 5017 1             CAF     PRIO5
 1260   REF   11  LAST  299    43,3242   0 5105 0             TC      FINDVAC
 1261   REF    1               E4,1600                        EBANK=  WWPOS
 1262   REF    1               43,3243    02007 1             2CADR   V67CALL
 1262   REF    1               43,3244    62064 1
 1263   REF   22  LAST  299    43,3245   0 5155 0             TC      ENDOFJOB

R1264   VERB 65         DISABLE U,V JETS DURING DPS BURNS

 1265   REF   13  LAST  300    43,3246   0 5504 0  SNUFFOUT TC        UPFLAG
 1266   REF    1               43,3247    00115 1             ADRES   SNUFFER
 1267   REF   19  LAST  292    43,3250   0 2117 1             TC      GOPIN

R1268   VERB 75         ENABLE U,V JETS DURING DPS BURNS

 1269   REF   30  LAST  291    43,3251   0 5516 0  OUTSNUFF TC        DOWNFLAG
 1270   REF    2  LAST  300    43,3252    00115 1             ADRES   SNUFFER
 1271   REF   20  LAST  300    43,3253   0 2117 1             TC      GOPIN
R1272   VERB 85         DISPLAY RR LOS AZIMUTH AND ELEVATION.

R1273            AZIMUTH IS THE ANGLE BETWEEN THE LOS AND THE X-Z NB PLANE, 0 - 90 DEG IN THE +Y HEMISPHERE,
R1275   360 - 270 DEG IN THE -Y HEMISPHERE.
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L         EXTENDED VERBS                                                                          USER'S PAGE NO.  39        E3 S4

R1276               ELEVATION IS THE ANGLE BETWEEN +ZNB AND THE PROJECTION OF THE LOS INTO THE X-Z PLANE, 0 - 360 ABOUT +Y.

 1278    REF    2  LAST  119     E4,1600                           EBANK=  RR-AZ
 1279    REF   19  LAST  300     43,3254   0 2076 1   VERB85      TC      TESTXACT
 1280    REF   16  LAST  300     43,3255   0 4635 0               TC      POSTJUMP
 1281    REF    1                43,3256    60000 1               CADR    DSPRRLOS

 1282    REF    1                40,2000                           SETLOC  PINBALL1
 1283                            40,2000                           BANK

 1284    REF    1                                                  COUNT*  $$/EXTVB

 1285    REF    3  LAST  300     40,2000   3 5017 1   DSPRRLOS    CAF     PRIO5
 1286    REF   12  LAST  300     40,2001   0 5105 0               TC      FINDVAC
 1287    REF    3  LAST  301     E4,1600                           EBANK=  RR-AZ
 1288    REF    1                40,2002    02017 0               2CADR   RRLOSDSP
 1288    REF    1                40,2003    60104 1
 1289    REF    3  LAST  282     40,2004   3 4740 0               CAF     PRIO4
 1290    REF    5  LAST  294     40,2005   0 5146 1               TC      PRIOCHNG
 1291    REF    1                40,2006   3 2076 1               CAF     V16N56
 1292    REF   56  LAST  298     40,2007   0 4616 1               TC      BANKCALL
 1293    REF    4  LAST  279     40,2010    20353 0               CADR    GOMARKFR
 1294    REF    4  LAST  273     40,2011   0 5563 1               TC      B5OFF
 1295    REF    5  LAST  301     40,2012   0 5563 1               TC      B5OFF
 1296    REF    6  LAST  301     40,2013   0 5563 1               TC      B5OFF

 1297    REF   19  LAST  298     40,2014   3 4751 0               CAF     BIT3
 1298    REF    7  LAST  298     40,2015   0 5464 1               TC      BLANKET
 1299    REF   23  LAST  300     40,2016   0 5155 0               TC      ENDOFJOB

 1300                            40,2017   0 0006 1   RRLOSDSP    EXTEND
 1301    REF    2  LAST  189     40,2020   3 0036 1               DCA     CDUT
 1302    REF   42  LAST  292     40,2021   52 155 1               DXCH    MPAC
 1303    REF   10  LAST  299     40,2022   0 6042 1               TC      INTPRET
 1304                            40,2023    77624 1               CALL
 1305    REF    1                40,2024    46065 0                       RRNBMPAC          GET RR LOS IN BODY AXIS.
 1306                            40,2025    00001 0               STORE   00                UNIT LOS
 1307                            40,2026    14007 0               STODL   6D
 1308    REF    1                40,2027    06524 1                       HI6ZEROS
 1309                            40,2030    24011 1               STOVL   8D
 1310                            40,2031    00007 0                       6D
 1311                            40,2032    77656 1               UNIT
 1312                            40,2033    00007 0               STORE   6D                UNIT OF LOS PROJ IN X-Z PLANE
 1313                            40,2034    77641 1               DOT
 1314    REF    3  LAST   37     40,2035    06516 0                       UNITZ
 1315    REF    1                40,2036    24021 1               STOVL   COSTH             16D
 1316    REF    3  LAST   37     40,2037    06522 1                       UNITX
 1317                            40,2040    77641 1               DOT
 1318                            40,2041    00007 0                       6D
 1319    REF    1                40,2042    34023 1               STCALL  SINTH             18D
 1320   REF   1                40,2043   47322 1                     ARCTRIG
 1321                          40,2044   43244 1            BPL      DAD          INSURE DISPLAY OF 0 - 360 DEG.
 1322                          40,2045   60047 1                     +2
 1323   REF   1                40,2046   06532 0                     DPPOSMAX     INTRODUCES AN ERROR OF B-28 REVS.
 1324   REF   1                40,2047   26203 1            STOVL    RR-ELEV
 1325                          40,2050   00001 0                     00
 1326                          40,2051   77641 1            DOT
 1327   REF   2  LAST   37     40,2052   06520 0                     UNITY
 1328   REF   2  LAST  301     40,2053   24023 0            STOVL    SINTH
 1329                          40,2054   00001 0                     00
 1330                          40,2055   77641 1            DOT
 1331                          40,2056   00007 0                     6D
 1332   REF   2  LAST  301     40,2057   34021 0            STCALL   COSTH
 1333   REF   2  LAST  302     40,2060   47322 1                     ARCTRIG
 1334                          40,2061   43244 1            BPL      DAD          INSURE DISPLAY OF 0 - 360 DEG.
 1335                          40,2062   60064 0                     +2
 1336   REF   2  LAST  302     40,2063   06532 0                     DPPOSMAX     INTRODUCES AN ERROR OF B-28 REVS.
 1337   REF   4  LAST  301     40,2064   02201 0            STORE    RR-AZ
 1338                          40,2065   77776 1            EXIT
 1339   REF   2  LAST  271     40,2066  3 4777 1            CA       1SEC
 1340   REF  57  LAST  301     40,2067  0 4616 1            TC       BANKCALL
 1341   REF   6  LAST  281     40,2070   01736 1            CADR     DELAYJOB

 1342   REF  18  LAST  273     40,2071  3 4747 1            CA       BIT5
 1343   REF   8  LAST  273     40,2072  7 1043 0            MASK     EXTVBACT
 1344   REF  88  LAST  297     40,2073 10 0000 0            CCS      A
 1345   REF   2  LAST  301     40,2074  0 2017 0            TC       RRLOSDSP
 1346   REF  25  LAST  298     40,2075  0 5472 0            TC       ENDEXT

 1347                          40,2076   04070 1   V16N56   VN       1656
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L        PINBALL NOUN TABLES                                                                     USER'S PAGE NO.   1       E0 S4

P1000    THE FOLLOWING REFERS TO THE NOUN TABLES


R1001    COMPONENT CODE NUMBER               INTERPRETATION

R1002    00000                               1 COMPONENT
R1003    00001                               2 COMPONENT
R1004    00010                               3 COMPONENT
R1005    X1XXX                               BIT4 = 1. DECIMAL ONLY
R1006    1XXXX                               BIT5 = 1. NO LOAD
R1007    END OF COMPONENT CODE NUMBERS


R1008    SF ROUTINE CODE NUMBER              INTERPRETATION

R1009    00000     OCTAL ONLY
R1010    00001     STRAIGHT FRACTIONAL
R1011    00010     CDU DEGREES (XXX.XX)
R1012    00011     ARITHMETIC SF
R1013    00100     ARITH DP1   OUT(MULT BY 2EXP14 AT END)    IN(STRAIGHT)
R1014    00101     ARITH DP2   OUT(STRAIGHT)                 IN(SL 7 AT END)
R1015    00110     LANDING RADAR POSITION (+0000X)
R1016    00111     ARITH DP3   OUT ( SL 7 AT END)        IN ( STRAIGHT)
R1017    01000     WHOLE HOURS IN R1, WHOLE MINUTES (MOD 60) IN R2,
R1018                 SECONDS (MOD 60) 0XX.XX IN R3. *** ALARMS IF USED WITH OCTAL
R1019    01001     MINUTES (MOD 60) IN D1D2, D3 BLANK, SECONDS (MOD 60) IN D4D5
R1020                          LIMITS TO 59B59 IF MAG EXCEEDS THIS VALUE.
R1021                          ALARMS IF USED WITH OCTAL  ********  IN (ALARM)
R1022    01010     ARITH DP4   OUT (STRAIGHT)                  IN (SL 3 AT END)
R10221   01011     ARITH1 SF   OUT(MULT BY 2EXP14 AT END)    IN(STRAIGHT)
R10222   01100     2 INTEGERS IN D1D2, D4D5, D3 BLANK.
R10223                         ALARMS IF USED WITH OCTAL  ********  IN (ALARM)
R10224   01101     360-CDU DEGREES (XXX.XX)
R10225   01110     RR RANGE        15 BIT MAG TO DP, THEN SCALE *******  IN (ALARM)
R10226   01111     RR RANGE RATE  15 BIT MAG TO DP, THEN SCALE *******  IN (ALARM)
R1023    END OF SF ROUTINE CODE NUMBERS


R1024    SF CONSTANT CODE NUMBER             INTERPRETATION

R1025    00000                               WHOLE                           USE ARITH
R1026    00000                               DP TIME SEC (XXX.XX SEC)        USE ARITHDP1
R10265   00000                               LR POSITION (+0000X)         USE LR POSITION
R1027    00001                               SPARE
R1028    00010                               CDU DEGREES                  USE CDU DEGREES
R1029    00010                               360-CDU DEGREES          USE 360-CDU DEGREES
R1030    00011                               DP DEGREES (90) XX.XXX DEG  USE ARITHDP3
R1031    00100                               DP DEGREES (360) XXX.XX DEG USE ARITHDP4
R1032    00101                               DEGREES (180) XXX.XX DEG    USE ARITH
R10321   00101                               OPTICAL TRACKER AZIMUTH ANGLE(XXX.XXDEG)
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R10322                                                             USE ARITHOP1
R1034   00110                          WEIGHT2 (XXXXX. LBS)        USE ARITH1
R1035   00111                          POSITION5 (XXX.XX NAUTICAL MILES)
R10351                                                             USE ARITHOP3
R1037   01000                          POSITION4 (XXXX.X NAUTICAL MILES)
R10371                                                             USE ARITHOP3
R1038   01001                          VELOCITY2 (XXXXX- FT/SEC)   USE ARITHOP4
R1039   01010                          VELOCITY3 (XXXX.X FT/SEC)   USE ARITHOP3
R1040   01011                          ELEVATION DEGREES(R9.999MAX) USE ARITH
R1041   01100                          RENDEZVOUS RADAR RANGE (XXX.XX NAUT MI)
R1042                                                              USE RR RANGE
R1043   01101                          RENDEZVOUS RADAR RANGE RATE(XXXXX.FT/SEC
R1044                                                         USE RR RANGE RATE
R1045   01110                          LANDING RADAR ALTITUDE(XXXXX.FEET)
R1046                                                              USE ARITHOP1
R1047   01111                          INITIAL/FINAL ALTITUDE(XXXXX.FEET)
R1048                                                              USE ARITHOP1
R1049   10000                          ALTITUDE RATE(XXXXX.FT/SEC)    USE ARITH
R1050   10001                          FORWARD/LATERAL VELOCITY(XXXXX.FEET/SEC)
R1051                                                                 USE ARITH
R1052   10010                          ROTATIONAL HAND CONTROLLER ANGLE RATES
R1053                                        XXXXX.DEG/SEC            USE ARITH
R1054   10011                          LANDING RADAR VELX(XXXXX.FEET/SEC)
R1055                                                              USE ARITHOP1
R1056   10100                          LANDING RADAR VELY(XXXXX.FEET/SEC)
R1057                                                              USE ARITHOP1
R1058   10101                          LANDING RADAR VELZ(XXXXX.FEET/SEC)
R1059                                                              USE ARITHOP1
R1060   10110                          POSITION7 (XXXX.X NAUT MI)  USE ARITHOP4
R10601  10111                          TRIM DEGREES2 (XXX.XX DEG)  USE ARITH
R1061   11000                          COMPUTED ALTITUDE (XXXXX. FEET)
R106101                                                            USE ARITHOP1
R106102 11001                          DP DEGREES (XXXX.X DEG)     USE ARITHOP3
R106103 11010                          POSITION9 (XXXXX. FT)       USE ARITHOP3
R106104 11011                          VELOCITY4 (XXXX.X FT/SEC)   USE ARITHOP2
R106105 11100                          RADIANS (XX.XXX RADIANS)    USE ARITHOP4
R1062   END OF SF CONSTANT CODE NUMBERS


R1063   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R1064   NOUN TABLES.
R1065   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R1066   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R1067   TO GET AT BOTH MAJOR AND MINOR PARTS(IN OCTAL), USE NOUN 01.


R1068   A NOUN MAY BE DECLARED :DECIMAL ONLY: BY MAKING BIT4=1 OF ITS COMPONENT
R1069   CODE NUMBER. IF THIS NOUN IS USED WITH ANY OCTAL DISPLAY VERB, OR IF
R1070   DATA IS LOADED IN OCTAL, IT ALARMS.
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R1071    IN LOADING AN :HOURS, MINUTES, SECONDS: NOUN, ALL 3 WORDS MUST BE
R1072    LOADED, OR ALARM.
R1073    ALARM IF AN ATTEMPT IS MADE TO LOAD :SPLIT MINUTES/SECONDS: (MMBSS).
R1074    THIS IS USED FOR DISPLAY ONLY.
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P1075    THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R1076    (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R1077    ROUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.


R1078    LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R1079    NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDAD1TEM IS LOADED WITH THE FIRST
R1080    IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R1081    IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R1082    MIXED OR NORMAL NOUN.

 1200                          06,3271                         BANK    6
 12002   REF    2  LAST  283   42,2000                         SETLOC  PINBALL3
 12003                         42,2103                         BANK
 12005   REF    1                                              COUNT*  $$/NOUNS
 1201    REF    1              42,2103  52 152 0  LODNNTAB  DXCH    IDAD2TEM          SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
 1202    REF    3  LAST  268   42,2104  51'001 1            INDEX   NOUNREG
 1203    REF    1              42,2105  3 2154 0            CAF     NNADTAB
 1204    REF    1              42,2106  54 146 0            TS      NNADTEM
 1205    REF    4  LAST  306   42,2107  51'001 1            INDEX   NOUNREG
 1206    REF    1              42,2110  3 2320 1            CAF     NNTYPTAB
 1207    REF    1              42,2111  54 147 1            TS      NNTYPTEM
 1208    REF    5  LAST  306   42,2112  4 1001 0            CS      NOUNREG
 1209    REF    1              42,2113  6 4771 1            AD      MIXCON
 1210                          42,2114  0 0006 1            EXTEND
 1211    REF    1              42,2115  6 2121 1            BZMF    LODMIXNN          NOUN NUMBER G/E FIRST MIXED NOUN
 1212    REF   14  LAST  280   42,2116  3 4753 1            CAF     ONE               NOUN NUMBER L/ FIRST MIXED NOUN
 1213    REF    1              42,2117  54 140 0            TS      MIXBR             NORMAL.  +1 INTO MIXBR.
 1214    REF    1              42,2120  0 2137 0            TC      LODNLV
 1215    REF   11  LAST  284   42,2121  3 4752 0  LODMIXNN  CAF     TWO               MIXED.  +2 INTO MIXBR.
 1216    REF    2  LAST  306   42,2122  54 140 0            TS      MIXBR
 1217    REF    6  LAST  306   42,2123  51'001 1            INDEX   NOUNREG
 1218    REF    1              42,2124  3 3064 0            CAF     RUTMXTAB -40D     FIRST MIXED NOUN = 40.
 1219    REF    1              42,2125  54 153 1            TS      RUTMXTEM
 1220    REF    2  LAST  284   42,2126  3 5012 1            CAF     LOW10
 1221    REF    2  LAST  306   42,2127  7 0146 0            MASK    NNADTEM
 1222    REF   28  LAST  284   42,2130  54 002 1            TS      Q                 TEMP
 1223    REF   89  LAST  302   42,2131  50 000 1            INDEX   A
 1224    REF    1              42,2132  3 2650 0            CAF     IDADDTAB
 1225    REF    1              42,2133  54 150 1            TS      IDAD1TEM          LOAD IDAD1TEM WITH FIRST IDADDTAB ENTRY
 1226                          42,2134  0 0006 1            EXTEND
 1227    REF   29  LAST  306   42,2135  5 0002 0            INDEX   Q                 LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
 1228    REF    2  LAST  306   42,2136  3 2652 1            DCA     IDADDTAB +1       LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY
 1229    REF    2  LAST  306   42,2137  52 152 0  LODNLV    DXCH    IDAD2TEM          PUT RETURN INFO INTO A, L.
 1230    REF    1              42,2140  52 006 0            DXCH    Z

 1231    REF    1                 4771            MIXCON    =       OCT50             (DEC 40)
R1232    GTSFOUT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOUTAB ENTRIES.

 1233    REF    1              42,2141  52 124 1  GTSFOUT   DXCH    SFTEMP1           2X(SFCONUM) ARRIVES IN SFTEMP1.
 1234                          42,2142  0 0006 1             EXTEND
 1235   REF  90  LAST  306     42,2143  5 0000 1             INDEX  A
 1236   REF   1                42,2144  3 2557 1             DCA    SFOUTAB
 1237   REF   2  LAST  306     42,2145  52 124 1  SFCOM      DXCH   SFTEMP1
 1238   REF   2  LAST  306     42,2146  52 006 0             DXCH   Z

R1239   GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

 1240   REF   3  LAST  307     42,2147  52 124 1  GTSFIN     DXCH   SFTEMP1              2X(SFCONUM) ARRIVES IN SFTEMP1.
 1241                          42,2150  0 0006 1             EXTEND
 1242   REF  91  LAST  307     42,2151  5 0000 1             INDEX  A
 1243   REF   1                42,2152  3 2465 1             DCA    SFINTAB
 1244   REF   1                42,2153  1 2145 1             TCF    SFCOM


A1400                                                                                NN  NORMAL NOUNS
 1401                          42,2154   00000 1  NNADTAB    OCT    00000                00 NOT IN USE
 1402                          42,2155   40000 0             OCT    40000                01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
 1403                          42,2156   40000 0             OCT    40000                02 SPECIFY MACHINE ADDRESS (WHOLE)
 1404                          42,2157   40000 0             OCT    40000                03 SPECIFY MACHINE ADDRESS (DEGREES)
 1405   REF   3  LAST  279     42,2160   01044 0             ECADR  DSPTEM1              04 ANGULAR ERROR/DIFFERENCE
 1406   REF   4  LAST  307     42,2161   01044 0             ECADR  DSPTEM1              05 ANGULAR ERROR/DIFFERENCE
 1407   REF   1                42,2162   01143 0             ECADR  OPTION1              06 OPTION CODE
 1408   REF   1                42,2163   01002 1             ECADR  XREG                 07 ECADR OF WORD TO BE MODIFIED
A14081                                                                                      ONES FOR BITS TO BE MODIFIED
A14082                                                                                      1 TO SET OR 0 TO RESET SELECTED BITS
 1409   REF   2  LAST  108     42,2164   01363 0             ECADR  ALMCADR              08 ALARM DATA
 1410   REF   4  LAST  213     42,2165   00375 0             ECADR  FAILREG              09 ALARM CODES
 1411                          42,2166   77776 1             OCT    77776                10 CHANNEL TO BE SPECIFIED
 1412   REF   3  LAST  200     42,2167   03633 1             ECADR  TCSI                 11 TIG OF CSI (HRS,MIN,SEC)
 1413   REF   7  LAST  279     42,2170   01050 0             ECADR  OPTIONX              12 OPTION CODE
A14131                                                                                          (USED BY EXTENDED VERBS ONLY)
 1414   REF   3  LAST  200     42,2171   01776 0             ECADR  TCDH                 13 TIG OF CDH (HRS,MIN,SEC)
 1415   REF   4  LAST  209     42,2172   01050 0             ECADR  DSPTEMX              14 CHECKLIST
A14151                                                                                          (USED BY EXTENDED VERBS ONLY)
 1416                          42,2173   77777 0             OCT    77777                15 INCREMENT MACHINE ADDRESS
 1417   REF   5  LAST  307     42,2174   01050 0             ECADR  DSPTEMX              16 TIME OF EVENT (HRS,MIN,SEC)
 1418                          42,2175   00000 1             OCT    00000                17 SPARE
 1419   REF   1                42,2176   02344 0             ECADR  FDAIX                18 AUTO MANEUVER BALL ANGLES
 1420                          42,2177   00000 1             OCT    00000                19 SPARE
 1421   REF   6  LAST  255     42,2200   00032 0             ECADR  CDUX                 20 ICDU ANGLES
 1422   REF   1                42,2201   00037 0             ECADR  PIPAX                21 PIPAS
 1423   REF   6  LAST  284     42,2202   00321 1             ECADR  THETAD               22 NEW ICDU ANGLES
 1424                          42,2203   00000 1             OCT    00000                23 SPARE
 1425   REF   3  LAST  277     42,2204   01050 0             ECADR  DSPTEM2 +1           24 DELTA TIME FOR AGC CLOCK(HRS,MIN,SEC)
 1426   REF   5  LAST  307     42,2205   01044 0             ECADR  DSPTEM1              25 CHECKLIST
A14261                                                                                          (USED WITH PLEASE PERFORM ONLY)
 1427   REF   6  LAST  307     42,2206   01044 0             ECADR  DSPTEM1              26 PRIO/DELAY, ADRES, BBCON
 1428   REF   4  LAST  292     42,2207   01362 1             ECADR  SMODE                27 SELF TEST ON/OFF SWITCH
 1429                           42,2210   00000 1         OCT      00000          28 SPARE
 1430                           42,2211   00000 1         OCT      00000          29 SPARE
 1431                           42,2212   00000 1         OCT      0              30 SPARE
 1432                           42,2213   00000 1         OCT      0              31 SPARE
 1433   REF   1                 42,2214   02142 1         ECADR    -TPER          32 TIME TO PERIGEE (HRS,MIN,SEC)
 1434   REF   8  LAST  286      42,2215   03441 0         ECADR    TIG            33 TIME OF IGNITION (HRS,MIN,SEC)
 1435   REF   7  LAST  307      42,2216   01044 0         ECADR    DSPTEM1        34 TIME OF EVENT (HRS,MIN,SEC)
 1436   REF   9  LAST  242      42,2217   03453 0         ECADR    TTOGO          35 TIME TO GO TO EVENT (HRS,MIN,SEC)
 1437   REF  10  LAST  277      42,2220   00024 1         ECADR    TIME2          36 TIME OF AGC CLOCK (HRS,MIN,SEC)
 1438   REF   3  LAST  200      42,2221   03635 1         ECADR    TTPI           37 TIG OF TPI (HRS,MIN,SEC)
 1439   REF   2  LAST  111      42,2222   01516 1         ECADR    TET            38 TIME OF STATE BEING INTEGRATED
 1440                           42,2223   00000 1         OCT      00000          39 SPARE
R14401  END OF NNADTAB FOR NORMAL NOUNS


A14402                                                                            NN  MIXED NOUNS
 1441                           42,2224   64000 0         OCT      64000          40 TIME TO IGNITION/CUTOFF
A14411                                                                               VG
A14412                                                                               DELTA V (ACCUMULATED)
 1442                           42,2225   02003 0         OCT      02003          41 TARGET  AZIMUTH
A14421                                                                                       ELEVATION
 1443                           42,2226   24006 1         OCT      24006          42 APOGEE
A14431                                                                               PERIGEE
A14432                                                                               DELTA V (REQUIRED)
 1444                           42,2227   24011 1         OCT      24011          43 LATITUDE
A14441                                                                               LONGITUDE
A14442                                                                               ALTITUDE
 1445                           42,2230   64014 0         OCT      64014          44 APOGEE
A14451                                                                               PERIGEE
A14452                                                                               TFF
 1446                           42,2231   64017 0         OCT      64017          45 MARKS
A14461                                                                               TTI OF NEXT BURN
A14462                                                                               MGA
 1447                           42,2232   00022 1         OCT      00022          46 AUTOPILOT CONFIGURATION
 1448                           42,2233   22025 0         OCT      22025          47 LEM WEIGHT
A14481                                                                               CSM WEIGHT
 1449                           42,2234   22030 1         OCT      22030          48 GIMBAL PITCH TRIM
A14491                                                                               GIMBAL ROLL TRIM
 1450                           42,2235   24033 1         OCT      24033          49 DELTA R
A14501                                                                               DELTA V
A14502                                                                               RADAR DATA SOURCE CODE
 1451                           42,2236   00000 1         OCT      0              50 SPARE
 1452                           42,2237   22041 1         OCT      22041          51 S-BAND ANTENNA PITCH
A14521                                                                                                 YAW
 1453                           42,2240   00044 1         OCT      00044          52 CENTRAL ANGLE OF ACTIVE VEHICLE
 1454                           42,2241   00000 1         OCT      00000          53 SPARE
 1455                           42,2242   24052 0         OCT      24052          54 RANGE
A14551                                                                               RANGE RATE
A14552                                                                               THETA
 1456                           42,2243   24055 1         OCT      24055          55 NO. OF APSIDAL CROSSINGS
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A14581                                                              ELEVATION ANGLE
A14582                                                              CENTRAL ANGLE
 1459            42,2244   02060 0        OCT      02060         56 RR LOS AZIMUTH
A14591                                                                      ELEVATION
 1460            42,2245   00000 1        OCT      00000         57 SPARE
 1461            42,2246   24066 1        OCT      24066         58 PERIGEE ALT
A14611                                                              DELTA V TPI
A14612                                                              DELTA V TPF
 1462            42,2247   24071 1        OCT      24071         59 DELTA VELOCITY LOS
 1463            42,2250   24074 1        OCT      24074         60 FORWARD VELOCITY
A14631                                                              ALTITUDE RATE
A14632                                                              COMPUTED ALTITUDE
 1464            42,2251   64077 0        OCT      64077         61 TIME TO GO IN BRAKING PHASE
A14641                                                              TIME TO IGNITION
A14642                                                              CROSS RANGE DISTANCE
 1465            42,2252   64102 0        OCT      64102         62 ABSOLUTE VALUE OF VELOCITY
A14651                                                              TIME TO IGNITION
A14652                                                              DELTA V (ACCUMULATED)
 1466            42,2253   24105 0        OCT      24105         63 ABSOLUTE VALUE OF VELOCITY
A14661                                                              ALTITUDE RATE
A14662                                                              COMPUTED ALTITUDE
 1467            42,2254   64110 0        OCT      64110         64 TIME LEFT FOR REDESIGNATION-LPD ANGLE
A14671                                                              ALTITUDE RATE
A14672                                                              COMPUTED ALTITUDE
 1468            42,2255   24113 1        OCT      24113         65 SAMPLED AGC TIME (HRS,MIN,SEC)
A14681                                                              (FETCHED IN INTERRUPT)
 1470            42,2256   62116 0        OCT      62116         66 LR RANGE
A14701                                                                 POSITION
 1471            42,2257   04121 1        OCT      04121         67 LRVX
A14711                                                              LRVY
A14712                                                              LRVZ
 1472            42,2260   64124 1        OCT      64124         68 SLANT RANGE TO LANDING SIGHT
A14721                                                              TIME TO GO IN BRAKING PHASE
A14722                                                              LR ALTITUDE - COMPUTED ALTITUDE
 1473            42,2261   24127 0        OCT      24127         69 LANDING SITE CORRECTION, Z-COMPONENT
A14731                                                              LANDING SITE CORRECTION, Y-COMPONENT
A14732                                                              LANDING SITE CORRECTION, X-COMPONENT
 1474            42,2262   04132 0        OCT      04132         70 AOT DETENT CODE/STAR CODE
 1475            42,2263   04135 1        OCT      04135         71 AOT DETENT CODE/STAR CODE
 1476            42,2264   02140 0        OCT      02140         72 RR  360 - TRUNNION ANGLE
A14761                                                                  SHAFT ANGLE
 1477            42,2265   02143 0        OCT      02143         73 NEW RR  360 - TRUNNION ANGLE
A14771                                                                      SHAFT ANGLE
 1478            42,2266   64146 0        OCT      64146         74 TIME TO IGNITION
A14781                                                              YAWAFTER VEHICLE RISE
A14782                                                              PITCH AFTER VEHICLE RISE
 1479            42,2267   64151 0        OCT      64151         75 DELTA ALTITUDE CDH
A14791                                                              DELTA TIME (CDH-CSI OR TPI-CDH)
A14792                                                              DELTA TIME (TPI-CDH OR TPI-NOMTPI)
 1480            42,2270   24154 1        OCT      24154         76 DESIRED HORIZONTAL VELOCITY
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A14801                                                                    DESIRED RADIAL VELOCITY
A14802                                                                    CROSS-RANGE DISTANCE
 1481                     42,2271  62157 0       OCT    62157         77 TIME TO ENGINE CUTOFF
A14811                                                                    VELOCITY NORMAL TO CSM PLANE
 1482                     42,2272  64162 0       OCT    64162         78 RR RANGE
A14821                                                                       RANGE RATE
A14822                                                                    TIME FROM IGNITION
 1483                     42,2273  24165 0       OCT    24165         79 CURSOR ANGLE
A14831                                                                    SPIRAL ANGLE
A14832                                                                    POSITION CODE
 1484                     42,2274  02170 0       OCT    02170         80 DATA INDICATOR
A14841                                                                    OMEGA
 1485                     42,2275  24173 1       OCT    24173         81 DELTA V (LV)
 1486                     42,2276  24176 1       OCT    24176         82 DELTA V (LV)
 1487                     42,2277  24201 1       OCT    24201         83 DELTA V (BODY)
 1488                     42,2300  24204 1       OCT    24204         84 DELTA V (OTHER VEHICLE)
 1489                     42,2301  24207 1       OCT    24207         85 VG (BODY)
 1490                     42,2302  24212 0       OCT    24212         86 VG (LV)
 1491                     42,2303  02215 0       OCT    02215         87 BACKUP OPTICS LOS AZIMUTH
A14911                                                                                   ELEVATION
 1492                     42,2304  24220 1       OCT    24220         88 HALF UNIT SUN OR PLANET VECTOR
 1493                     42,2305  24223 1       OCT    24223         89 LANDMARK LATITUDE
A14931                                                                            LONGITUDE/2
A14932                                                                            ALTITUDE
 1494                     42,2306  24226 1       OCT    24226         90 Y
A14941                                                                    Y DOT
A14942                                                                    PSI
 1495                     42,2307  04231 0       OCT    04231         91 ALTITUDE
A14951                                                                    VELOCITY
A14952                                                                    FLIGHT PATH ANGLE
 1496                     42,2310  04234 0       OCT    04234         92 PCT FTP(10.5KLB) AT PRESENT THRUST
A14961                                                                    ALTITUDE RATE
A14962                                                                 COMPUTED ALTITUDE
 1497                     42,2311  04237 0       OCT    04237         93 DELTA GYRO ANGLES
 1498                     42,2312  00000 1       OCT    00000         94 SPARE
 1499                     42,2313  00000 1       OCT    0             95 SPARE
 1500                     42,2314  00000 1       OCT    0             96 SPARE
 1501                     42,2315  04253 1       OCT    04253         97 SYSTEM TEST INPUTS
 1502                     42,2316  04256 1       OCT    04256         98 SYSTEM TEST RESULTS
 1503                     42,2317  24261 1       OCT    24261         99 RMS IN POSITION
A15031                                                                    RMS IN VELOCITY
A15032                                                                    RMS IN BIAS
R1504  END OF NNADTAB FOR MIXED NOUNS


A1800                                                                NN          NORMAL NOUNS
 1801                     42,2320  00000 1 NNTYPTAB OCT    00000         00 NOT IN USE
 1802                     42,2321  04040 1       OCT    04040         01 3COMP  FRACTIONAL
 1803                     42,2322  04140 0       OCT    04140         02 3COMP  WHOLE
 1804                     42,2323  04102 0       OCT    04102         03 3COMP  CDU DEGREES
 1805                    42,2324   00504 0         OCT     00504           04 1COMP   DPDEG(360)
 1806                    42,2325   00504 0         OCT     00504           05 1COMP   DPDEG(360)
 1807                    42,2326   04000 0         OCT     04000           06 3COMP   OCTAL ONLY
 1808                    42,2327   04000 0         OCT     04000           07 3COMP   OCTAL ONLY
 1809                    42,2330   04000 0         OCT     04000           08 3COMP   OCTAL ONLY
 1810                    42,2331   04000 0         OCT     04000           09 3COMP   OCTAL ONLY
 1811                    42,2332   00000 1         OCT     00000           10 1COMP   OCTAL ONLY
 1812                    42,2333   24400 0         OCT     24400           11 3COMP   HMS (DEC ONLY)
 1813                    42,2334   02000 0         OCT     02000           12 2COMP   OCTAL ONLY
 1814                    42,2335   24400 0         OCT     24400           13 3COMP   HMS (DEC ONLY)
 1815                    42,2336   04140 0         OCT     04140           14 3COMP   WHOLE
 1816                    42,2337   00000 1         OCT     00000           15 1COMP   OCTAL ONLY
 1817                    42,2340   24400 0         OCT     24400           16 3COMP   HMS (DEC ONLY)
 1818                    42,2341   00000 1         OCT     0               17        SPARE
 1819                    42,2342   04102 0         OCT     04102           18 3COMP   CDU DEG
 1820                    42,2343   00000 1         OCT     00000           19         SPARE
 1821                    42,2344   04102 0         OCT     04102           20 3COMP   CDU DEGREES
 1822                    42,2345   04140 0         OCT     04140           21 3COMP   WHOLE
 1823                    42,2346   04102 0         OCT     04102           22 3COMP   CDU DEGREES
 1824                    42,2347   00000 1         OCT     00000           23         SPARE
 1825                    42,2350   24400 0         OCT     24400           24 3COMP   HMS (DEC ONLY)
 1826                    42,2351   04140 0         OCT     04140           25 3COMP   WHOLE
 1827                    42,2352   04000 0         OCT     04000           26 3COMP   OCTAL ONLY
 1828                    42,2353   00140 1         OCT     00140           27 1COMP   WHOLE
 1829                    42,2354   00000 1         OCT     00000           28         SPARE
 1830                    42,2355   00000 1         OCT     00000           29         SPARE
 1831                    42,2356   00000 1         OCT     0               30 SPARE
 1832                    42,2357   00000 1         OCT     0               31 SPARE
 1833                    42,2360   24400 0         OCT     24400           32 3COMP   HMS (DEC ONLY)
 1834                    42,2361   24400 0         OCT     24400           33 3COMP   HMS (DEC ONLY)
 1835                    42,2362   24400 0         OCT     24400           34 3COMP   HMS (DEC ONLY)
 1836                    42,2363   24400 0         OCT     24400           35 3COMP   HMS (DEC ONLY)
 1837                    42,2364   24400 0         OCT     24400           36 3COMP   HMS (DEC ONLY)
 1838                    42,2365   24400 0         OCT     24400           37 3COMP   HMS (DEC ONLY)
 1839                    42,2366   24400 0         OCT     24400           38 3COMP   HMS (DEC ONLY)
 1840                    42,2367   00000 1         OCT     00000           39         SPARE
R18401  END OF NNTYPTAB FOR NORMAL NOUNS


A18402                                                                     NN    MIXED NOUNS
 1841                    42,2370   24500 1         OCT     24500           40 3COMP   MIN/SEC, VEL3, VEL3
A18411                                                                                (NO LOAD, DEC ONLY)
 1842                    42,2371   00542 1         OCT     00542           41 2COMP   CDU DEG, ELEV DEG
 1843                    42,2372   24410 1         OCT     24410           42 3COMP   POS4, POS4, VEL3
A18431                                                                                (DEC ONLY)
 1844                    42,2373   20204 0         OCT     20204           43 3COMP   DPDEG(360), DPDEG(360), POS4
A18441                                                                                (DEC ONLY)
 1845                    42,2374   00410 1         OCT     00410           44 3COMP   POS4, POS4, MIN/SEC
A18451                                                                                (NO LOAD, DEC ONLY)
 1846                    42,2375   10000 0         OCT     10000           45 3COMP   WHOLE, MIN/SEC, DPDEG(360)
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A18461                                                                          (NO LOAD, DEC ONLY)
 1847                 42,2376  00000 1        OCT     00000          46 1COMP  OCTAL ONLY
 1848                 42,2377  00306 1        OCT     00306          47 2COMP WEIGHT2 FOR EACH
A18481                                                                          (DEC ONLY)
 1849                 42,2400  01367 1        OCT     01367          48 2COMP  TRIM DEG2 FOR EACH
A18491                                                                          (DEC ONLY)
 1850                 42,2401  00510 0        OCT     00510          49 3COMP  POS4, VEL3, WHOLE
A18501                                                                          (DEC ONLY)
 1851                 42,2402  00000 1        OCT     0              50        SPARE
 1852                 42,2403  00204 1        OCT     00204          51 2COMP  OPDEG(360), OPDEG(360)
A18521                                                                          (DEC ONLY)
 1853                 42,2404  00004 0        OCT     00004          52 1COMP  OPDEG(360)
 1854                 42,2405  00000 1        OCT     00000          53        SPARE
 1855                 42,2406  10507 1        OCT     10507          54 3COMP  POS5, VEL3, OPDEG(360)
A18551                                                                          (DEC ONLY)
 1858                 42,2407  10200 1        OCT     10200          55 3COMP  WHOLE, OPDEG(360), OPDEG(360)
A18581                                                                          (DEC ONLY)
 1859                 42,2410  00204 1        OCT     00204          56 2COMP  OPDEG(360), OPDEG(360)
 1860                 42,2411  00000 1        OCT     00000          57        SPARE
A18601                                                                          (DEC ONLY)
 1861                 42,2412  24510 0        OCT     24510          58 3COMP  POS4, VEL3, VEL3
A18611                                                                          (DEC ONLY)
 1862                 42,2413  24512 1        OCT     24512          59 3COMP  VEL3 FOR EACH
A18621                                                                          (DEC ONLY)
 1863                 42,2414  60521 1        OCT     60521          60 3COMP  FOR/LAT VEL, VEL3, COMP ALT
A18631                                                                          (DEC ONLY)
 1864                 42,2415  54000 0        OCT     54000          61 3COMP  MIN/SEC, MIN/SEC, POS7
A18641                                                                          (NO LOAD, DEC ONLY)
 1865                 42,2416  24012 1        OCT     24012          62 3COMP  VEL3, MIN/SEC, VEL3
A18651                                                                          (NO LOAD, DEC ONLY)
 1866                 42,2417  60512 1        OCT     60512          63 3COMP  VEL3, VEL3, COMP ALT
A18661                                                                          (DEC ONLY)
 1867                 42,2420  60500 1        OCT     60500          64 3COMP  2INT, VEL3, COMP ALT
A18671                                                                          (NO LOAD, DEC ONLY)
 1868                 42,2421  00000 1        OCT     00000          65 3COMP  HMS (DEC ONLY)
 1869                 42,2422  00016 0        OCT     00016          66 2COMP  LANDING RADAR ALT, POSITION
A18691                                                                          (NO LOAD, DEC ONLY)
 1870                 42,2423  53223 1        OCT     53223          67 3COMP LANDING RADAR VELX, Y, Z
 1871                 42,2424  60026 0        OCT     60026          68 3COMP  POS7, MIN/SEC, COMP ALT
A18711                                                                          (NO LOAD, DEC ONLY)
 1872                 42,2425  61430 1        OCT     61430          69 3COMP  COMP ALT, COMP ALT, COMP ALT
A18721                                                                          (DEC ONLY)
 1873                 42,2426  00000 1        OCT     0              70 3COMP  OCTAL ONLY FOR EACH
 1874                 42,2427  00000 1        OCT     0              71 3COMP  OCTAL ONLY FOR EACH
 1875                 42,2430  00102 1        OCT     00102          72 2COMP  360-CDU DEG, CDU DEG
 1876                 42,2431  00102 1        OCT     00102          73 2COMP  360-CDU DEG, CDU DEG
 1877                 42,2432  10200 1        OCT     10200          74 3COMP  MIN/SEC, OPDEG(360),OPDEG(360)
A18771                                                                          (NO LOAD, DEC ONLY)
 1878                 42,2433  00010 0        OCT     00010          75 3COMP  POS4, MIN/SEC, MIN/SEC
A18781                                                                          (NO LOAD, DEC ONLY)
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 1879                  42,2434   20512 0             OCT     20512          76 3COMP   VEL3, VEL3, POS4
A18791                                                                                  (DEC ONLY)
 1880                  42,2435   00500 1             OCT     00500          77 2COMP   MIN/SEC, VEL3
A18801                                                                                  (NO LOAD, DEC ONLY)
 1881                  42,2436   00654 0             OCT     00654          78 3COMP   RR RANGE, RR RANGE RATE, M/S
A18811                                                                                  (NO LOAD, DEC ONLY)
 1882                  42,2437   00102 1             OCT     00102          79 3COMP   CDU DEG, CDU DEG, WHOLE
A18821                                                                                  (DEC ONLY)
 1883                  42,2440   00200 0             OCT     00200          80 2COMP   WHOLE, DPDEG(360)
 1884                  42,2441   24512 1             OCT     24512          81 3COMP   VEL3 FOR EACH
A18841                                                                                  (DEC ONLY)
 1885                  42,2442   24512 1             OCT     24512          82 3COMP   VEL3 FOR EACH
A18851                                                                                  (DEC ONLY)
 1886                  42,2443   24512 1             OCT     24512          83 3COMP   VEL3 FOR EACH
A18861                                                                                  (DEC ONLY)
 1887                  42,2444   24512 1             OCT     24512          84 3COMP   VEL3 FOR EACH
A18871                                                                                  (DEC ONLY)
 1888                  42,2445   24512 1             OCT     24512          85 3COMP   VEL3 FOR EACH
A18881                                                                                  (DEC ONLY)
 1889                  42,2446   24512 1             OCT     24512          86 3COMP   VEL3 FOR EACH
A18891                                                                                  (DEC ONLY)
 1890                  42,2447   00102 1             OCT     00102          87 2COMP   CDU DEG FOR EACH
 1891                  42,2450   00000 1             OCT     0              88 3COMP   FRAC FOR EACH
A18912                                                                                   (DEC ONLY)
 1892                  42,2451   16143 0             OCT     16143          89 3COMP   DPDEG(90), DPDEG(90), POS5
A18921                                                                                  (DEC ONLY)
 1893                  42,2452   10507 1             OCT     10507          90 3COMP   POS5, VEL3, DPDEG(360)
A18931                                                                                  (DEC ONLY)
 1894                  42,2453   10450 1             OCT     10450          91 3COMP   POS4, VEL2, DPDEG(360)
 1895                  42,2454   60500 1             OCT     60500          92 3COMP   WHOLE, VEL3, COMP ALT
 1896                  42,2455   06143 1             OCT     06143          93 3COMP   DPDEG(90) FOR EACH
 1897                  42,2456   00000 1             OCT     00000          94         SPARE
 1898                  42,2457   00000 1             OCT     0              95         SPARE
 1899                  42,2460   00000 1             OCT     0              96         SPARE
 1900                  42,2461   00000 1             OCT     00000          97 3COMP   WHOLE FOR EACH
 1901                  42,2462   00000 1             OCT     00000          98 3COMP   WHOLE, FRAC, WHOLE
 1902                  42,2463   71572 1             OCT     71572          99 3COMP   POS9, VEL4, RADIANS
A19021                                                                                  (DEC ONLY)
R1903    END OF NNTYPTAB FOR MIXED NOUNS


 2200                  42,2464   00006 1   SFINTAB   OCT     00006          WHOLE, DP TIME (SEC)
 2201                  42,2465   03240 1             OCT     03240
 2202                  42,2466   00000 1             OCT     00000          SPARE
 2203                  42,2467   00000 1             OCT     00000
 2204                  42,2470   00000 1             OCT     00000          CDU DEGREES, 360-CDU DEGREES
 2205                  42,2471   00000 1             OCT     00000              (SFCONS IN DEGINSF)
 2206                  42,2472   10707 0             OCT     10707          DP DEGREES (90)
 2207                  42,2473   03435 0             OCT     03435                  UPPED BY 1
 2208                  42,2474   13070 1             OCT     13070          DP DEGREES (360)(POINT BETWN BITS 11-12)
 2209                    42,2475   34345 1         OCT     34345              UPPED BY 1
 2210                    42,2476   00005 1         OCT     00005           DEGREES (180)
 2211                    42,2477   21616 0         OCT     21616
 2212                    42,2500   26113 0         OCT     26113           WEIGHT2
 2213                    42,2501   31713 0         OCT     31713
 2214                    42,2502   00070 0         OCT     00070           POSITION5
 2215                    42,2503   20460 1         OCT     20460
 2216                    42,2504   01065 0         OCT     01065           POSITION4
 2217                    42,2505   05740 1         OCT     05740
 2218                    42,2506   11414 0         OCT     11414           VELOCITY2      (POINT BETWN BITS 11-12)
 2219                    42,2507   31463 1         OCT     31463
 2220                    42,2510   07475 0         OCT     07475           VELOCITY3
 2221                    42,2511   16051 1         OCT     16051
 2222                    42,2512   00001 0         OCT     00001           ELEVATION DEGREES
 2223                    42,2513   03434 1         OCT     03434
 2224                    42,2514   00047 1         OCT     00047           RENDEZVOUS RADAR RANGE
 2225                    42,2515   21135 0         OCT     21135
 2226                    42,2516   77766 0         OCT     77766           RENDEZVOUS RADAR RANGE RATE
 2227                    42,2517   50711 0         OCT     50711
 2228                    42,2520   00005 1         2DEC*   .9267840599 E5 B-28 * LANDING RADAR ALTITUDE
 2228                    42,2521   25006 0
 2230                    42,2522   00002 0         OCT     00002           INITIAL/FINAL ALTITUDE
 2231                    42,2523   23224 1         OCT     23224
 2232                    42,2524   00014 1         OCT     00014           ALTITUDE RATE
 2233                    42,2525   06500 1         OCT     06500
 2234                    42,2526   00001 0         2DEC    .18125 E5 B-28  FORWARD/LATERAL VELOCITY
 2234                    42,2527   03315 0
 2236                    42,2530   04256 1         OCT     04256           ROT HAND CONT ANGLE RATE
 2237                    42,2531   07071 0         OCT     07071
 2238                    42,2532   77766 0         2DEC*   -1.552795030 E5 B-28 * LANDING RADAR VELX
 2238                    42,2533   60557 0
 2240                    42,2534   00005 1         2DEC*    .8250825087 E5 B-28 *  LANDING RADAR VELY
 2240                    42,2535   01114 1
 2242                    42,2536   00007 0         2DEC*    1.153668673 E5 B-28 *  LANDING RADAR VELZ
 2242                    42,2537   01247 1
 2244                    42,2540   04324 0         OCT     04324           POSITION7
 2245                    42,2541   27600 1         OCT     27600
 2246                    42,2542   00036 1         OCT     00036           TRIM DEGREES2
 2247                    42,2543   20440 0         OCT     20440
 2248                    42,2544   00035 1         OCT     00035           COMPUTED ALTITUDE
 2249                    42,2545   30400 0         OCT     30400
 2250                    42,2546   23420 0         OCT     23420           DP DEGREES
 2251                    42,2547   00000 1         OCT     00000
 2252                    42,2550   01670 1         2DEC    30480 B-19      POSITION 9
 2252                    42,2551   20000 0
 2253                    42,2552   07475 0         2DEC    30.48 B-7       VELOCITY4
 2253                    42,2553   16051 1
 2254                    42,2554   14400 0         2DEC    100 B-8         RADIANS
 2254                    42,2555   00000 1
A2290                                                                      END OF SFINTAB
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L         PINBALL NOUN TABLES                                                                   USER'S PAGE NO.  13      EO S4

 2300                       42,2556   05174 0   SFOUTAB   OCT     05174                WHOLE, DP TIME (SEC)
 2301                       42,2557   13261 0             OCT     13261
 2302                       42,2560   00000 1             OCT     00000                SPARE
 2303                       42,2561   00000 1             OCT     00000
 2304                       42,2562   00000 1             OCT     00000                CDU DEGREES, 360-CDU DEGREES
 2305                       42,2563   00000 1             OCT     00000                    (SFCONS IN DEGOUTSF, 360-CDUD)
 2306                       42,2564   00714 0             OCT     00714                DP DEGREES (90) (POINT BETWN BITS 7-8)
 2307                       42,2565   31463 1             OCT     31463
 2308                       42,2566   13412 1             OCT     13412                DP DEGREES (360)
 2309                       42,2567   07534 1             OCT     07534
 2310                       42,2570   05605 1             OCT     05605                DEGREES (180)
 2311                       42,2571   03656 1             OCT     03656
 2312                       42,2572   00001 0             OCT     00001                WEIGHT2
 2313                       42,2573   16170 0             OCT     16170
 2314                       42,2574   00441 0             OCT     00441                POSITION5
 2315                       42,2575   34306 0             OCT     34306
 2316                       42,2576   07176 0             OCT     07176                POSITION4        (POINT BETWN BITS 7-8)
 2317                       42,2577   21603 1             OCT     21603
 2318                       42,2600   15340 1             OCT     15340                VELOCITY2
 2319                       42,2601   15340 1             OCT     15340
 2320                       42,2602   01031 1             OCT     01031                VELOCITY3        (POINT BETWN BITS 7-8)
 2321                       42,2603   21032 0             OCT     21032
 2322                       42,2604   34631 1             OCT     34631                ELEVATION DEGREES
 2323                       42,2605   23146 0             OCT     23146
 2324                       42,2606   00636 1             OCT     00636                RENDEZVOUS RADAR RANGE
 2325                       42,2607   14552 0             OCT     14552
 2326                       42,2610   74552 0             OCT     74552                RENDEZVOUS RADAR RANGE RATE
 2327                       42,2611   70307 1             OCT     70307
 2328                       42,2612   05520 0             2DEC    1.079 E-5 B14        LANDING RADAR ALTITUDE
 2328                       42,2613   15312 0
 2330                       42,2614   14226 1             OCT     14226                INITIAL/FINAL ALTITUDE
 2331                       42,2615   31757 0             OCT     31757
 2332                       42,2616   02476 0             OCT     02476                ALTITUDE RATE
 2333                       42,2617   05531 0             OCT     05531
 2334                       42,2620   34731 0             2DEC    5.517 E-5 B14        FORWARD/LATERAL VELOCITY
 2334                       42,2621   22542 1
 2336                       42,2622   00007 0             OCT     00007                ROT HAND CONT ANGLE RATE
 2337                       42,2623   13734 0             OCT     13734
 2338                       42,2624   74477 0             2DEC    -.6440 E-5 B14       LANDING RADAR VELX
 2338                       42,2625   50643 0
 2340                       42,2626   06265 0             2DEC     1.212 E-5 B14       LANDING RADAR VELY
 2340                       42,2627   16004 1
 2342                       42,2630   04426 0             2DEC     .8668 E-5 B14       LANDING RADAR VELZ
 2342                       42,2631   31433 1
 2344                       42,2632   34772 1             OCT     34772                POSITION7
 2345                       42,2633   07016 1             OCT     07016
 2346                       42,2634   01030 0             OCT     01030                TRIM DEGREES2
 2347                       42,2635   33675 0             OCT     33675
 2348                       42,2636   01046 1             OCT     01046                COMPUTED ALTITUDE
 2349                       42,2637   15700 1             OCT     15700
 2350                       42,2640   00321 1              OCT     00321             DP DEGREES
 2351                       42,2641   26706 1              OCT     26706
 2352                       42,2642   04231 0              2DEC    17.2010499 B-7    POSITION 9
 2352                       42,2643   27400 0
 2353                       42,2644   01031 1              2DEC    .032808399        VELOCITY4
 2353                       42,2645   21032 0
 2354                       42,2646   12172 0              2DEC    .32               RADIANS
 2354                       42,2647   34122 1
A2390                                                                                END OF SFOUTAB


A2400                                                                                NN  SF CONSTANT              SF ROUTINE

 2401   REF  10  LAST  308  42,2650   03453 0   IOADDTAB   ECADR   TTOGO             40 MIN/SEC                      M/S
 2402   REF   1             42,2651   03663 1              ECADR   VGDISP            40 VEL3                         DP3
 2403   REF   2  LAST  149  42,2652   03507 0              ECADR   DVTOTAL           40 VEL3                         DP3
 2404   REF   8  LAST  308  42,2653   01044 0              ECADR   DSPTEM1           41 CDU DEG                      CDU
 2405   REF   9  LAST  316  42,2654   01045 1              ECADR   DSPTEM1 +1        41 ELEV DEG                     ARTH
 2406                       42,2655   00000 1              OCT     0                 41 SPARE COMPONENT
 2407   REF   3  LAST  285  42,2656   02316 1              ECADR   HAPO              42 POS4                         DP3
 2408   REF   1             42,2657   02320 1              ECADR   HPER              42 POS4                         DP3
 2409   REF   2  LAST  316  42,2660   03663 1              ECADR   VGDISP            42 VEL3                         DP3
 2410   REF   2  LAST  104  42,2661   01117 1              ECADR   LAT               43 DPDEG(360)                   DP4
 2411   REF   2  LAST  104  42,2662   01121 1              ECADR   LONG              43 DPDEG(360)                   DP4
 2412   REF   2  LAST  104  42,2663   01123 0              ECADR   ALT               43 POS4                         DP3
 2413   REF   2  LAST  115  42,2664   02117 1              ECADR   HAPOX             44 POS4                         DP3
 2414   REF   1             42,2665   02121 1              ECADR   HPERX             44 POS4                         DP3
 2415   REF   2  LAST  116  42,2666   02140 0              ECADR   TFF               44 MIN/SEC                      M/S
 2416   REF   3  LAST  242  42,2667   03462 1              ECADR   TRKMKCNT          45 WHOLE                        ARTH
 2417   REF  11  LAST  316  42,2670   03453 0              ECADR   TTOGO             45 MIN/SEC                      M/S
 2418   REF   1             42,2671   02252 0              ECADR   +MGA              45 DPDEG(360)                   DP4
 2419   REF  10  LAST  295  42,2672   01340 1              ECADR   DAPDATR1          46 OCTAL ONLY                   OCT
 2420                       42,2673   00000 1              OCT     0                 46 SPARE COMPONENT
 2421                       42,2674   00000 1              OCT     0                 46 SPARE COMPONENT
 2422   REF  10  LAST  297  42,2675   01326 1              ECADR   LEMMASS           47 WEIGHT2                      ARTH1
 2423   REF   4  LAST  297  42,2676   01327 0              ECADR   CSMMASS           47 WEIGHT2                      ARTH1
 2424                       42,2677   00000 1              OCT     0                 47 SPARE COMPONENT
 2425   REF   1             42,2700   03002 0              ECADR   PITTIME           48 TRIM DEG2                    ARTH
 2426   REF   2  LAST  298  42,2701   03001 0              ECADR   ROLLTIME          48 TRIM DEG2                    ARTH
 2427                       42,2702   00000 1              OCT     0                 48 SPARE COMPONENT
 2428   REF   1             42,2703   00314 1              ECADR   R22DISP           49 POS4                         DP3
 2429   REF   2  LAST  316  42,2704   00316 0              ECADR   R22DISP +2        49 VEL3                         DP3
 2430   REF   2  LAST  108  42,2705   01356 0              ECADR   WHCHREAD          49 WHOLE                        ARTH
 2431                       42,2706   00000 1              OCT     0                 50 SPARE
 2432                       42,2707   00000 1              OCT     0                 50 SPARE
 2433                       42,2710   00000 1              OCT     0                 50 SPARE
 2434   REF   4  LAST  282  42,2711   02200 1              ECADR   ALPHASB           51 DPDEG(360)                   DP4
 2435   REF   3  LAST  119  42,2712   02202 0              ECADR   BETASB            51 DPDEG(360)                   DP4
 2436                       42,2713   00000 1              OCT     0                 51 SPARE COMPONENT
 2437   REF   1             42,2714   01755 1              ECADR   ACTCENT           52 DPDEG(360)                   DP4
 2438                              42,2715   00000 1         OCT     00000          52 SPARE COMPONENT
 2439                              42,2716   00000 1         OCT     00000          52 SPARE COMPONENT
 2440                              42,2717   00000 1         OCT     00000          53 SPARE
 2441                              42,2720   00000 1         OCT     00000          53
 2442                              42,2721   00000 1         OCT     00000          53
 2443     REF   7  LAST  119       42,2722   02200 1         ECADR   RANGE          54 POS5                                     DP1
 2444     REF   3  LAST  116       42,2723   02202 0         ECADR   RRATE          54 VEL3                                     DP3
 2445     REF   3  LAST  116       42,2724   02204 0         ECADR   RTHETA         54 DPDEG(360)                               DP4
 2446     REF   2  LAST  200       42,2725   03466 0         ECADR   NN             55 WHOLE                                    ARTH
 2447     REF   3  LAST  200       42,2726   02256 1         ECADR   ELEV           55 DPDEG(360)                               DP4
 2448     REF   2  LAST  200       42,2727   03620 0         ECADR   CENTANG        55 DPDEG(360)                               DP4
 2449     REF   5  LAST  302       42,2730   02200 1         ECADR   RR-AZ          56 DPDEG(360)                               DP4
 2450     REF   2  LAST  302       42,2731   02202 0         ECADR   RR-ELEV        56 DPDEG(360)                               DP4
 2451                              42,2732   00000 1         OCT     0              56 SPARE COMPONENT
 2452                              42,2733   00000 1         OCT     0              57 SPARE
 2453                              42,2734   00000 1         OCT     0              57 SPARE
 2454                              42,2735   00000 1         OCT     0              57 SPARE
 2455     REF   3  LAST  143       42,2736   03605 1         ECADR   POSTTPI        58 POS4                                     DP3
 2456     REF   5  LAST  143       42,2737   03575 0         ECADR   DELVTPI        58 VEL3                                     DP3
 2457     REF   2  LAST  200       42,2740   02347 0         ECADR   DELVTPF        58 VEL3                                     DP3
 2458     REF   1                  42,2741   02302 1         ECADR   DVLOS          59 VEL3                                     DP3
 2459     REF   2  LAST  317       42,2742   02304 1         ECADR   DVLOS +2       59 VEL3                                     DP3
 2460     REF   3  LAST  317       42,2743   02306 0         ECADR   DVLOS +4       59 VEL3                                     DP3
 2461     REF   2  LAST  152       42,2744   03701 1         ECADR   FORVEL         60 FOR/LAT VEL                              ARTH
 2462     REF   3  LAST  149       42,2745   03473 1         ECADR   HDOTDISP       60 VEL3                                     DP3
 2463     REF   1                  42,2746   03774 0         ECADR   HCALC1         60 COMP ALT                                 DP1
 2464     REF   2  LAST  149       42,2747   03475 1         ECADR   TTFDISP        61 MIN/SEC                                  M/S
 2465     REF  12  LAST  316       42,2750   03453 0         ECADR   TTOGO          61 MIN/SEC                                  M/S
 2466     REF   2  LAST  123       42,2751   02616 1         ECADR   OUTOFPLN       61 POS7                                     DP4
 2467     REF   2  LAST  149       42,2752   03471 0         ECADR   ABVEL          62 VEL3                                     DP3
 2468     REF  13  LAST  317       42,2753   03453 0         ECADR   TTOGO          62 MIN/SEC                                  M/S
 2469     REF   3  LAST  316       42,2754   03507 0         ECADR   DVTOTAL        62 VEL3                                     DP3
 2470     REF   3  LAST  317       42,2755   03471 0         ECADR   ABVEL          63 VEL3                                     DP3
 2471     REF   4  LAST  317       42,2756   03473 1         ECADR   HDOTDISP       63 VEL3                                     DP3
 2472     REF   2  LAST  317       42,2757   03774 0         ECADR   HCALC1         63 COMP ALT                                 DP1
 2473     REF   5  LAST  152       42,2760   03666 1         ECADR   FUNNYDSP       64 2INT                                     2INT
 2474     REF   5  LAST  317       42,2761   03473 1         ECADR   HDOTDISP       64 VEL3                                     DP3
 2475     REF   2  LAST  149       42,2762   03534 0         ECADR   HCALC          64 COMP ALT                                 DP1
 2476     REF   2  LAST  209       42,2763   00013 0         ECADR   SAMPTIME       65 HMS (MIXED ONLY TO KEEP CODE 65) HMS
 2477     REF   3  LAST  317       42,2764   00013 0         ECADR   SAMPTIME       65 HMS                                      HMS
 2478     REF   4  LAST  317       42,2765   00013 0         ECADR   SAMPTIME       65 HMS                                      HMS
 2479     REF   3  LAST  279       42,2766   02206 1         ECADR   RSTACK +6      66 LANDING RADAR ALT                        DP1
 2480                              42,2767   00000 1         OCT     0              66 LR POSITION                             LRPOS
 2481                              42,2770   00000 1         OCT     0              66 SPARE COMPONENT
 2482     REF   4  LAST  317       42,2771   02200 1         ECADR   RSTACK         67 LANDING RADAR VELX                       DP1
 2483     REF   5  LAST  317       42,2772   02202 0         ECADR   RSTACK +2      67 LANDING RADAR VELY                       DP1
 2484     REF   6  LAST  317       42,2773   02204 0         ECADR   RSTACK +4      67 LANDING RADAR VELZ                       DP1
 2485     REF   2  LAST  123       42,2774   02616 1         ECADR   RANGEDSP       68 POS7                                     DP4
 2486     REF   3  LAST  317       42,2775   03475 1         ECADR   TTFDISP        68 MIN/SEC                                  M/S
 2487     REF   3  LAST  202       42,2776   03664 0         ECADR   DELTAH         68 COMP ALT                                 DP1
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L        PINBALL NOUN TABLES                                                          USER'S PAGE NO. 16      EO S4

 2488   REF   1              42,2777   02640 1          ECADR   DLANDZ            69 COMP ALT                         DP1
 2489   REF   1              42,3000   02636 0          ECADR   DLANDY            69 COMP ALT                         DP1
 2490   REF   1              42,3001   02634 1          ECADR   DLANDX            69 COMP ALT                         DP1
 2491   REF   3  LAST  247   42,3002   00734 1          ECADR   AOTCODE           70 OCTAL ONLY                       OCT
 2492   REF   4  LAST  318   42,3003   00735 0          ECADR   AOTCODE +1        70 OCTAL ONLY                       OCT
 2493   REF   5  LAST  318   42,3004   00736 0          ECADR   AOTCODE +2        70 OCTAL ONLY                       OCT
 2494   REF   6  LAST  318   42,3005   00734 1          ECADR   AOTCODE           71 OCTAL ONLY                       OCT
 2495   REF   7  LAST  318   42,3006   00735 0          ECADR   AOTCODE +1        71 OCTAL ONLY                       OCT
 2496   REF   8  LAST  318   42,3007   00736 0          ECADR   AOTCODE +2        71 OCTAL ONLY                       OCT
 2497   REF   3  LAST  301   42,3010   00035 1          ECADR   CDUT              72 360-CDU DEG                  360-CDU
 2498   REF   3  LAST  200   42,3011   00036 1          ECADR   CDUS              72 CDU DEG                          CDU
 2499                        42,3012   00000 1          OCT     0                 72 SPARE COMPONENT
 2500   REF   2  LAST  103   42,3013   01106 1          ECADR   TANG              73 360-CDU DEG                  360-CDU
 2501   REF   3  LAST  318   42,3014   01107 0          ECADR   TANG +1           73 CDU DEG                          CDU
 2502                        42,3015   00000 1          OCT     0                 73 SPARE COMPONENT
 2503   REF  14  LAST  317   42,3016   03453 0          ECADR   TTOGO             74 MIN/SEC                          M/S
 2504   REF   2  LAST  121   42,3017   02362 1          ECADR   YAW               74 DPDEG(360)                       DP4
 2505   REF   1              42,3020   02364 1          ECADR   PITCH             74 DPDEG(360)                       DP4
 2506   REF   3  LAST  200   42,3021   03577 1          ECADR   DIFFALT           75 POS4                             DP3
 2507   REF   2  LAST  118   42,3022   02252 0          ECADR   T1TOT2            75 MIN/SEC
 2508   REF   1              42,3023   02254 0          ECADR   T2TOT3            75 MIN/SEC                          M/S
 2509   REF   3  LAST  202   42,3024   02276 0          ECADR   ZDOTD             76 VEL3                             DP3
 2510   REF   2  LAST  120   42,3025   02272 1          ECADR   RDOTD             76 VEL3                             DP3
 2511   REF   2  LAST  154   42,3026   03642 1          ECADR   XRANGE            76 POS4                             DP3
 2512   REF  15  LAST  318   42,3027   03453 0          ECADR   TTOGO             77 MIN/SEC                          M/S
 2513   REF   2  LAST  120   42,3030   02310 1          ECADR   YDOT              77 VEL3                             DP3
 2514                        42,3031   00000 1          OCT     0                 77 SPARE COMPONENT
 2515   REF   4  LAST  198   42,3032   01330 0          ECADR   DNRRANGE          78 RR RANGE                    RR RANGE
 2516   REF   2  LAST  107   42,3033   01331 1          ECADR   DNRRDOT           78 RR RANGE RATE          RR RANGE RATE
 2517   REF   1              42,3034   01271 1          ECADR   TTOTIG            78 MIN/SEC                          M/S
 2518   REF   2  LAST  262   42,3035   01235 1          ECADR   CURSOR            79 CDU DEG                          CDU
 2519   REF   2  LAST  262   42,3036   01237 0          ECADR   SPIRAL            79 CDU DEG                          CDU
 2520   REF   1              42,3037   01241 1          ECADR   RDSCODE           79 WHOLE                           ARTH
 2521   REF   2  LAST  146   42,3040   03733 0          ECADR   DATAGOOD          80 WHOLE                           ARTH
 2522   REF   1              42,3041   03734 1          ECADR   OMEGAQ            80 DPDEG(360)                       DP4
 2523                        42,3042   00000 1          OCT     0                 80 SPARE COMPONENT
 2524   REF   2  LAST  141   42,3043   03433 0          ECADR   DELVLVC           81 VEL3                             DP3
 2525   REF   3  LAST  318   42,3044   03435 0          ECADR   DELVLVC +2        81 VEL3                             DP3
 2526   REF   4  LAST  318   42,3045   03437 1          ECADR   DELVLVC +4        81 VEL3                             DP3
 2527   REF   5  LAST  318   42,3046   03433 0          ECADR   DELVLVC           82 VEL3                             DP3
 2528   REF   6  LAST  318   42,3047   03435 0          ECADR   DELVLVC +2        82 VEL3                             DP3
 2529   REF   7  LAST  318   42,3050   03437 1          ECADR   DELVLVC +4        82 VEL3                             DP3
 2530   REF   1              42,3051   03622 1          ECADR   DELVIMU           83 VEL3                             DP3
 2531   REF   2  LAST  318   42,3052   03624 1          ECADR   DELVIMU +2        83 VEL3                             DP3
 2532   REF   3  LAST  318   42,3053   03626 0          ECADR   DELVIMU +4        83 VEL3                             DP3
 2533   REF   1              42,3054   02222 1          ECADR   DELVDV            84 VEL3                             DP3
 2534   REF   2  LAST  318   42,3055   02224 1          ECADR   DELVDV  +2        84 VEL3                             DP3
 2535   REF   3  LAST  318   42,3056   02226 0          ECADR   DELVDV  +4        84 VEL3                             DP3
 2536   REF   3  LAST  149   42,3057   03501 0          ECADR   VGBODY            85 VEL3                             DP3
 2537   REF   4  LAST  318   42,3060   03503 1          ECADR   VGBODY +2         85 VEL3                             DP3
 2538   REF   5  LAST  318  ·42,3061   03505 1             ECADR   VGBODY +4         85 VEL3                       DP3
 2539   REF   8  LAST  318   42,3062   03433 0             ECADR   DELVLVC           86 VEL3                       DP3
 2540   REF   9  LAST  319   42,3063   03435 0             ECADR   DELVLVC +2        86 VEL3                       DP3
 2541   REF  10  LAST  319   42,3064   03437 1             ECADR   DELVLVC +4        86 VEL3                       DP3
 2542   REF   3  LAST  247   42,3065   01344 0             ECADR   AZ                87 CDU DEG                    CDU
 2543   REF   1              42,3066   01345 1             ECADR   EL                87 CDU DEG                    CDU
 2544                        42,3067   00000 1             OCT     0                 87 SPARE COMPONENT
 2545   REF  10  LAST  254   42,3070   02706 1             ECADR   STARAD            88 FRAC                       FRAC
 2546   REF  11  LAST  319   42,3071   02710 0             ECADR   STARAD +2         88 FRAC                       FRAC
 2547   REF  12  LAST  319   42,3072   02712 1             ECADR   STARAD +4         88 FRAC                       FRAC
 2548   REF   2  LAST  124   42,3073   02706 1             ECADR   LANDLAT           89 DPDEG(90)                  DP3
 2549   REF   2  LAST  124   42,3074   02710 0             ECADR   LANDLONG          89 DPDEG(90)                  DP3
 2550   REF   1              42,3075   02712 1             ECADR   LANDALT           89 POS5                       DP1
 2551   REF   8  LAST  317   42,3076   02200 1             ECADR   RANGE             90 POS5                       DP1
 2552   REF   4  LAST  317   42,3077   02202 0             ECADR   RRATE             90 VEL3                       DP3
 2553   REF   4  LAST  317   42,3100   02204 0             ECADR   RTHETA            90 DPDEG(360)                 DP4
 2554   REF   1              42,3101   03715 1             ECADR   P21ALT            91 POS4                       DP3
 2555   REF   2  LAST  150   42,3102   03711 0             ECADR   R21VEL            91 VEL2                       DP4
 2556   REF   2  LAST  150   42,3103   03713 1             ECADR   R21GAM            91 DPDEG(360)                 DP4
 2557   REF   1              42,3104   03750 0             ECADR   THRDISP           92 WHOLE                      ARTH
 2558   REF   6  LAST  317   42,3105   03473 1             ECADR   HDOTDISP          92 VEL3                       DP3
 2559   REF   3  LAST  317   42,3106   03774 0             ECADR   HCALC1            92 COMP ALT                   DP1
 2560   REF   6  LAST  275   42,3107   02737 0             ECADR   DGC               93 DPDEG(90)                  DP3
 2561   REF   7  LAST  319   42,3110   02741 1             ECADR   DGC      +2       93 DPDEG(90)                  DP3
 2562   REF   8  LAST  319   42,3111   02743 0             ECADR   DGC      +4       93 DPDEG(90)                  DP3
 2563                        42,3112   00000 1             OCT     00000             94 SPARE
 2564                        42,3113   00000 1             OCT     00000             94
 2565                        42,3114   00000 1             OCT     00000             94
 2566                        42,3115   00000 1             OCT     0                 95 SPARE
 2567                        42,3116   00000 1             OCT     0                 95 SPARE
 2568                        42,3117   00000 1             OCT     0                 95 SPARE
 2569                        42,3120   00000 1             OCT     0                 96 SPARE
 2570                        42,3121   00000 1             OCT     0                 96 SPARE
 2571                        42,3122   00000 1             OCT     0                 96 SPARE
 2572   REF  10  LAST  316   42,3123   01044 0             ECADR   DSPTEM1           97 WHOLE                      ARTH
 2573   REF  11  LAST  319   42,3124   01045 1             ECADR   DSPTEM1 +1        97 WHOLE                      ARTH
 2574   REF  12  LAST  319   42,3125   01046 1             ECADR   DSPTEM1 +2        97 WHOLE                      ARTH
 2575   REF   4  LAST  307   42,3126   01047 0             ECADR   DSPTEM2           98 WHOLE                      ARTH
 2576   REF   5  LAST  319   42,3127   01050 0             ECADR   DSPTEM2 +1        98 FRAC                       FRAC
 2577   REF   6  LAST  319   42,3130   01051 1             ECADR   DSPTEM2 +2        98 WHOLE                      ARTH
 2578   REF   2  LAST  300   42,3131   02200 1             ECADR   WWPOS             99 POS9                       DP3
 2579   REF   1              42,3132   02202 0             ECADR   WWVEL             99 VEL4                       DP2
 2580   REF   1              42,3133   02204 0             ECADR   WWBIAS            99 RADIANS                    DP4
R2600   END OF IDADDTAB


A2800                                                                            NN  SF ROUTINES

 2801                        42,3134   16351 1  RUTMXTAB OCT     16351             40 M/S, DP3, DP3
 2802                        42,3135   00142 0           OCT     00142             41 CDU, ARTH
 2803                        42,3136   16347 0        OCT      16347        42 OP3, OP3, OP3
 2804                        42,3137   16512 0        OCT      16512        43 OP4, OP4, OP3
 2805                        42,3140   22347 1        OCT      22347        44 OP3, OP3, M/S
 2806                        42,3141   24443 1        OCT      24443        45 ARTH, M/S, OP4
 2807                        42,3142   00000 1        OCT      00000        46 OCT
 2808                        42,3143   00553 1        OCT      00553        47 ARITH1, ARITH1
 2809                        42,3144   00143 1        OCT      00143        48 ARTH, ARTH
 2810                        42,3145   06347 1        OCT      06347        49 OP3, OP3, ARTH
 2811                        42,3146   00000 1        OCT      0            50 SPARE
 2812                        42,3147   00512 1        OCT      00512        51 OP4, OP4
 2813                        42,3150   00012 1        OCT      00012        52 OP4
 2814                        42,3151   00000 1        OCT      00000        53 SPARE
 2815                        42,3152   24344 1        OCT      24344        54 OP1, OP3, OP4
 2816                        42,3153   24503 1        OCT      24503        55 ARTH, OP4 , OP4
 2817                        42,3154   00512 1        OCT      00512        56 OP4, OP4
 2818                        42,3155   00000 1        OCT      0            57 SPARE
 2819                        42,3156   16347 0        OCT      16347        58 OP3, OP3, OP3
 2820                        42,3157   16347 0        OCT      16347        59 OP3, OP3, OP3
 2821                        42,3160   10343 1        OCT      10343        60 ARTH, OP3, OP1
 2822                        42,3161   24451 1        OCT      24451        61 M/S, M/S, OP4
 2823                        42,3162   16447 1        OCT      16447        62 OP3, M/S, OP3
 2824                        42,3163   10347 0        OCT      10347        63 OP3, OP3, OP1
 2825                        42,3164   10354 1        OCT      10354        64 2INT, OP3, OP1
 2826                        42,3165   20410 0        OCT      20410        65 HMS, HMS, HMS
 2827                        42,3166   00304 0        OCT      00304        66 OP1, LRPOS
 2828                        42,3167   10204 0        OCT      10204        67 OP1, OP1, OP1
 2829                        42,3170   10452 0        OCT      10452        68 OP4, M/S, OP1
 2830                        42,3171   10204 0        OCT      10204        69 OP1, OP1, OP1
 2831                        42,3172   00000 1        OCT      0            70 OCT, OCT, OCT
 2832                        42,3173   00000 1        OCT      0            71 OCT, OCT, OCT
 2833                        42,3174   00115 1        OCT      00115        72 360-COU, COU
 2834                        42,3175   00115 1        OCT      00115        73 360-COU, COU
 2835                        42,3176   24511 1        OCT      24511        74M/S, OP4,OP4
 2836                        42,3177   22447 0        OCT      22447        75 OP3, M/S, M/S
 2837                        42,3200   16347 0        OCT      16347        76 OP3, OP3, OP3
 2838                        42,3201   00351 0        OCT      00351        77 M/S, OP3
 2839                        42,3202   22756 0        OCT      22756        78 RR RANGE, RR RANGE RATE, M/S
 2840                        42,3203   06102 1        OCT      06102        79 COU, COU, ARTH
 2841                        42,3204   00503 1        OCT      00503        80 ARTH, OP4
 2842                        42,3205   16347 0        OCT      16347        81 OP3, OP3, OP3
 2843                        42,3206   16347 0        OCT      16347        82 OP3, OP3, OP3
 2844                        42,3207   16347 0        OCT      16347        83 OP3, OP3, OP3
 2845                        42,3210   16347 0        OCT      16347        84 OP3, OP3, OP3
 2846                        42,3211   16347 0        OCT      16347        85 OP3, OP3, OP3
 2847                        42,3212   16347 0        OCT      16347        86 OP3, OP3, OP3
 2848                        42,3213   00102 1        OCT      00102        87 COU, COU
 2849                        42,3214   02041 0        OCT      02041        88 FRAC FOR EACH
 2850                        42,3215   10347 0        OCT      10347        89 OP3, OP3, OP1
 2851                        42,3216   24344 1        OCT      24344        90 OP1, OP3, OP4
 2852                        42,3217   24507 0        OCT      24507        91 OP3, OP4, OP4
 2853                         42,3220   10343 1          OCT     10343          92 ARTH, DP3, DP1
 2854                         42,3221   16347 0          OCT     16347          93 DP3, DP3, DP3
 2855                         42,3222   00000 1          OCT     00000          94 SPARE
 2856                         42,3223   00000 1          OCT     0              95 SPARE
 2857                         42,3224   00000 1          OCT     0              96 SPARE
 2858                         42,3225   06143 1          OCT     06143          97 ARTH, ARTH, ARTH
 2859                         42,3226   06043 0          OCT     06043          98 ARTH, FRAC, ARTH
 2860                         42,3227   24247 0          OCT     24247          99 DP3, DP2, DP4
R2870    END OF RUTMXTAB


 2871    REF   3  LAST  294    30,2000                   SBANK= LOWSUPER
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L       LEM GEOMETRY                                                                              USER'S PAGE NO.   1       ED S?

 0001                                 23,2041                     BANK    23
 000101  REF    1                     13,2000                     SETLOC  LEMGEOM
 000102                               13,2070                     BANK

 00015   REF    4   LAST   321        30,2000                     SBANK=  LOWSUPER
 0002    REF    3   LAST   124        E5,1642                     EBANK=  XSM

R0500    THESE TWO ROUTINES COMPUTE THE ACTUAL STATE VECTOR FOR LM,CSM BY ADDING
R0501    THE CONIC R,V AND THE DEVIATIONS R,V. THE STATE VECTORS ARE CONVERTED TO
R0502    METERS B-29 AND METERS/CSEC B-7 AND STORED APPROPRIATELY IN RN,VN OR
R0503    R-OTHER , V-OTHER FOR DOWNLINK. THE ROUTINES NAMES ARE SWITCHED IN THE
R0504    OTHER VEHICLES COMPUTER.

R0505    INPUT
R0506      STATE VECTOR IN TEMPORARY STORAGE AREA
R05061     IF STATE VECTOR IS SCALED POS B27 AND VEL B5
R05062         SET X2 TO +2
R05063     IF STATE VECTOR IS SCALED POS B29 AND VEL B7
R05064         SET X2 TO 0

R0507    OUTPUT
R0508      R(T) IN RN, V(T) IN VN, T IN PIPTIME
R0509    OR
R0510      R(T) IN R-OTHER, V(T) IN V-OTHER   (T IS DEFINED BY T-OTHER)


 05106   REF    1                                                 COUNT*  $$/GEOM
 0511                                 13,2070   43414 1  SVDWN2   BOF     RVQ               SW=1=AVETOMID DOING W-MATRIX INTEG.
 05112   REF    1                     13,2071   04756 1                   AVEMIDSW
 05113                                13,2072   26073 1                   +1
 05114                                13,2073   53775 1           VLOAD   VSL*
 0512    REF    2   LAST   111        13,2074   01521 0                   TDELTAV
 0513                                 13,2075   57605 0                   0 -7,2
 0514                                 13,2076   53655 1           VAD     VSL*
 0515    REF    2   LAST   111        13,2077   01535 0                   RCV
 0516                                 13,2100   57576 1                   0,2
 0517    REF    4   LAST   197        13,2101   25220 0           STOVL   RN
 0518    REF    2   LAST   111        13,2102   01527 0                   TNUV
 0519                                 13,2103   53257 1           VSL*    VAD
 0520                                 13,2104   57602 1                   0 -4,2
 0521    REF    2   LAST   111        13,2105   01543 1                   VCV
 0522                                 13,2106   77657 0           VSL*
 0523                                 13,2107   57576 1                   0,2
 0524    REF    4   LAST   197        13,2110   15226 0           STODL   VN
 0525    REF    3   LAST   308        13,2111   01517 0                   TET
 0526    REF    2   LAST   197        13,2112   01234 0           STORE   PIPTIME
 0527                                 13,2113   77616 0           RVQ
 0528                          13,2114   53775 1  SVDWN1   VLOAD  VSL*
 0529   REF   3  LAST  322     13,2115   01521 0                  TDELTAV
 0530                          13,2116   57605 0                  0 -7,2
 0531                          13,2117   53655 1           VAD    VSL*
 0532   REF   3  LAST  322     13,2120   01535 0                  RCV
 0533                          13,2121   57576 1                  0,2
 0534   REF   5  LAST  196     13,2122   25720 0           STOVL  R-OTHER
 0535   REF   3  LAST  322     13,2123   01527 0                  TNUV
 0536                          13,2124   53257 1           VSL*   VAD
 0537                          13,2125   57602 1                  0 -4,2
 0538   REF   3  LAST  322     13,2126   01543 1                  VCV
 0539                          13,2127   77657 0           VSL*
 0540                          13,2130   57576 1                  0,2
 0541   REF   5  LAST  196     13,2131   01726 0           STORE  V-OTHER
 0542                          13,2132   77616 0           RVQ
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P0649             THE FOLLOWING ROUTINE TAKES A HALF UNIT TARGET VECTOR REFERRED TO NAV BASE COORDINATES AND FINDS BOTH
R0651        GIMBAL ORIENTATIONS AT WHICH THE RR MIGHT SIGHT THE TARGET. THE GIMBAL ANGLES CORRESPONDING TO THE PRESENT MODE
R0653        ARE LEFT IN MODEA AND THOSE WHICH WOULD BE USED AFTER A REMODE IN MODEB. THIS ROUTINE ASSUMES MODE 1 IS TRUNNION
R0655        ANGLE LESS THAN 90 DEGS IN ABS VALUE WITH ARBITRARY SHAFT, WITH A CORRESPONDING DEFINITION FOR MODE 2. MODE
R0657        SELECTION AND LIMIT CHECKING ARE DONE ELSEWHERE.

R0658             THE MODE 1 CONFIGURATION IS CALCULATED FROM THE VECTOR AND THEN MODE 2 IS FOUND USING THE RELATIONS

R0660             S(2) = 180 + S(1)
R0661             T(2) = 180 - T(1)

R066101      THE VECTOR ARRIVES IN MPAC WHERE TRG*SMNB OR *SMNB* WILL HAVE LEFT IT.

 0662                         13,2133   00041 1   RRANGLES STORE  32D
 06625                        13,2134   57545 1            DLOAD  DCOMP          SINCE WE WILL FIND THE MODE 1 SHAFT
 0663                         13,2135   00043 0                   34D            ANGLE LATER, WE CAN FIND THE MODE 1
 0664                         13,2136   67401 0            SETPD  ASIN           TRUNNION BY SIMPLY TAKING THE ARCSIN OF
 0665                         13,2137   00001 0                   0              THE Y COMPONENT, THE ASIN GIVING AN
 0666                         13,2140   44206 0            PUSH   BDSU           ANSWER WHOSE ABS VAL IS LESS THAN 90 DEG
 0667  REF  1                 13,2141   24005 1                   LOOPHALF
 0668                         13,2142   14005 1            STODL  4              MODE 2 TRUNNION TO 4.

 0669  REF  3  LAST  250      13,2143   24007 0                   LO6ZEROS
 0670                         13,2144   24043 0            STOVL  34D            UNIT THE PROJECTION OF THE VECTOR
 0671                         13,2145   00041 1                   32D              IN THE X-Z PLANE
 0672                         13,2146   41056 1            UNIT   BOVB           IF OVERFLOW,TARGET VECTOR IS ALONG Y
 0673  REF  1                 13,2147   52432 0                   LUNDESCH       CALL FOR MANEUVER UNLESS ON LUNAR SURF
 0674                         13,2150   14041 1            STODL  32D            PROJECTION VECTOR.
 0675                         13,2151   00041 1                   32D
 0676                         13,2152   44142 0            SR1    STQ
 0677  REF  1                 13,2153   00051 0                   S2
 0678  REF  3  LAST  302      13,2154   14023 0            STODL  SINTH          USE ARCTRIG SINCE SHAFT COULD BE ARB.
 0679                         13,2155   00045 0                   36D
 0680                         13,2156   77742 0            SR1
 0681  REF  3  LAST  302      13,2157   34021 0            STCALL COSTH
 0682  REF  3  LAST  302      13,2160   47322 1                   ARCTRIG
 0683                           13,2161   43206 1          PUSH    DAD             MODE 1 SHAFT TO 2.
 0684   REF    2  LAST  324     13,2162   24005 1                  LOOPHALF
 0685                           13,2163   24007 0          STOVL   6
 0686                           13,2164   00005 1                  4
 0687                           13,2165   77634 0          RTB                     FIND MODE 2 CDU ANGLES.
 0688   REF    1                13,2166   21636 1                  2V1STO2S
 0689   REF    2  LAST  103     13,2167   25111 1          STOVL   MODEB
 0690                           13,2170   00001 0                  0
 0691                           13,2171   77634 0          RTB                     MODE 1 ANGLES TO MODE A.
 0692   REF    2  LAST  325     13,2172   21636 1                  2V1STO2S
 0693   REF    1                13,2173   01107 0          STORE   MODEA
 0694                           13,2174   77776 1          EXIT

 0695   REF   26  LAST  278     13,2175  4 0110 0          CS      RADMODES        SWAP MODEA AND MODEB IF RR IN MODE 2.
 0696   REF    1                13,2176  7 4740 1          MASK    ANTENBIT
 0697   REF   92  LAST  307     13,2177  10 000 0          CCS     A
 0698                           13,2200  1 2204 1          TCF     +4

 0699   REF    2  LAST  325     13,2201  53'107 1          DXCH    MODEA
 0700   REF    3  LAST  325     13,2202  53'111 0          DXCH    MODEB
 0701   REF    3  LAST  325     13,2203  53'107 1          DXCH    MODEA

 0702   REF   11  LAST  301     13,2204  0 6042 1          TC      INTPRET
 0703                           13,2205   77650 1          GOTO
 0704   REF    2  LAST  324     13,2206   00051 0                  S2
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L         LEM GEOMETRY

R0705     GIVEN RR TRUNNION AND SHAFT (T,S) IN TANGNB,+1,FIND THE ASSOCIATED
R0706     LINE OF SIGHT IN NAV BASE AXES.  THE HALF UNIT VECTOR, .5(SIN(S)COS(T),
R0707     -SIN(T),COS(S)COS(T)) IS LEFT IN MPAC AND 320.

 07072  REF    1              23,2000                      SETLOC  INFLIGHT
 07074                        23,2041                      BANK

 07076  REF    1                                           COUNT*  $$/GEOM

 0708                         23,2041    47135 0  RRNB     SLOAD   RTB
 0709   REF    4  LAST  203   23,2042    03753 0                   TANGNB
 07091  REF    5  LAST  251   23,2043    21577 1                   CDULOGIC
 0710                         23,2044    41401 1           SETPD   PUSH              TRUNNION ANGLE TO 0
 0711                         23,2045    00001 0                   0
 0712                         23,2046    57556 0           SIN     DCOMP
 0713                         23,2047    14043 0           STODL   340               Y COMPONENT

 0714                         23,2050    41546 0           COS     PUSH              .5 COS(T) TO 0
 0715                         23,2051    47135 0           SLOAD   RTB
 0716   REF    5  LAST  326   23,2052    03754 1                   TANGNB +1
 0717   REF    6  LAST  326   23,2053    21577 1                   CDULOGIC
 0718                         23,2054    71406 0  RRNB1    PUSH    COS               SHAFT ANGLE TO 2
 0719                         23,2055    72405 0           DMP     SL1
 0720                         23,2056    00001 0                   0
 0721                         23,2057    14045 0           STODL   360               Z COMPONENT

 0722                         23,2060    41356 1           SIN     DMP
 0723                         23,2061    77752 1           SL1
 0724                         23,2062    24041 1           STOVL   320
 0725                         23,2063    00041 1                   320
 0726                         23,2064    77616 0           RVQ

R0727   THIS ENTRY TO RRNB REQUIRES THE TRUNNION AND SHAFT ANGLES IN MPAC AND MPAC +1 RESPECTIVELY

 0729                         23,2065    14025 0  RRNBMPAC STODL   200               SAVE SHAFT CDU IN 21.
 07291  REF   43  LAST  301   23,2066    00155 0                   MPAC              SET MODE TO DP.  (THE PRECEEDING STORE
A07292                                                                               MAY BE DP, TP OR VECTOR.)
 0730                         23,2067    40234 0           RTB     SETPD
 0731   REF    7  LAST  326   23,2070    21577 1                   CDULOGIC
 0732                         23,2071    00001 0                   0
 0733                         23,2072    73406 1           PUSH    SIN               TRUNNION ANGLE TO 0
 0734                         23,2073    77676 0           DCOMP
 0735                         23,2074    14043 0           STODL   340               Y COMPONENT
 0736                         23,2075    41546 0           COS     PUSH              .5COS(T) TO 0
 0737                         23,2076    47135 0           SLOAD   RTB               PICK UP CDU'S.
 0738                         23,2077    00026 0                   210
 0739   REF    8  LAST  326   23,2100    21577 1                   CDULOGIC
 0740                         23,2101    77650 1           GOTO
 0741   REF    1              23,2102    46054 1                   RRNB1
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L       IMU COMPENSATION PACKAGE

                                  07,2666                          BANK     7
0001                              06,2000                          SETLOC   IMUCOMP
000101  REF   1                   06,3271                          BANK
000102

0002    REF   1                   E3,1460                          EBANK=   NBOX

                                                                   COUNT*   $$/ICOMP
0100    REF   1                   06,3271   3 3537 0   1/PIPA      CAF      LGCOMP         SAVE EBANK OF CALLING PROGRAM
0112    REF   1                   06,3272  56 003 1                XCH      EBANK
0113    REF   8   LAST   296      06,3273  54 163 1                TS       MODE
0114    REF   1

0115    REF   1                   06,3274  11 1477 0               CCS      GCOMPSW        BYPASS IF GCOMPSW NEGATIVE
0116                              06,3275   1 3300 0               TCF      +3
0117                              06,3276   1 3300 0               TCF      +2
0118    REF   1                   06,3277   1 3361 1               TCF      IRIG1          RETURN

0119    REF   4   LAST   256      06,3300   3 4751 0   1/PIPA1     CAF      FOUR           PIPAZ, PIPAY, PIPAX
0120    REF   9   LAST   123      06,3301  54 132 0                TS       BUF +2

0121    REF  10   LAST   328      06,3302  50 132 1                INDEX    BUF +2
0122    REF   1                   06,3303   3 1453 1               CA       PIPASCF        (P.P.M.) X 2(-9)
0123                              06,3304   0 0006 1               EXTEND
0124    REF  11   LAST   328      06,3305   5 0132 1               INDEX    BUF +2
0125    REF   1                   06,3306   7 0324 0               MP       DELVX          (PP) X 2(+14) NOW (PIPA PULSES) X 2(+5)
0126    REF  30   LAST   306      06,3307  54 002 1                TS       Q              SAVE MAJOR PART

0127    REF  26   LAST   295      06,3310   3 0001 0               CA       L              MINOR PART
0128                              06,3311   0 0006 1               EXTEND
0129    REF  33   LAST   283      06,3312   7 4746 1               MP       BIT6           SCALE 2(+9)   SHIFT RIGHT 9
0130    REF  12   LAST   328      06,3313  50 132 1                INDEX    BUF +2
0131    REF   2   LAST   328      06,3314  54 325 1                TS       DELVX +1       FRACTIONAL PIPA PULSES SCALED 2(+14)

0132    REF  31   LAST   328      06,3315   3 0002 0               CA       Q              MAJOR PART
0133                              06,3316   0 0006 1               EXTEND
0134    REF  34   LAST   328      06,3317   7 4746 1               MP       BIT6           SCALE 2(+9)   SHIFT RIGHT 9
0135    REF  13   LAST   328      06,3320  50 132 1                INDEX    BUF +2
0136    REF   3   LAST   328      06,3321  20 325 1                DAS      DELVX          (PIPAI) + (PIPAI)(SFE)

0137    REF  14   LAST   328      06,3322  50 132 1                INDEX    BUF +2         (PIPA PULSES)/(CS) X 2(-3)          *
0138    REF   1                   06,3323   4 1452 1               CS       PIPABIAS
0139                              06,3324   0 0006 1               EXTEND
0140    REF   2   LAST   167      06,3325   7 1074 1               MP       1/PIPADT       (CS) X 2(+8) NOW (PIPA PULSES) X 2(+5)*
0141                              06,3326   0 0006 1               EXTEND
0142    REF  35   LAST   328      06,3327   7 4746 1               MP       BIT6           SCALE 2(+9) SHIFT RIGHT 9           *
0143    REF  15   LAST   328      06,3330  50 132 1                INDEX    BUF +2
0144    REF   4   LAST   328      06,3331  20 325 1                DAS      DELVX          (PIPAI) + (PIPAI)(SFE) - (BIAS)(DELTAT)

0145    REF  16   LAST   328      06,3332  10 132 0                CCS      BUF +2         PIPAZ, PIPAY, PIPAX
0146    REF   1                   06,3333   6 7752 0               AD       NEG1
0147    REF   1                   06,3334   1 3301 1               TCF      1/PIPA1 +1
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 0148                    06,3335  13 336 0          NOOP                   LESS THAN ZERO IMPOSSIBLE
 01481  REF   2  LAST  328    06,3336  55'477 0  IRIGCOMP TS      GCOMPSW          INDICATE COMMANDS 2 PULSES OR LESS.
 01482  REF  17  LAST  328    06,3337  54 130 1           TS      BUF              INDEX COUNTER . IRIGX, IRIGY, IRIGZ.

 01483  REF   1               06,3340  0 3364 0           TC      IRIGX            COMPENSATE ACCELERATION TERMS

 01484  REF   2  LAST  328    06,3341  4 1460 0           CS      NBDX             (GYRO PULSES)/(CS) X 2(-5)
 01485  REF   1               06,3342  0 3462 1           TC      DRIFTSUB         -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

 01486  REF   1               06,3343  0 3401 1           TC      IRIGY            COMPENSATE ACCELERATION TERMS

 01487  REF   1               06,3344  4 1461 1           CS      NBDY             (GYRO PULSES)/(CS) X 2(-5)
 01488  REF   2  LAST  330    06,3345  0 3462 1           TC      DRIFTSUB         -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

 01489  REF   1               06,3346  0 3416 1           TC      IRIGZ            COMPENSATE ACCELERATION TERMS

 0149   REF   1               06,3347  3 1462 0           CA      NBDZ             (GYRO PULSES)/(CS) X 2(-5)
 01491  REF   3  LAST  330    06,3350  0 3462 1           TC      DRIFTSUB         +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)


 01492  REF   3  LAST  330    06,3351  11'477 0           CCS     GCOMPSW          ARE GYRO COMMANDS GREATER THAN 2 PULSES
 01493                        06,3352  1 3354 1           TCF     +2               YES  SEND OUT GYRO TORQUING COMMANDS.
 01494  REF   2  LAST  328    06,3353  1 3361 1           TCF     IRIG1            NO   RETURN

 01495  REF   1               06,3354  3 5031 0           CA      PRIO21           PRIO GREATER THAN SERVICER
 01496  REF   4  LAST  261    06,3355  0 5072 1           TC      NOVAC            SEND OUT GYRO TORQUING COMMANDS.
 01497  REF   3  LAST  330    E3,1460                     FBANK=  NBDX
 01498  REF   1               06,3356   03515 0           2CADR   1/GYRO
 01498  REF   1               06,3357   14063 1

 01499                        06,3360  0 0003 1           RELINT
 0150   REF   2  LAST  328    06,3361  3 0163 0  IRIG1    CA      MODE             RESTORE CALLERS FBANK
 01501  REF   9  LAST  328    06,3362  54 003 0           TS      EBANK
 01502  REF   2  LAST  245    06,3363  1 4631 0           TCF     SWRETURN
 0151                          06,3364  0 0006 1  IRIGX    EXTEND
 01511  REF  44  LAST  326     06,3365  22 156 0           DXCH    MPAC +2          SAVE Q
 01512                         06,3366  0 0006 1           EXTEND
 0152   REF   5  LAST  328     06,3367  4 0325 1           DCS     DELVX            (PIPA PULSES) X 2(+14)
 0153   REF  45  LAST  331     06,3370  52 155 1           DXCH    MPAC
 0154   REF   1                06,3371  3 1463 1           CA      ADIAX            (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0155   REF   1                06,3372  0 3433 0           TC      GCOMPSUB         -(ADIAX)(PIPAX)    (GYRO PULSES) X 2(+14)

 0156                          06,3373  0 0006 1           EXTEND
 0157   REF   1                06,3374  4 0327 0           DCS     DELVY            (PIPA PULSES) X 2(+14)
 0158   REF  46  LAST  331     06,3375  52 155 1           DXCH    MPAC
 0159   REF   1                06,3376  4 1466 0           CS      ADSRAX           (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0160   REF   2  LAST  331     06,3377  0 3433 0           TC      GCOMPSUB         +(ADSRAX)(PIPAY)   (GYRO PULSES) X 2(+14)

A01603                                                     EXTEND           ***
A01604                                                     DCS     DELVZ    ***     (PIPA PULSES) X 2(+14)
A01605                                                     DXCH    MPAC     ***
A01606                                                     CA      ADOAX    ***     (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
A01607                                                     TC      GCOMPSUB ***     -(ADOAX)(PIPAZ)    (GYRO PULSES) X 2(+14)

 0161   REF  47  LAST  331     06,3400  0 0156 0           TC      MPAC +2

 0163                          06,3401  0 0006 1  IRIGY    EXTEND
 01631  REF  48  LAST  331     06,3402  22 156 0           DXCH    MPAC +2          SAVE Q
 01632                         06,3403  0 0006 1           EXTEND
 0164   REF   2  LAST  331     06,3404  4 0327 0           DCS     DELVY            (PIPA PULSES) X 2(+14)
 0165   REF  49  LAST  331     06,3405  52 155 1           DXCH    MPAC
 0166   REF   1                06,3406  3 1464 0           CA      ADIAY            (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0167   REF   3  LAST  331     06,3407  0 3433 0           TC      GCOMPSUB         -(ADIAY)(PIPAY)    (GYRO PULSES) X 2(+14)

 0168                          06,3410  0 0006 1           EXTEND
 0169   REF   1                06,3411  4 0331 1           DCS     DELVZ            (PIPA PULSES) X 2(+14)
 0170   REF  50  LAST  331     06,3412  52 155 1           DXCH    MPAC
 0171   REF   1                06,3413  4 1467 1           CS      ADSRAY           (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0172   REF   4  LAST  331     06,3414  0 3433 0           TC      GCOMPSUB         +(ADSRAY)(PIPAZ)   (GYRO PULSES) X 2(+14)

A01723                                                     EXTEND           ***
A01724                                                     DCS     DELVX    ***     (PIPA PULSES) X 2(+14)
A01725                                                     DXCH    MPAC     ***
A01726                                                     CA      ADOAY    ***     (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
A01727                                                     TC      GCOMPSUB ***     -(ADOAY)(PIPAX)    (GYRO PULSES) X 2(+14)

 0173   REF  51  LAST  331     06,3415  0 0156 0           TC      MPAC +2

 0175                          06,3416  0 0006 1  IRIGZ    EXTEND
 01751  REF  52  LAST  331     06,3417  22 156 0           DXCH    MPAC +2          SAVE Q
 01752                         06,3420  0 0006 1           EXTEND
 0176   REF   3  LAST  331     06,3421  4 0327 0           DCS     DELVY            (PIPA PULSES) X 2(+14)
 0177   REF  53  LAST  331     06,3422  52 155 1           DXCH    MPAC
 0178   REF   1                06,3423  3 1470 0           CA      ADSRAZ           (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0179    REF    5  LAST   331    06,3424   0 3433 0          TC       GCOMPSUB          -(ADSRAZ)(PIPAY)   (GYRO PULSES) X 2(+14)

 0180                            06,3425   0 0006 1          EXTEND
 0181    REF    2  LAST   331    06,3426   4 0331 1          DCS      DELVZ             (PIPA PULSES) X 2(+14)
 0182    REF   54  LAST   331    06,3427   52 155 1          DXCH     MPAC
 0183    REF    1                06,3430   3 1465 1          CA       ADIAZ             (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0184    REF    6  LAST   332    06,3431   0 3433 0          TC       GCOMPSUB          -(ADIAZ)(PIPAZ)    (GYRO PULSES) X 2(+14)

A01843                                                       EXTEND           ***
A01844                                                       DCS      DELVX   ***      (PIPA PULSE) X 2(+14)
A01845                                                       DXCH     MPAC    ***
A01846                                                       CS       ADOAZ   ***      (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
A01847                                                       TC       GCOMPSUB ***     +(ADOAZ)(PIPAX)    (GYRO PULSES) X 2(+14)

 0185    REF   55  LAST   332    06,3432   0 0156 0          TC       MPAC +2
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 0199   REF  56  LAST  332   06,3433  56 154 1  GCOMPSUB XCH     MPAC            AOIA OR AOSRA COEFFICIENT ARRIVES IN A
 0200                        06,3434  0 0006 1           EXTEND                   C(MPAC) = (PIPA PULSES) X 2(+14)
 0201   REF  57  LAST  333   06,3435  7 0154 0           MP       MPAC            (GYRO PULSES)/(PIPA PULSE) X 2(-6)       *
 0202   REF  18  LAST   98   06,3436  52 123 0           DXCH     VBUF            NOW = (GYRO PULSES) X 2(+8)              *

 0203   REF  58  LAST  333   06,3437  3 0155 0           CA       MPAC +1         MINOR PART PIPA PULSES
 0204                        06,3440  0 0006 1           EXTEND
 0205   REF  59  LAST  333   06,3441  7 0154 0           MP       MPAC            AOIA OR AOSRA
 0206   REF  27  LAST  328   06,3442  54 001 1           TS       L
 0207   REF  32  LAST  300   06,3443  3 4755 1           CAF      ZERO
 0208   REF  19  LAST  333   06,3444  20 123 0           DAS      VBUF            NOW = (GYRO PULSES) X 2(+8)              *

 0209   REF  20  LAST  333   06,3445  3 0122 0           CA       VBUF            PARTIAL RESULT - MAJOR
 0210                        06,3446  0 0006 1           EXTEND
 0211   REF  16  LAST  247   06,3447  7 4743 1           MP       BIT9            SCALE 2(+6)      SHIFT RIGHT 6           *
 0212   REF  18  LAST  330   06,3450  50 130 0           INDEX    BUF             RESULT = (GYRO PULSES) X 2(+14)
 0213   REF   3  LAST  111   06,3451  21'472 0           DAS      GCOMP           HI(AOIA)(PIPAI)  OR  HI(AOSRA)(PIPAI)

 0214   REF  21  LAST  333   06,3452  3 0123 1           CA       VBUF +1         PARTIAL RESULT - MINOR
 0215                        06,3453  0 0006 1           EXTEND
 0216   REF  17  LAST  333   06,3454  7 4743 1           MP       BIT9            SCALE 2(+6)      SHIFT RIGHT 6           *
 0217   REF  28  LAST  333   06,3455  54 001 1           TS       L
 0218   REF  33  LAST  333   06,3456  3 4755 1           CAF      ZERO
 0219   REF  19  LAST  333   06,3457  50 130 0           INDEX    BUF             RESULT = (GYRO PULSES) X 2(+14)
 0220   REF   4  LAST  333   06,3460  21'472 0           DAS      GCOMP           (AOIA)(PIPAI)  OR  (AOSRA)(PIPAI)

 0221   REF  32  LAST  328   06,3461  0 0002 0           TC       Q
 0222                             06,3462  0 0006 1  DRIFTSUB EXTEND
 0223   REF  20  LAST  333        06,3463  22 131 1           QXCH    BUF +1

 0224                             06,3464  0 0006 1           EXTEND                    C(A) = NBD    (GYRO PULSES)/(CS) X 2(-5)
 0225   REF   3  LAST  328        06,3465  7 1074 1           MP      1/PIPADT          (CS) X 2(+8)   NOW (GYRO PULSES) X 2(+3)
 0226   REF  60  LAST  333        06,3466  22 155 0           LXCH    MPAC +1           SAVE FOR FRACTIONAL COMPENSATION
 0227                             06,3467  0 0006 1           EXTEND
 0228   REF  19  LAST  255        06,3470  7 4750 0           MP      BIT4              SCALE 2(+11)      SHIFT RIGHT 11
 0229   REF  21  LAST  334        06,3471  50 130 0           INDEX   BUF
 0230   REF   5  LAST  333        06,3472  21'472 0           DAS     GCOMP             HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

 0231   REF  61  LAST  334        06,3473  3 0155 0           CA      MPAC +1           NOW MINOR PART
 0232                             06,3474  0 0006 1           EXTEND
 0233   REF  20  LAST  334        06,3475  7 4750 0           MP      BIT4              SCALE 2(+11)      SHIFT RIGHT 11
 0234   REF  29  LAST  333        06,3476  54 001 1           TS      L
 0235   REF  34  LAST  333        06,3477  3 4755 1           CAF     ZERO
 0236   REF  22  LAST  334        06,3500  50 130 0           INDEX   BUF               ADD IN FRACTIONAL COMPENSATION
 0237   REF   6  LAST  334        06,3501  21'472 0           DAS     GCOMP             (NBD)(DELTAT)      (GYRO PULSES) X 2(+14)

 0238   REF  12  LAST  306        06,3502  3 4752 0  DRFTSUB2 CAF     TWO               PIPAX, PIPAY, PIPAZ
 0239   REF  23  LAST  334        06,3503  6 0130 0           AD      BUF
 0240   REF  24  LAST  334        06,3504  56 130 0           XCH     BUF
 0241   REF  93  LAST  325        06,3505  50 000 1           INDEX   A
 0242   REF   7  LAST  334        06,3506  11'471 0           CCS     GCOMP             ARE GYRO COMMANDS 1 PULSE OR GREATER
 0243                             06,3507  1 3511 0           TCF     +2                YES
 0244   REF  25  LAST  334        06,3510  0 0131 1           TC      BUF +1            NO

 0245   REF   1                   06,3511  7 3561 1           MASK    COMPCHK           DEC -1
 0246   REF  94  LAST  334        06,3512  10 000 0           CCS     A                 ARE GYRO COMMANDS GREATER THAN 2 PULSES
 0247   REF   4  LAST  330        06,3513  55'477 0           TS      GCOMPSW           YES - SET GCOMPSW POSITIVE
 0248   REF  26  LAST  334        06,3514  0 0131 1           TC      BUF +1            NO
 0249  REF   5  LAST  328   06,3515   3 4751 0  1/GYRO    CAF     FOUR          PIPAZ, PIPAY, PIPAX
 0250  REF  27  LAST  334   06,3516  54 130 1             TS      BUF

 0251  REF  28  LAST  335   06,3517  50 130 0             INOEX   BUF           SCALE GYRO COMMANDS FOR IMUPULSE
 0252  REF   8  LAST  334   06,3520   3 1472 1            CA      GCOMP +1      FRACTIONAL PULSES
 0253                       06,3521   C 0006 1            EXTENO
 0254  REF  21  LAST  281   06,3522   7 4744 0            MP      BIT8          SHIFT RIGHT 7
 0255  REF  29  LAST  335   06,3523  50 130 0             INDEX   BUF
 0256  REF   9  LAST  335   06,3524  55'472 0             TS      GCOMP +1      FRACTIONAL PULSES SCALED

 0257  REF  35  LAST  334   06,3525   3 4755 1            CAF     ZERO          SET GCOMP = 0 FOR DAS INSTRUCTION
 0258  REF  30  LAST  335   06,3526  50 130 0             INOEX   BUF
 0259  REF  10  LAST  335   06,3527  57'471 1             XCH     GCOMP         GYRO PULSES
 0260                       06,3530   0 0006 1            EXTENO
 0261  REF  22  LAST  335   06,3531   7 4744 0            MP      BIT8          SHIFT RIGHT 7
 0262  REF  31  LAST  335   06,3532  50 130 0             INDEX   BUF
 0263  REF  11  LAST  335   06,3533  21'472 0             OAS     GCOMP         ADD THESE TO FRACTIONAL PULSES ABOVE

 0264  REF  32  LAST  335   06,3534  10 130 1             CCS     BUF           PIPAZ, PIPAY, PIPAX
 0265  REF   2  LAST  328   06,3535   6 7752 0            AO      NEG1
 0266  REF   2  LAST  330   06,3536   1 3516 1            TCF     I/GYRO +1
 0267  REF  12  LAST  335   06,3537    01471 1  LGCOMP    ECAOR   GCOMP         LESS THAN ZERO IMPOSSIBLE

 0268  REF   2  LAST  328   06,3540   3 3537 0            CAF     LGCOMP
 0269  REF  58  LAST  302   06,3541   C 4616 1            TC      BANKCALL
 0270  REF   2  LAST  275   06,3542    17314 1            CAOR    IMUPULSE      CALL GYRO TORQUING ROUTINE
 0271  REF  59  LAST  335   06,3543   0 4616 1            TC      BANKCALL
 0272  REF   6  LAST  275   06,3544    17707 1            CADR    IMUSTALL      WAIT FOR PULSES TO GET OUT
 0273  REF  24  LAST  301   06,3545   1 5155 1            TCF     ENOOFJOB      TEMPORARY

 0274  REF   6  LAST  335   06,3546   3 4751 0  GCOMP1    CAF     FOUR          PIPAZ, PIPAY, PIPAX
 0275  REF  33  LAST  335   06,3547  54 130 1             TS      BUF

 0276  REF  34  LAST  335   06,3550  50 130 0             INOEX   BUF           RESCALE
 0277  REF  13  LAST  335   06,3551   3 1472 1            CA      GCOMP +1
 0278                       06,3552   C 0006 1            EXTENO
 0279  REF  23  LAST  335   06,3553   7 4744 0            MP      BITB          SHIFT MINOR PART LEFT 7 - MAJOR PART = 0
 0280  REF  35  LAST  335   06,3554  50 130 0             INOEX   BUF
 0281  REF  14  LAST  335   06,3555  23'472 1             LXCH    GCOMP +1      BITS 8-14 OF MINOR PART WERE = 0

 0282  REF  36  LAST  335   06,3556  10 130 1             CCS     BUF           PIPAZ, PIPAY, PIPAX
 0283  REF   3  LAST  335   06,3557   6 7752 0            AO      NEG1
 0284  REF   1              06,3560   1 3547 0            TCF     GCOMP1 +1
 0285                       06,3561    77776 1  COMPCHK   OEC     -1            LESS THAN ZERO IMPOSSIBLE
 0286  PEF  25  LAST  335   06,3562   1 5155 1            TCF     ENOOFJOB
 0287    REF    5  LAST  334    06,3563  11'477 0  NBDONLY  CCS     GCOMPSW          BYPASS IF GCOMPSW NEGATIVE
 0288                           06,3564  1 3567 1           TCF     +3
 0289                           06,3565  1 3567 1           TCF     +2
 0290    REF   26  LAST  335    06,3566  1 5155 1           TCF     ENDOFJOB

 029005                         06,3567  0 0004 0           INHINT
 02901   REF    6  LAST  231    06,3570  10 076 1           CCS     FLAGWRD2         PREREAD T3RUPT MAY COINCIDE
 02902   REF   27  LAST  336    06,3571  1 5155 1           TCF     ENDOFJOB
 02903   REF   28  LAST  336    06,3572  1 5155 1           TCF     ENDOFJOB
 02904                          06,3573  1 3574 0           TCF     +1

 02905   REF    3  LAST  299    06,3574  3 0104 1           CA      FLAGWRD8         IF SURFACE FLAG IS SET, SET TEM1
 02906   REF   24  LAST  335    06,3575  7 4744 0           MASK    BIT8             POSITIVE SO THAT THE ACCELERATION TERMS
 02907   REF    4  LAST   98    06,3576  54 141 1           TS      TEM1             WILL BE COMPENSATED.
 02908                          06,3577  0 0006 1           EXTEND
 0291                           06,3600  1 3603 0           BZF     +3               ARE WE ON THE SURFACE

 0292    REF   16  LAST  297    06,3601  0 4674 0           TC      IBNKCALL         ON THE SURFACE
 02925   REF    1               06,3602   77541 1           CADR    PIPASR +3        READ PIPAS, BUT DO NOT SCALE THEM

 0293    REF    2  LAST  167    06,3603  3 0025 0           CA      TIME1            (CS) X 2(+14)
 0294    REF    4  LAST  334    06,3604  57'074 0           XCH     1/PIPADT         PREVIOUS TIME
 0295                           06,3605  0 0003 1           RELINT
 0296                           06,3606  4 0000 0           COM
 0297    REF    5  LAST  336    06,3607  6 1074 0           AD      1/PIPADT         PRESENT TIME - PREVIOUS TIME
 0298    REF    1               06,3610  6 4736 1  NBD2     AD      HALF             CORRECT FOR POSSIBLE TIME1 TICK
 0299    REF    2  LAST  336    06,3611  6 4736 1           AD      HALF
 0300    REF   30  LAST  334    06,3612  56 001 0           XCH     L                IF TIME1 DID NOT TICK, REMOVE RESULTING
 0301    REF   31  LAST  336    06,3613  56 001 0           XCH     L                OVERFLOW.

 0302                           06,3614  0 0006 1  NBD3     EXTEND                   C(A) = DELTAT    (CS) X 2(+14)
 0303    REF   18  LAST  256    06,3615  7 4742 0           MP      BIT10            SHIFT RIGHT 5
 0304    REF   22  LAST  333    06,3616  52 125 0           DXCH    VBUF +2

 03041   REF   36  LAST  335    06,3617  3 4755 1           CA      ZERO
 03042   REF    6  LAST  336    06,3620  55'477 0           TS      GCOMPSW          INDICATE COMMANDS 2 PULSES OR LESS.
 03043   REF   37  LAST  335    06,3621  54 130 1           TS      BUF              INDEX  X, Y, Z.

 03044   REF    5  LAST  336    06,3622  10 141 1           CCS     TEM1             IF SURFACE FLAG IS SET,
 03045   REF    2  LAST  330    06,3623  0 3364 0           TC      IRIGX            COMPENSATE ACCELERATION TERMS.

 0305                           06,3624  0 0006 1           EXTEND
 0306    REF   23  LAST  336    06,3625  3 0125 1           DCA     VBUF +2
 0307    REF   62  LAST  334    06,3626  52 155 1           DXCH    MPAC             DELTAT NOW SCALED (CS) X 2(+19)

 0311    REF    4  LAST  330    06,3627  4 1460 0           CS      NBOX             (GYRO PULSES)/(CS) X 2(-5)
 0312    REF    1               06,3630  0 3652 0           TC      FBIASSUB         -(NBOX)(DELTAT)   (GYRO PULSES) X 2(+14)

 03121   REF    6  LAST  336    06,3631  10 141 1           CCS     TEM1             IF SURFACE FLAG IS SET,
 03122   REF    2  LAST  330    06,3632  0 3401 1           TC      IRIGY            COMPENSATE ACCELERATION TERMS.
 0313                                16,3633   0 0006 1         EXTEND
 0314   REF  24  LAST  336           06,3634   4 0125 0         DCS     VBUF +2
 0315   REF  63  LAST  336           06,3635   52 155 1         DXCH    MPAC              DELTAT SCALED (CS) X 2(+19)
 0316   REF   2  LAST  330           06,3636   3 1461 0         CA      NBDY              (GYRO PULSES)/(CS) X 2(-5)
 0317   REF   2  LAST  336           06,3637   0 3652 0         TC      FBIASSUB          -(NBDY)(DELTAT)    (GYRO PULSES) X 2(+14)

 03171  REF   7  LAST  336           06,3640   10 141 1         CCS     TEM1              IF SURFACE FLAG IS SET,
 03172  REF   2  LAST  330           06,3641   0 3416 1         TC      IRIGZ             COMPENSATE ACCELERATION TERMS

 0318                                06,3642   0 0006 1         EXTEND
 0319   REF  25  LAST  337           06,3643   4 0125 0         DCS     VBUF +2
 0320   REF  64  LAST  337           06,3644   52 155 1         DXCH    MPAC              DELTAT SCALED (CS) X 2(+19)
 0321   REF   2  LAST  330           06,3645   4 1462 1         CS      NBDZ              (GYRO PULSES)/(CS) X 2(-5)
 0322   REF   3  LAST  337           06,3646   0 3652 0         TC      FBIASSUB          +(NBDZ)(DELTAT)    (GYRO PULSES) X 2(+14)

 0323   REF   7  LAST  336           06,3647   11 477 0         CCS     GCOMPSW           ARE GYRO COMMANDS GREATER THAN 2 PULSES
 0324   REF   3  LAST  335           06,3650   1 3515 1         TCF     1/GYRO            YES
 0325   REF  29  LAST  336           06,3651   1 5155 1         TCF     ENDOFJOB          NO
 0326   REF  33  LAST  333   06,3652  56 002 0  EBIASSUB XCH    Q
 0327   REF  38  LAST  336   06,3653  54 131 0           TS     BUF +1

 0328   REF  34  LAST  338   06,3654  3 0002 0           CA     Q                NBD SCALED (GYRO PULSES)/(CS) X 2(-5)
 0329                        06,3655  0 0006 1           EXTEND
 0330   REF  65  LAST  337   06,3656  7 0154 0           MP     MPAC             DELTAT SCALED (CS) X 2(+19)
 0331   REF  39  LAST  338   06,3657  50 130 0           INDEX  BUF
 0332   REF  15  LAST  335   06,3660  21'472 0           DAS    GCOMP            PI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

 0333   REF  35  LAST  338   06,3661  3 0002 0           CA     Q                NOW FRACTIONAL PART
 0334                        06,3662  0 0006 1           EXTEND
 0335   REF  66  LAST  338   06,3663  7 0155 1           MP     MPAC +1
 0336   REF  32  LAST  336   06,3664  54 001 1           TS     L
 0337   REF  37  LAST  336   06,3665  3 4755 1           CAF    ZERO
 0338   REF  40  LAST  338   06,3666  50 130 0           INDEX  BUF
 0339   REF  16  LAST  338   06,3667  21'472 0           DAS    GCOMP            (NBD)(DELTAT)      (GYRO PULSES) X 2(+14)

 0340   REF   1              06,3670  1 3502 1           TCF    DRFTSUB2         CHECK MAGNITUDE OF COMPENSATION


 0341   REF  60  LAST  335   06,3671  0 4616 1  LASTBIAS TC     BANKCALL
 03411  REF   1              06,3672   17270 1           CADR   PIPUSE1

 03412  REF   8  LAST  337   06,3673  11'477 0           CCS    GCOMPSW
 0342                        06,3674  1 3677 0           TCF    +3
 0343                        06,3675  1 3677 0           TCF    +2
 0344   REF  30  LAST  337   06,3676  1 5155 1           TCF    ENDOFJOB

 03441  REF   4  LAST  336   06,3677  3 0104 1           CA     FLAGWRD8         IF SURFACE FLAG IS SET, SET TEM1
 03442  REF   3  LAST  299   06,3700  7 4744 0           MASK   SURFFBIT         POSITIVE SO THAT THE ACCELERATION TERMS
 03443  REF   8  LAST  337   06,3701  54 141 1           TS     TEM1             WILL BE COMPENSATED.

 0345   REF   1              06,3702  3 7721 1           CAF    PRIO31           2 SECONDS SCALED (CS) X 2(+8)
 0346   REF   6  LAST  336   06,3703  57'074 0           XCH    1/PIPADT
 0347                        06,3704  4 0000 0           COM
 0348   REF   3  LAST  322   06,3705  6 1234 0           AD     PIPTIME +1
 0349   REF   1              06,3706  1 3610 1           TCF    NBD2


 0350   REF   3  LAST  335   06,3707  3 3537 0  GCOMPZER CAF    LGCOMP            ROUTINE TO ZERO GCOMP BEFORE FIRST
 0351   REF  10  LAST  330   06,3710  56 003 1           XCH    EBANK             CALL TO 1/PIPA
 0352   REF   3  LAST  330   06,3711  54 163 1           TS     MODE

 0353   REF  38  LAST  338   06,3712  3 4755 1           CAF    ZERO
 0354   REF   9  LAST  338   06,3713  55'477 0           TS     GCOMPSW
 0355   REF  17  LAST  338   06,3714  55'471 0           TS     GCOMP
 0356   REF  18  LAST  338   06,3715  55'472 0           TS     GCOMP +1
 0357   REF  19  LAST  338   06,3716  55'473 1           TS     GCOMP +2
 0358   REF  20  LAST  338   06,3717  55'474 0           TS     GCOMP +3
 0359   REF  21  LAST  338   06,3720  55'475 1           TS     GCOMP +4
 0360    REF  22  LAST  338   06,3721  55'476 1            TS      GCOMP +5
 0361    REF   3  LAST  330   06,3722  1 3361 1            TCF     IRIG1            RESTORE EBANK AND RETURN
```

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R0010   SUBROUTINE NAME:    V89CALL
R0011   MOD NO:  0                       DATE: 9 JAN 1968
R0012   MOD BY:  DIGITAL DEVEL GROUP     LOG SECTION: R63

R0013   FUNCTIONAL DESCRIPTION:

R0014   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED.  CALCULATES AND
R0015   DISPLAYS FINAL FDAI BALL ANGLES TO POINT LM +X OR +Z AXIS AT CSM.

R0016   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R0017   EXIT R63, OTHERWISE CONTINUE.

R0018   2. IF IN P00, DO IMU STATUS CHECK ROUTINE (R02BOTH). IF IMU ON AND ITS
R0019   ORIENTATION KNOWN TO LGC, CONTINUE.

R0020   3. FLASH DISPLAY V 04 N 06.  R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R0021   BE POINTED AT CSM.  INITIAL CHOICE IS PREFERRED (+Z) AXIS (R2=1).
R0022   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT = 1) BY V 22 E 2 E.  CONTINUE
R0023   AFTER KEYING IN PROCEED.

R0024   4. BOTH VEHICLE STATE VECTORS UPDATED BY CONIC EQS.

R0025   5. HALF MAGNITUDE UNIT LOS VECTOR (IN STABLE MEMBER COORDINATES) AND
R0026   HALF MAGNITUDE UNIT SPACECRAFT AXIS VECTOR (IN BODY COORDINATES)
R0027   PREPARED FOR VECPOINT.

R0028   6. GIMBAL ANGLES FROM VECPOINT TRANSFORMED INTO FDAI BALL ANGLES BY
R0029   BALLANGS. FLASH DISPLAY V 06 N 18 AND AWAIT RESPONSE.

R0030   7. RECYCLE - RETURN TO STEP 4.
R0031      TERMINATE - EXIT R63.
R0032      PROCEED - RESET 3AXISFLG AND CALL R60LEM FOR ATTITUDE MANEUVER.


R0033   CALLING SEQUENCE:  V 89 E.

R0034   SUBROUTINES CALLED:  CHKPOOH, R02BOTH, GOXDSPF, CSMCONIC, LEMCONIC,
R0035                        VECPOINT, BALLANGS, R60LEM.

R0036   NORMAL EXIT MODES:  TC ENDEXT

R0037   ALARMS:  1. OPERATOR ERROR IF NOT IN P00.
R0038            2. PROGRAM ALARM IF IMU IS OFF.
R0039            3. PROGRAM ALARM IF IMU ORIENTATION IS UNKNOWN.

R0040   OUTPUT:  NONE

R0041   ERASABLE INITIALIZATION REQUIRED:  NONE

R0042   DEBRIS:  OPTION1, +1, TDEC1, PCINTVSM, SCAXIS, CPHI, CTHETA, CPSI,
L          R63                                                                                    USER'S PAGE NO.   2       E0 S3

R0043              3AXISFLG.  .


 0044    REF    4  LAST  286   E4,1606                      EBANK= RONE
 0045                          32,2217                      BANK    32
 0046    REF    1              26,2000                      SETLOC  BAWLANGS
 0047                          26,2022                      BANK


 0048    REF    1                                           COUNT*  $$/R63
 0049    REF   61  LAST  338   26,2022  0 4616 1  V89CALL   TC      BANKCALL          IMU STATUS CHECK. RETURNS IF ORIENTATION
 0050    REF    1              26,2023   11233 0            CADR    R02BOTH           KNOWN. ALARMS IF NOT.
 0051    REF    3  LAST  296   26,2024  3 6250 0            CAF     THREE             ALLOW ASTRONAUT TO SELECT DESIRED
 0052    REF    8  LAST  307   26,2025  55'050 1            TS      OPTIONX           TRACKING ATTITUDE AXIS.
 0053    REF   15  LAST  306   26,2026  3 4753 1            CAF     ONE
 0054    REF    9  LAST  341   26,2027  55'051 0            TS      OPTIONX +1
 0055    REF    1              26,2030  3 2117 1            CAF     VB04N12           V 04 N 12
 0056    REF   62  LAST  341   26,2031  0 4616 1            TC      BANKCALL
 0057    REF    2  LAST  227   26,2032   20477 1            CADR    GOFLASH
 0058    REF   26  LAST  302   26,2033  0 5472 0            TC      ENDEXT            TERMINATE
 0059                          26,2034  0 2036 0            TC      +2                PROCEED
 0060                          26,2035  0 2030 0            TC      -5                DATA IN. OPTION1+1 = 1 FOR Z AXIS
 0061    REF   12  LAST  325   26,2036  0 6042 1  V89RECL   TC      INTPRET                              = 2 FOR X AXIS
 0062                          26,2037   43234 0            RTB     DAD
 0063    REF    2  LAST  209   26,2040   21574 1                    LOADTIME          READ PRESENT TIME
 00635   REF    1              26,2041   14122 0                    DP1MIN
 0064    REF    1              26,2042   02205 1            STORE   TSTART82          SAVE TIME FOR LEMCONIC CALL
 0065    REF    4  LAST  238   26,2043   34041 0            STCALL  TDEC1             STORE TIME FOR CSMCONIC CALL
 0066    REF    1              26,2044   27065 1                    CSMCONIC          CSM STATE VECTOR UPDATE
 0067                          26,2045   77775 1            VLOAD                     CSMCONIC LEFT R VECTOR IN RATT
 0068    REF    1              26,2046   00001 0                    RATT
 0069    REF    5  LAST  341   26,2047   16207 0            STODL   RONE              SAVE FOR LINE OF SIGHT (LOS) COMPUTATION
 0070    REF    2  LAST  341   26,2050   02205 1                    TSTART82
 0071    REF    5  LAST  341   26,2051   34041 0            STCALL  TDEC1             STORE TIME FOR LEMCONIC CALL
 0072    REF    1              26,2052   27077 1                    LEMCONIC          LEM STATE VECTOR UPDATE
 0073                          26,2053   52375 1            VLOAD   VSU               CSM POSITION - LEM POSITION = LOS
 0074    REF    6  LAST  341   26,2054   02207 0                    RONE              LOS VECTOR LEFT IN MPAC
 0075    REF    2  LAST  341   26,2055   00001 0                    RATT
 0076                          26,2056   47121 0            MXV     RTB               (REFSMMAT X LOS). TRANSFORMS LOS FROM
 0077    REF    6  LAST  211   26,2057   01734 0                    REFSMMAT          REFERENCE COORD TO STAB MEMB COORD.
 00771   REF    1              26,2060   21727 0                    NORMUNIT
 0078    REF    2  LAST  154   26,2061   03773 1            STORE   POINTVSM          STORE LOS FOR VECPOINT CALL
 0079                          26,2062   77776 1            EXIT
 0080    REF   10  LAST  341   26,2063  4 1051 0            CS      OPTIONX +1        1 FOR Z AXIS. 2 FOR X AXIS.
 0081    REF   16  LAST  341   26,2064  6 4753 1            AD      ONE
 0082                          26,2065  0 0006 1            EXTEND
 0083    REF    1              26,2066  1 2113 1            BZF     ALINEZ
 0084    REF   13  LAST  341   26,2067  0 6042 1  ALINEX    TC      INTPRET           X AXIS ALIGNMENT
 0085                          26,2070   77775 1            VLOAD
 0086    REF    4  LAST  301   26,2071   06522 1                    UNITX             READ (.5, 0, 0)
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L        R63                                                                               USER'S PAGE NO.   3      E4 S3

 0087    REF  11  LAST  252    26,2072   37765 1  V89CALL1 STCALL  SCAXIS            STORE SELECTED ALIGNMENT AXIS
 0088    REF   1               26,2073   56040 0                   VECPOINT          PUTS DESIRED GIM ANG (OG,IG,MG) IN TMPAC
 0089    REF   1               26,2074   00322 1           STORE   CPHI              STORE GIMBAL ANGLES FOR BALLANGS CALL
 0090                          26,2075   77776 1           EXIT
 00905   REF  63  LAST  341    26,2076  0 4616 1           TC      BANKCALL
 0091    REF   1               26,2077   54272 1           CADR    BALLANGS          PUTS DESIRED BALL ANGLES IN FDAIX,Y,Z
 0092    REF   1               26,2100  3 2120 0           CAF     V06N18            V 06 N 18
 0093    REF  64  LAST  342    26,2101  0 4616 1           TC      BANKCALL          NOUN 18 REFERS TO FDAIX,Y,Z
 0094    REF   3  LAST  341    26,2102   20477 1           CADR    GOFLASH
 0095    REF  27  LAST  341    26,2103  0 5472 0           TC      ENDEXT            TERMINATE
 0096                          26,2104  0 2106 1           TC      +2                PROCEED
 0097    REF   1               26,2105  0 2036 0           TC      V89RECL           RECYCLE
 0098    REF  31  LAST  300    26,2106  0 5516 0           TC      DOWNFLAG          RESET 3 AXIS FLAG
 0099    REF   2  LAST  231    26,2107   00124 0           ADRES   3AXISFLG          RESET BIT6 FLAG WORD 5
 0100    REF  65  LAST  342    26,2110  0 4616 1           TC      BANKCALL          PERFORMS LEM MANEUVER TO ALIGN SELECTED
 0101    REF   1               26,2111   54123 0           CADR    R60LEM            SPACECRAFT AXIS TO CSM.
 0102    REF  28  LAST  342    26,2112  1 5472 1           TCF     ENDEXT            TERMINATE R63


 0103    REF  14  LAST  341    26,2113  0 6042 1  ALINEZ   TC      INTPRET           Z AXIS ALIGNMENT
 0104                          26,2114   52175 0           VLOAD   GOTO
 0105    REF   4  LAST  301    26,2115   06516 0                   UNITZ             READ (0, 0, .5)
 0106    REF   1               26,2116   54072 0                   V89CALL1


 0107                          26,2117   01014 0  V04N12   VN      412
 0108                          26,2120   01422 1  V06N18   VN      0618
 01085                          26,2121   00000 1  OP1MIN    2DEC    6000
 01085                          26,2122   13560 0
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P0001    BLOCK 2 LGC ATTITUDE MANEUVER ROUTINE-KALCMANU


R0002    MOD 2              DATE  5/1/67     BY DON KEENE
R0003    PROGRAM DESCRIPTION

R0004         KALCMANU IS A ROUTINE WHICH GENERATES COMMANDS FOR THE LM DAP TO CHANGE THE ATTITUDE OF THE SPACECRAFT
R0006    DURING FREE FALL.  IT IS DESIGNED TO MANEUVER THE SPACECRAFT FROM ITS INITIAL ORIENTATION TO SOME DESIRED
R0008    ORIENTATION SPECIFIED BY THE PROGRAM WHICH CALLS KALCMANU, AVOIDING GIMBAL LOCK IN THE PROCESS.  IN THE
R0010    MOD 2 VERSION, THIS DESIRED ATTITUDE IS SPECIFIED BY A SET OF THREE COMMANDED CDU ANGLES STORED AS 2S COMPLEMENT
R0012    SINGLE PRECISION ANGLES IN THE THREE CONSECUTIVE LOCATIONS, CPHI, CTHETA, CPSI, WHERE

R0014         CPHI = COMMANDED OUTER GIMBAL ANGLE
R0015         CTHETA = COMMANDED INNER GIMBAL ANGLE
R0016         CPSI = COMMANDED MIDDLE GIMBAL ANGLE

R0017        WHEN POINTING A SPACECRAFT AXIS (E.I. X, Y, Z, THE AOT, THRUST AXIS, ETC) THE SUBROUTINE VECPOINT MAY BE
R0019    USED TO GENERATE THIS SET OF DESIRED CDU ANGLES (SEE DESCRIPTION IN R60)    -
R0021     WITH THIS INFORMATION KALCMANU DETERMINES THE DIRECTION OF THE SINGLE EQUIVALENT ROTATION (COF ALSO U) AND THE
R0023    MAGNITUDE OF THE ROTATION (AM) TO BRING THE S/C FROM ITS INITIAL ORIENTATION TO ITS FINAL ORIENTATION.
R0025    THIS DIRECTION REMAINS FIXED BOTH IN INERTIAL COORDINATES AND IN COMMANDED S/C AXES THROUGHOUT THE
R0027                     -
R0028    MANEUVER.  ONCE COF AND AM HAVE BEEN DETERMINED, KALCMANU THEN EXAMINES THE MANEUVER TO SEE IF IT WILL BRING
R0030                                        -
R0031    THE S/C THROUGH GIMBAL LOCK.  IF SO, COF AND AM ARE READJUSTED SO THAT THE S/C WILL JUST SKIM THE GIMBAL
R0033    LOCK ZONE AND ALIGN THE X-AXIS.  IN GENERAL A FINAL YAW  ABOUT X WILL BE NECESSARY TO COMPLETE THE MANEUVER.
R0035    NEEDLESS TO SAY, NEITHER THE INITIAL NOR THE FINAL ORIENTATION CAN BE IN GIMBAL LOCK.
R0037
R0038         FOR PROPER ATTITUDE CONTROL THE DIGITAL AUTOPILOT MUST BE GIVEN AN ATTITUDE REFERENCE WHICH IT CAN TRACK.
R0040    KALCMANU DOES THIS BY GENERATING A REFERENCE OF DESIRED GIMBAL ANGLES (CDUXD, CDUYD, CDUZD) WHICH ARE UPDATED
R0042    EVERY ONE SECOND DURING THE MANEUVER.  TO ACHIEVE A SMOOTHER SEQUENCE OF COMMANDS BETWEEN SUCCESSIVE UPDATES,
R0044    THE PROGRAM ALSO GENERATES A SET OF INCREMENTAL CDU ANGLES (DELDCDU) TO BE ADDED TO CDU DESIRED BY THE DIGITAL
R0046    AUTOPILOT.  KALCMANU ALSO CALCULATES THE COMPONENT MANEUVER RATES (OMEGAPD, OMEGAQD, OMEGARD), WHICH CAN
R0048                                      -
R0049    BE DETERMINED SIMPLY BY MULTIPLYING COF BY SOME SCALAR (ARATE) CORRESPONDING TO THE DESIRED ROTATIONAL RATE.
R0051
R0052         AUTOMATIC MANEUVERS ARE TIMED WITH THE HELP OF WAITLIST SO THAT AFTER A SPECIFIED INTERVAL THE Y AND Z
R0054    DESIRED RATES ARE SET TO ZERO AND THE DESIRED CDU ANGLES (CDUYD, CDUZD) ARE SET EQUAL TO THE FINAL DESIRED CDU
R0056    ANGLES (CTHETA, CPSI).  IF ANY YAW  REMAINS DUE TO GIMBAL LOCK AVOIDANCE, THE FINAL YAW  MANEUVER IS
R0058    CALCULATED AND THE DESIRED YAW  RATE SET TO SOME FIXED VALUE (ROLLRATE = + OR - 2 DEGREES PER SEC).
R0060    IN THIS CASE ONLY AN INCREMENTAL CDUX ANGLE (DELFROLL) IS SUPPLIED TO THE DAP.  AT THE END OF THE YAW
R0062    MANEUVER OR IN THE EVENT THAT THERE WAS NO FINAL YAW,  CDUXD IS SET EQUAL TO CPHI AND THE X-AXIS DESIRED
R0064    RATE SET TO ZERO.  THUS, UPON COMPLETION OF THE MANEUVER THE S/C WILL FINISH UP IN A LIMIT CYCLE ABOUT THE
R0066    DESIRED FINAL GIMBAL ANGLES.


R0067    PROGRAM LOGIC FLOW

R0068         KALCMANU IS CALLED AS A HIGH PRIORITY JOB WITH ENTRY POINTS AT KALCMAN3 AND VECPOINT.  IT FIRST PICKS
R0070    UP THE CURRENT CDU ANGLES TO BE USED AS THE BASIS FOR ALL COMPUTATIONS INVOLVING THE INITIAL S/C ORIENTATION.
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R0072   IT THEN DETERMINES THE DIRECTION COSINE MATRICES RELATING BOTH THE INITIAL AND FINAL S/C ORIENTATION TO STABLE
R0074                 *    *                                                                              *
R0076   MEMBER AXES (MIS, MFS).  IT ALSO COMPUTES THE MATRIX RELATING FINAL S/C AXES TO INITIAL S/C AXES (MFI).  THE
R0078   ANGLE OF ROTATION (AM) IS THEN EXTRACTED FROM THIS MATRIX, AND TESTS ARE MADE TO DETERMINE IF
R0080
R0081        A)  AM LESS THAN .25 DEGREES (MINANG)
R0082        B)  AM GREATER THAN 170 DEGREES (MAXANG)

R0083        IF AM LESS THAN .25 DEGREES, NO COMPLICATED AUTOMATIC MANEUVERING IS NECESSARY.  THEREFORE WE CAN SIMPLY
R0085   SET CDU DESIRED EQUAL TO THE FINAL CDU DESIRED ANGLES AND TERMINATE THE JOB.
R0087
R0088        IF AM IS GREATER THAN .25 DEGREES BUT LESS THAN 170 DEGREES, THE AXES OF THE SINGLE EQUIVALENT ROTATION
R0090     -                                                    *
R0091   (COF) IS EXTRACTED FROM THE SKEW SYMMETRIC COMPONENTS OF MFI.                                  *     *
R0093        IF AM GREATER THAN 170 DEGREES AN ALTERNATE METHOD EMPLOYING THE SYMMETRIC PART OF MFI (MFISYM) IS USED
R0095                 -
R0096   TO DETERMINE COF.

R0097        THE PROGRAM THEN CHECKS TO SEE IF THE MANEUVER AS COMPUTED WILL BRING THE S/C THROUGH GIMBAL LOCK.  IF
R0099   SO, A NEW MANEUVER IS CALCULATED WHICH WILL JUST SKIM THE GIMBAL LOCK ZONE AND ALIGN THE S/C X-AXIS.  THIS
R0101   METHOD ASSURES THAT THE ADDITIONAL MANEUVERING TO AVOID GIMBAL LOCK WILL BE KEPT TO A MINIMUM   SINCE A FINAL
R0103   P AXIS YAW WILL BE NECESSARY, A SWITCH IS RESET (STATE SWITCH 31) TO ALLOW FOR THE COMPUTATION OF THIS FINAL
R0105   YAW.

R0106        AS STATED PREVIOUSLY KALCMANU GENERATES A SEQUENCE OF DESIRED GIMBAL ANGLES WHICH ARE UPDATED EVERY
R0108                                                                                                -
R0110   SECOND.  THIS IS ACCOMPLISHED BY A SMALL ROTATION OF THE DESIRED S/C FRAME ABOUT THE VECTOR COF.  THE NEW
R0112   DESIRED REFERENCE MATRIX IS THEN,

R0113                    *              *         *
R0114                   MIS        =   MIS       DEL
R0115                      N+1             N

R0116          *
R0117   WHERE DEL IS THE MATRIX CORRESPONDING TO THIS SMALL ROTATION.  THE NEW CDU ANGLES CAN THEN BE EXTRACTED
R0119         *
R0120   FROM MIS.

R0121        AT THE BEGINNING OF THE MANEUVER THE AUTOPILOT DESIRED RATES (OMEGAPD, OMEGAQD, OMEGARD) AND THE
R0123   MANEUVER TIMINGS ARE ESTABLISHED.  ON THE FIRST PASS AND ON ALL SUBSEQUENT UPDATES THE CDU DESIRED
R0125   ANGLES ARE LOADED WITH THE APPROPRIATE VALUES AND THE INCREMENTAL CDU ANGLES ARE COMPUTED.  THE AGC CLOCKS
R0127   (TIME1 AND TIME2) ARE THAN CHECKED TO SEE IF THE MANEUVER WILL TERMINATE BEFORE THE NEXT UPDATE.  IF
R0129   NOT, KALCMANU CALLS FOR ANOTHER UPDATE (RUN AS A JOB WITH PRIORITY TBD) IN ONE SECOND.  ANY DELAYS IN THIS
R0131   CALLING SEQUENCE ARE AUTOMATICALLY COMPENSATED IN CALLING FOR THE NEXT UPDATE.
R0133
R0134        IF IT IS FOUND THAT THE MANEUVER IS TO TERMINATE BEFORE THE NEXT UPDATE A ROUTINE IS CALLED (AS A WAIT-
R0136   LIST TASK) TO STOP THE MANEUVER AT THE APPROPRIATE TIME AS EXPLAINED ABOVE.
R0138
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L         ATTITUDE MANEUVER ROUTINE                                                        USER'S PAGE NO.   3      EC S3

R0139     CALLING SEQUENCE

R0140          IN ORDER TO PERFORM A KALCMANU SUPERVISED MANEUVER, THE COMMANDED GIMBAL ANGLES MUST BE PRECOMPUTED AND
R0142     STORED IN LOCATIONS CPHI, CTHETA, CPSI.  THE USER:S PROGRAM MUST THEN CLEAR STATE SWITCH NO 33 TO ALLOW THE
R0144     ATTITUDE MANEUVER ROUTINE TO PERFORM ANY FINAL P-AXIS YAW INCURRED BY AVOIDING GIMBAL LOCK.  THE MANEUVER IS
R0146     THEN INITIATED BY ESTABLISHING THE FOLLOWING EXECUTIVE JOB

R0147                                *
R0148          CAF      PRIO    XX
R0149                           --
R0150          INHINT
R0151          TC         EINOVAC
R0152          2CADR      KALCMAN3
R0153          RELINT

R0154     THE USER:S PROGRAM MAY EITHER CONTINUE OR WAIT FOR THE TERMINATION OF THE MANEUVER.  IF THE USER WISHES TO
R0156     WAIT, HE MAY PUT HIS JOB TO SLEEP WITH THE FOLLOWING INSTRUCTIONS

R0157          L          TC         BANKCALL
R0158          L+1        CADR       ATTSTALL
R0159          L+2        (BAD       RETURN)
R0160          L+3        (GOOD      RETURN)

R0161          UPON COMPLETION OF THE MANEUVER, THE PROGRAM WILL BE AWAKENED AT L+3 IF THE MANEUVER WAS COMPLETED
R0163     SUCCESSFULLY, OR AT L+2 IF THE MANEUVER WAS ABORTED.  THIS ABORT WOULD OCCUR IF THE INITIAL OR FINAL ATTITUDE
R0165     WAS IN GIMBAL LOCK.

R0166     ***NOTA BENE***  IT IS ASSUMED THAT THE DESIRED MANEUVERING RATE (0.5, 2, 5, 10, DEG/SEC) HAS BEEN SELECTED BY
R0168     KEYBOARD ENTRY PRIOR TO THE EXECUTION OF KALCMANU.
R0169         IT IS ALSO ASSUMED THAT THE AUTOPILOT IS IN THE AUTO MODE.  IF THE MODE SWITCH IS CHANGED DURING THE
R0171     MANEUVER, KALCMANU WILL TERMINATE VIA GOODEND WITHIN 1 SECOND SO THAT R60 MAY REQUEST A TRIM OF THE S/C ATTITUDE
R0173     THIS IS THE ONLY MEANS FOR MANUALLY TERMINATING A KALCMANU SUPERVISED MANEUVER.
R0175     SUBROUTINES

R0176          KALCMANU USES A NUMBER OF INTERPRETIVE SUBROUTINES WHICH MAY BE OF GENERAL INTEREST.  SINCE THESE ROUTINES
R0178     WERE PROGRAMMED EXCLUSIVELY FOR KALCMANU, THEY ARE NOT, AS YET, GENERALLY AVAILABLE FOR USE BY OTHER PROGRAMS.
R0180
R0181          MXM3
R0182          ----

R0183          THIS SUBROUTINE MULTIPLIES TWO 3X3 MATRICES AND LEAVES THE RESULT IN THE FIRST 18 LOCATIONS OF THE PUSH
R0185     DOWN LIST, I.E.,

R0186                         (M     M     M )
R0187                         ( 0     1     2)
R0188          *              (              )       *          *
R0189          M     =        (M     M     M )  =    M1    X    M2
R0190                         ( 3     4     5)
R0191                         (              )
R0192                         (M     M     M )
```

```
R0193                  (.6    7    8)

R0194                                                                                                *
R0196        INDEX REGISTER X1 MUST BE LOADED WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR M1, AND X2 MUST BE
R0198                                                           *
R0199   LOADED WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR M2.   THE ROUTINE USES THE FIRST 20 LOCATIONS OF THE PUSH
R0201   DOWN LIST.  THE FIRST ELEMENT OF THE MATRIX APPEARS IN PD0.  PUSH UP FOR M .
R0203                                                                             8
R0205
R0206        TRANSPOS
R0207        --------

R0208        THIS ROUTINE TRANSPOSES A 3X3 MATRIX AND LEAVES THE RESULT IN THE PUSH DOWN LIST, I.E.,
R0210
R0211         *         * T
R0212         M    =    M1

R0213   INDEX REGISTER X1 MUST CONTAIN THE COMPLEMENT OF THE STARTING ADDRESS FOR M1.  PUSH UP FOR THE FIRST AND SUB-
R0215                         *
R0216   SEQUENT COMPONENTS OF M.   THIS SUBROUTINE ALSO USES THE FIRST 20 LOCATIONS OF THE PUSH DOWN LIST.
R0218
R0219        CDU TO DCM
R0220        ----------

R0221        THIS SUBROUTINE CONVERTS THREE CDU ANGLES IN T(MPAC) TO A DIRECTION COSINE MATRIX (SCALED BY 2) RELATING
R0223   THE CORRESPONDING S/C ORIENTATIONS TO THE STABLE MEMBER FRAME.  THE FORMULAS FOR THIS CONVERSION ARE
R0225
R0226         M    =    COSY  COSZ
R0227          0

R0228         M    =   -COSY  SINZ  COSX  +  SINY  SINX
R0229          1

R0230         M    =    COSY  SINZ  SINX  +  SINY  COSX
R0231          2

R0232         M    =    SINZ
R0233          3

R0234         M    =    COSZ  COSX
R0235          4

R0236         M    =   -COSZ  SINX
R0237          5

R0238         M    =   -SINY  COSZ
R0239          6

R0240         M    =    SINY  SINZ  COSX  +  COSY  SINX
R0241          7
```

```
L        ATTITUDE MANEUVER ROUTINE                                                            USER'S PAGE NO.   5      ED 53

R0242          M     =    -SINY  SINZ  SINX  +  COSY  COSX
R0243           B

R0244    WHERE       X     =    OUTER GIMBAL ANGLE
R0245                Y     =    INNER GIMBAL ANGLE
R0246                Z     =    MIDDLE GIMBAL ANGLE

R0247          THE INTERPRETATION OF THIS MATRIX IS AS FOLLOWS

R0248          IF A , A , A  REPRESENT THE COMPONENTS OF A VECTOR IN S/C AXES THEN THE COMPONENTS OF THE SAME VECTOR IN
R0250              X   Y   Z
R0251    STABLE MEMBER AXES (B , B , B ) ARE
R0252                        X   Y   Z

R0253                (B )               (A )
R0254                ( X)               ( X)
R0255                (  )               (  )
R0256                (  )           *   (  )
R0257                (B )     =     M   (A )
R0258                ( Y)               ( Y)
R0259                (  )               (  )
R0260                (B )               (A )
R0261                ( Z)               ( Z)

R0262         THE SUBROUTINE WILL STORE THIS MATRIX IN SEQUENTIAL LOCATIONS OF ERASABLE MEMORY AS SPECIFIED BY THE CALLING
R0264                                                                                                                 *
R0266    PROGRAM.  TO DO THIS THE CALLING PROGRAM MUST FIRST LOAD X2 WITH THE COMPLEMENT OF THE  STARTING ADDRESS FOR M.
R0268
R0269          INTERNALLY, THE ROUTINE USES THE FIRST 16 LOCATIONS OF THE PUSH DOWN LIST, ALSO STEP REGISTER S1 AND INDEX
R0271    REGISTER X2.


R0272          DCM TO CDU
R0273          ----------
R0274                                                                   *
R0276          THIS ROUTINE EXTRACTS THE CDU ANGLES FROM A DIRECTION COSINE MATRIX (M SCALED BY 2) RELATING S/C AXIS TO
R0278                                                                              *
R0280    STABLE MEMBER AXES.  X1 MUST CONTAIN THE COMPLEMENT OF THE STARTING ADDRESS FOR M.  THE SUBROUTINE LEAVES THE
R0282    CORRESPONDING GIMBAL ANGLES IN V(MPAC) AS DOUBLE PRECISION 1'S COMPLEMENT ANGLES SCALED BY 2PI.  THE FORMULAS
R0284    FOR THIS CONVERSION ARE

R0285           Z     =    ARCSIN (M )
R0286                               3

R0287           Y     =    ARCSIN (-M /COSZ)
R0288                                6

R0289    IF M  IS NEGATIVE, Y IS REPLACED BY PI SGN Y - Y
R0290        0
```

```
R0291         X    =    ARCSIN (-M /COSZ)
R0292                               5

R0293   IF M  IS NEGATIVE X IS REPLACED BY PI SGN X - X
R0294       4

R0295        THIS ROUTINE DOES NOT SET THE PUSH DOWN POINTER, BUT USES THE NEXT 8 LOCATIONS OF THE PUSH DOWN LIST AND
R0297   RETURNS THE POINTER TO ITS ORIGINAL SETTING.  THIS PROCEDURE ALLOWS THE CALLER TO STORE THE MATRIX AT THE TOP OF
R0299   THE PUSH DOWN LIST.


R0300        DELCOMP
R0301        -------

R0302                                                             *
R0303        THIS ROUTINE COMPUTES THE DIRECTION COSINE MATRIX (DEL) RELATING ON
R0304                                                                                  -
R0306   IS ROTATED WITH RESPECT TO THE FIRST BY AN ANGLE, A, ABOUT A UNIT VECTOR, U.  THE FORMULA FOR THIS MATRIX IS
R0308
R0309         *         *           --T           *
R0310         DEL  =    I  COSA  +  UU (1-COSA) + V SINA
R0311                                              X

R0312   WHERE      *        (1    0    0)
R0313              I   =    (0    1    0)
R0314                       (0    0    1)


R0315                         2
R0316                       (U       U U       U U )
R0317                       ( X       X Y       X Z)
R0318                       (                      )
R0319             --T       (          2           )
R0320             UU   =    (U U     U         U U )
R0321                       ( Y X     Y         Y Z)
R0322                       (                      )
R0323                       (                     2 )
R0324                       (U U     U U       U  )
R0325                       ( Z X     Z Y       Z  )


R0326                       (0       -U        U  )
R0327                       (          Z        Y )
R0328              *        (                     )
R0329              V   =    (U       0        -U  )
R0330               X       ( Z                 X)
R0331                       (                     )
R0332                       (-U      U        0   )
R0333                       (  Y      X           )
```

```
L       ATTITUDE MANEUVER ROUTINE                                                    USER'S PAGE NO.   7       EO S3

R0334                  -
R0335                  U    =    UNIT ROTATION VECTOR RESOLVED INTO S/C AXES
R0336                  A    =    ROTATION ANGLE

R0337                                *
R0338        THE INTERPRETATION OF DEL IS AS FOLLOWS

R0339        IF A , A , A  REPRESENT THE COMPONENT OF A VECTOR IN THE ROTATED FRAME, THEN THE COMPONENTS OF THE SAME
R0341            X   Y   Z
R0342   VECTOR IN THE ORIGINAL S/C AXES (B , B , B ) ARE
R0343                                     X   Y   Z

R0344              (B )                          (A )
R0345              ( X)                          ( X)
R0346              (  )               *          (  )
R0347              (B )      =      DEL          (A )
R0348              ( Y)                          ( Y)
R0349              (  )                          (  )
R0350              (B )                          (A )
R0351              ( Z)                          ( Z)

R0352        THE ROUTINE WILL STORE THIS MATRIX (SCALED UNITY) IN SEQUENTIAL LOCATIONS OF ERASABLE MEMORY BEGINNING WITH
R0354                                                                                                    -
R0356   THE LOCATION CALLED DEL.  IN ORDER TO USE THE ROUTINE, THE CALLING PROGRAM MUST FIRST STORE U (A HALF UNIT
R0358   DOUBLE PRECISION VECTOR) IN THE SET OF ERASABLE LOCATIONS BEGINNING WITH THE ADDRESS CALLED COF.  THE ANGLE, A,
R0360   MUST THEN BE LOADED INTO D(MPAC).

R0361        INTERNALLY, THE PROGRAM ALSO USES THE FIRST 10 LOCATIONS OF THE PUSH DOWN LIST.
R0363


R0364        READCDUK
R0365        --------

R0366        THIS BASIC LANGUAGE SUBROUTINE LOADS T(MPAC) WITH THE THREE CDU ANGLES.
R0368


R0369       SIGNMPAC
R0370        --------

R0371        THIS IS A BASIC LANGUAGE SUBROUTINE WHICH LIMITS THE MAGNITUDE OF D(MPAC) TO + OR - DPOSMAX ON OVERFLOW.
R0373


R0374        PROGRAM STORAGE ALLOCATION

R0375              1)   FIXED MEMORY                       1059 WORDS
R0376              2)   ERASABLE MEMORY                      98
R0377              3)   STATE SWITCHES                        3
```

```
R0378                 4)    FLAGS                                1


R0379           JOB PRIORITIES

R0380                 1)    KALCMANU                           TBD
R0381                 2)    ONE SECOND UPDATE                  TBD


R0382           SUMMARY OF STATE SWITCHES AND FLAGWORDS USED BY KALCMANU.


R0383     STATE                 FLAGWRD 2       SETTING              MEANING
R0384     SWITCH NO.             BIT NO.

R0385       *
R0386     31                       14              0        MANEUVER WENT THROUGH GIMBAL LOCK
R0388                                              1        MANEUVER DID NOT GO THROUGH GIMBAL LOCK
R0390
R0391       *
R0392     32                       13              0        CONTINUE UPDATE PROCESS
R0393                                              1        START UPDATE PROCESS

R0394     33                       12              0        PERFORM FINAL P-AXIS YAW IF REQUIRED
R0396                                              1        IGNORE ANY FINAL P-AXIS YAW
R0398
R0399     34                       11              0        SIGNAL END OF KALCMANU
R0400                                              1        KALCMANU IN PROCESS        USER MUST SET SWITCH BEFORE INITIATING


R0402              *  INTERNAL TO KALCMANU


R0403           SUGGESTIONS FOR PROGRAM INTEGRATION

R0404           THE FOLLOWING VARIABLES SHOULD BE ASSIGNED TO UNSWITCH ERASABLE

R0405                           CPHI
R0406                           CTHETA
R0407                           CPSI
R0408                           POINTVSM  +5
R0409                           SCAXIS    +5
R0410                           DELDCDU
R0411                           DELDCDU1
R0412                           DELDCDU2
R0413                           RATEINDX

R0414           THE FOLLOWING SUBROUTINES MAY BE PUT IN A DIFFERENT BANK

R0415                           MXM3
```

```
R0416                   TRANSFCS
R0417                   SIGNMPAC
R0418                   READCDUK
R0419                   CDUTODCM
```

```
 0420                          15,2050                       BANK    15
 0421    REF   1               22,2000                       SETLOC  KALCMON1
 0422                          22,2004                       BANK

 0423    REF   3  LAST  288    E6,1675                       EBANK=  BCDU

R0424    THE THREE DESIRED CDU ANGLES MUST BE STORED AS SINGLE PRECISION TWOS COMPLEMENT ANGLES IN THE THREE SUCCESSIVE
R0426    LOCATIONS, CPHI, CTHETA, CPSI.

 0427    REF   1                                             COUNT*  $$/KALC
 0428    REF  15  LAST  342    22,2004   06042 1  KALCMAN3   TC      INTPRET           PICK UP THE CURRENT CDU ANGLES AND
 0429                          22,2005   77634 0             RTB                         COMPUTE THE MATRIX FROM INITIAL S/C
 0430    REF   1               22,2006   44403 0                     READCDUK            AXES TO FINAL S/C AXES
 0431    REF   4  LAST  353    22,2007   03276 1             STORE   BCDU              STORE INITIAL S/C ANGLES
 0437                          22,2010   51535 0             SLOAD   ABS               CHECK THE MAGNITUDE OF THE DESIRED
 0438    REF   1               22,2011   00324 1                     CPSI              MIDDLE GIMBAL ANGLE
 0439                          22,2012   51025 1             DSU     BPL
 0440    REF   1               22,2013   04403 1                     LOCKANGL          IF GREATER THAN 70 DEG ABORT MANEUVER
 0441    REF   1               22,2014   44724 0                     TOOBADF
 0442                          22,2015   72364 0             AXC,2   TLOAD
 0443    REF   4  LAST  137    22,2016   03245 1                     MIS
 0444    REF   5  LAST  353    22,2017   03276 1                     BCDU
 0445                          22,2020   77624 1             CALL                      COMPUTE THE TRANSFORMATION FROM INITIAL
 0446    REF   1               22,2021   44410 1                     CDUTODCM          S/C AXES TO STABLE MEMBER AXES
 0447                          22,2022   72364 0             AXC,2   TLOAD
 0448    REF   4  LAST  117    22,2023   02230 1                     MFS               PREPARE TO CALCULATE ARRAY MFS
 0449    REF   2  LAST  342    22,2024   00322 1                     CPHI
 0450                          22,2025   77624 1             CALL
 0451    REF   2  LAST  353    22,2026   44410 1                     CDUTODCM
 0452                          22,2027   45160 1  SECAD      AXC,1   CALL              MIS AND MFS ARRAYS CALCULATED         $2
 0453    REF   5  LAST  353    22,2030   03245 1                     MIS
 0454    REF   1               22,2031   44326 0                     TRANSPOS
 0455                          22,2032   45575 1             VLOAD   STADR
 0456    REF  12  LAST  136    22,2033   50460 0             STOVL   TMIS +12D
 0457                          22,2034   77626 0             STADR
 0458    REF  13  LAST  353    22,2035   50466 0             STOVL   TMIS +6
 0459                          22,2036   77626 0             STADR
 0460    REF  14  LAST  353    22,2037   74474 0             STORE   TMIS              TMIS = TRANSPOSE(MIS) SCALED BY 2
 0461                          22,2040   75160 1             AXC,1   AXC,2
 0462    REF  15  LAST  353    22,2041   03302 0                     TMIS
 0463    REF   5  LAST  353    22,2042   02230 1                     MFS
 0464                          22,2043   77624 1             CALL
 0465    REF   1               22,2044   44312 1                     MXM3
 0466                          22,2045   45575 1             VLOAD   STADR
 0467    REF   1               22,2046   51532 1             STOVL   MFI +12D
 0468                          22,2047   77626 0             STADR
 0469    REF   2  LAST  353    22,2050   51540 1             STOVL   MFI +6
 0470                          22,2051   77626 0             STADR
 0471    REF   3  LAST  353    22,2052   75546 1             STORE   MFI               MFI = TMIS MFS (SCALED BY 4)
 0472                          22,2053   45001 1             SETPD   CALL              TRANSPOSE MFI IN PD LIST
 0473                            22,2054    00023 0                    18D
 0474    REF    1                22,2055    44335 1                    TRNSPSPD
 0475                            22,2056    45575 1           VLOAD    STADR
 0476    REF    1                22,2057    50460 0           STOVL    TMFI +12D
 0477                            22,2060    77626 0           STADR
 0478    REF    2  LAST   354    22,2061    50466 0           STOVL    TMFI +6
 0479                            22,2062    77626 0           STADR
 0480    REF    3  LAST   354    22,2063    74474 0           STORE    TMFI               TMFI = TRANSPOSE (MFI)  SCALED BY 4
R0481
R0482    CALCULATE COFSKEW AND MFISYM
R0483
 0484                            22,2064    45345 1           DLOAD    DSU
 0485    REF    4  LAST   354    22,2065    03305 1                    TMFI +2
 0486    REF    4  LAST   353    22,2066    02233 1                    MFI +2
 0487                            22,2067    45325 1           PDDL     DSU                CALCULATE COF SCALED BY 2/SIN(AM)
 0488    REF    5  LAST   354    22,2070    02235 1                    MFI +4
 0489    REF    5  LAST   354    22,2071    03307 0                    TMFI +4
 0490                            22,2072    45325 1           PDDL     DSU
 0491    REF    6  LAST   354    22,2073    03315 0                    TMFI +10D
 0492    REF    6  LAST   354    22,2074    02243 0                    MFI +10D
 0493                            22,2075    77666 1           VDEF
 0494    REF    5  LAST   136    22,2076    03325 0           STORE    COFSKEW            EQUALS MFISKEW
R0495
R0496    CALCULATE AM AND PROCEED ACCORDING TO ITS MAGNITUDE
R0497
 0498                            22,2077    43345 1           DLOAD    DAD
 0499    REF    7  LAST   354    22,2100    02231 0                    MFI
 0500    REF    8  LAST   354    22,2101    02251 0                    MFI +16D
 0501                            22,2102    43225 0           DSU      DAD
 0502    REF    2  LAST    37    22,2103    06514 1                    DP1/4TH
 0503    REF    9  LAST   354    22,2104    02241 1                    MFI +8D
 0504    REF    2  LAST   136    22,2105    03333 1           STORE    CAM                CAM = (MFI0+MFI4+MFI8-1)/2 HALF SCALE
 0505                            22,2106    77726 1           ARCCOS
 0506    REF    1                22,2107    03335 1           STORE    AM                 AM=ARCCOS(CAM)  (AM SCALED BY 2)
 0507                            22,2110    51025 1           DSU      BPL
 0508    REF    1                22,2111    04363 0                    MINANG
 0509    REF    1                22,2112    44117 0                    CHECKMAX
 0510                            22,2113    77751 1           TLOAD                       MANEUVER LESS THAN .25 DEGREES
 0511    REF    3  LAST   353    22,2114    00322 1                    CPHI               GO DIRECTLY INTO ATTITUDE HOLD
 0512    REF    6  LAST   197    22,2115    37235 1           STCALL   CDUXD              ABOUT COMMANDED ANGLES
 0513    REF    1                22,2116    44742 0                    TOOBADI            STOP RATE AND EXIT

 0514                            22,2117    45345 1  CHECKMAX DLOAD    DSU
 0515    REF    2  LAST   354    22,2120    03335 1                    AM
 0516    REF    1                22,2121    04365 0                    MAXANG
 0517                            22,2122    77244 0           BPL      VLOAD
 0518    REF    1                22,2123    44131 1                    ALTCALC            UNIT
 0519    REF    6  LAST   354    22,2124    03325 0                    COFSKEW            COFSKEW
 0520                            22,2125    77656 1           UNIT
 0521    REF    1                22,2126    03270 1           STORE    COF                COF IS THE MANEUVER AXIS
 0522                        22,2127   77650 1            GOTD                    SEE IF MANEUVER GOES THRU GIMBAL LOCK
 0523   REF    1             22,2130   44744 0                    LOCSKIRT
 0524                        22,2131   53375 0  ALTCALC   VLDAD   VAD             IF AM GREATER THAN 170 DEGREES
 0525   REF   10  LAST  354  22,2132   02231 0                    MFI
 0526   REF    7  LAST  354  22,2133   03303 1                    TMFI
 0527                        22,2134   77762 1            VSR1
 0528   REF    1             22,2135   27303 1            STCVL   MFISYM
 0529   REF   11  LAST  355  22,2136   02237 0                    MFI +6
 0530                        22,2137   74455 0            VAD     VSR1
 0531   REF    8  LAST  355  22,2140   03311 1                    TMFI +6
 0532   REF    2  LAST  355  22,2141   27311 1            STOVL   MFISYM +6
 0533   REF   12  LAST  355  22,2142   02245 0                    MFI +12D
 0534                        22,2143   74455 0            VAD     VSR1
 0535   REF    9  LAST  355  22,2144   03317 1                    TMFI +12D
 0536   REF    3  LAST  355  22,2145   03317 1            STCRE   MFISYM +12D     MFISYM=(MFI+TMFI)/2  SCALED BY 4
R0537
R0538
R0539   CALCULATE COF
R0540
 0541                        22,2146   70545 1            DLOAD   SR1
 0542   REF    3  LAST  354  22,2147   03333 1                    CAM
 0543                        22,2150   45325 1            PDDL    DSU             PD0 CAM                                  $4
 0544   REF    1             22,2151   06522 1                    DPHALF
 0545   REF    4  LAST  355  22,2152   03333 1                    CAM
 0546                        22,2153   65204 1            BOVB    PDDL            PD2 1 - CAM                              $2
 0547   REF    1             22,2154   21713 1                    SIGNMPAC
 0548   REF    4  LAST  355  22,2155   03323 0                    MFISYM +16D
 0549                        22,2156   56225 1            DSU     DDV
 0550                        22,2157   00001 0                    0
 0551                        22,2160   00003 1                    2
 0552                        22,2161   65366 1            SQRT    PDDL            COFZ = SQRT(MFISYM8-CAM)/1-CAM)
 0553   REF    5  LAST  355  22,2162   03313 0                    MFISYM +8D                                    $ ROOT 2
 0554                        22,2163   56225 1            DSU     DDV
 0555                        22,2164   00001 0                    0
 0556                        22,2165   00003 1                    2
 0557                        22,2166   65366 1            SQRT    PDDL            COFY = SQRT(MFISYM4-CAM)/(1-CAM)  $ROOT2
 0558   REF    6  LAST  355  22,2167   03303 1                    MFISYM
 0559                        22,2170   56225 1            DSU     DDV
 0560                        22,2171   00001 0                    0
 0561                        22,2172   00003 1                    2
 0562                        22,2173   55566 1            SQRT    VDEF            COFX = SQRT(MFISYM-CAM)/(1-CAM)  $ROOT 2
 0563                        22,2174   77656 1            UNIT
 0564   REF    2  LAST  354  22,2175   03270 1            STORE   COF
R0565
R0566   DETERMINE  LARGEST COF AND ADJUST ACCORDINGLY
R0567
 0568                        22,2176   45345 1  COFMAXGO  DLOAD   DSU
 0569   REF    3  LAST  355  22,2177   03270 1                    COF
 0570   REF    4  LAST  355  22,2200   03272 0                    COF +2
 0571                        22,2201   71240 1            BMN     DLOAD           COFY G COFX
 0572   REF    1              22,2202   44211 0                     COMP12
 0573   REF    5  LAST   355  22,2203   03270 1                     COF
 0574                         22,2204   50025 0             DSU     BMN
 0575   REF    6  LAST   356  22,2205   03274 0                     COF +4
 0576   REF    1              22,2206   44266 0                     METHOD3         COFZ G COFX OR COFY
 0577                         22,2207   77650 1             GOTO
 0578   REF    1              22,2210   44242 0                     METHOD1         COFX G COFY OR COFZ
 0579                         22,2211   45345 1  COMP12     DLOAD   DSU
 0580   REF    7  LAST   356  22,2212   03272 0                     COF +2
 0581   REF    8  LAST   356  22,2213   03274 0                     COF +4
 0582                         22,2214   77640 0             BMN
 0583   REF    2  LAST   356  22,2215   44266 0                     METHOD3         COFZ G COFY OR COFX

 0584                         22,2216   51145 0  METHOD2    DLOAD   BPL             COFY MAX
 0585   REF    7  LAST   354  22,2217   03327 1                     COFSKEW +2      UY
 0586   REF    1              22,2220   44224 0                     U2POS
 0587                         22,2221   57575 1             VLOAD   VCOMP
 0588   REF    9  LAST   356  22,2222   03270 1                     COF
 0589   REF   10  LAST   356  22,2223   03270 1             STORE   COF
 0590                         22,2224   51145 0  U2POS      DLOAD   BPL
 0591   REF    7  LAST   355  22,2225   03305 1                     MFISYM +2       UX UY
 0592   REF    1              22,2226   44232 1                     OKU21
 0593                         22,2227   57545 1             DLOAD   DCOMP           SIGN OF UX OPPOSITE TO UY
 0594   REF   11  LAST   356  22,2230   03270 1                     COF
 0595   REF   12  LAST   356  22,2231   03270 1             STORE   COF
 0596                         22,2232   51145 0  OKU21      DLOAD   BPL
 0597   REF    8  LAST   356  22,2233   03315 0                     MFISYM +10D     UY UZ
 0598   REF    2  LAST   355  22,2234   44744 0                     LOCSKIRT
 0599                         22,2235   57545 1             DLOAD   DCOMP           SIGN OF UZ OPPOSITE TO UY
 0600   REF   13  LAST   356  22,2236   03274 0                     COF +4
 0601   REF   14  LAST   356  22,2237   03274 0             STORE   COF +4
 0602                         22,2240   77650 1             GOTO
 0603   REF    3  LAST   356  22,2241   44744 0                     LOCSKIRT
 0604                         22,2242   51145 0  METHOD1    DLOAD   BPL             COFX MAX
 0605   REF    8  LAST   356  22,2243   03325 0                     COFSKEW         UX
 0606   REF    1              22,2244   44250 0                     U1POS
 0607                         22,2245   57575 1             VLOAD   VCOMP
 0608   REF   15  LAST   356  22,2246   03270 1                     COF
 0609   REF   16  LAST   356  22,2247   03270 1             STORE   COF
 0610                         22,2250   51145 0  U1POS      DLOAD   BPL
 0611   REF    9  LAST   356  22,2251   03305 1                     MFISYM +2       UX UY
 0612   REF    1              22,2252   44256 0                     OKU12
 0613                         22,2253   57545 1             DLOAD   DCOMP
 0614   REF   17  LAST   356  22,2254   03272 0                     COF +2          SIGN OF UY OPPOSITE TO UX
 0615   REF   18  LAST   356  22,2255   03272 0             STORE   COF +2
 0616                         22,2256   51145 0  OKU12      DLOAD   BPL
 0617   REF   10  LAST   356  22,2257   03307 0                     MFISYM +4       UX UZ
 0618   REF    4  LAST   356  22,2260   44744 0                     LOCSKIRT
 0619                         22,2261   57545 1             DLOAD   DCOMP           SIGN OF UZ OPPOSITE TO UY
 0620   REF   19  LAST   356  22,2262   03274 0                     COF +4
 0621   REF  20  LAST  356    22,2263    03274 0                STORE  COF +4
 0622                         22,2264    77650 1                GOTO
 0623   REF   5  LAST  356    22,2265    44744 0                       LOCSKIRT
 0624                         22,2266    51145 0  METHOD3       DLOAD  BPL              COFZ MAX
 0625   REF   9  LAST  356    22,2267    03331 0                       COFSKEW +4       UZ
 0626   REF   1               22,2270    44274 0                       U3POS
 0627                         22,2271    57575 1                VLOAD  VCOMP
 0628   REF  21  LAST  357    22,2272    03270 1                       COF
 0629   REF  22  LAST  357    22,2273    03270 1                STORE  COF
 0630                         22,2274    51145 0  U3POS         DLOAD  BPL
 0631   REF  11  LAST  356    22,2275    03307 0                       MFISYM +4        UX UZ
 0632   REF   1               22,2276    44302 0                       OKU31
 0633                         22,2277    57545 1                DLOAD  DCOMP
 0634   REF  23  LAST  357    22,2300    03270 1                       COF              SIGN OF UX OPPOSITE TO UZ
 0635   REF  24  LAST  357    22,2301    03270 1                STORE  COF
 0636                         22,2302    51145 0  OKU31         DLOAD  BPL
 0637   REF  12  LAST  357    22,2303    03315 0                       MFISYM +100      UY UZ
 0638   REF   6  LAST  357    22,2304    44744 0                       LOCSKIRT
 0639                         22,2305    57545 1                DLOAD  DCOMP
 0640   REF  25  LAST  357    22,2306    03272 0                       COF +2           SIGN OF UY OPPOSITE TO UZ
 0641   REF  26  LAST  357    22,2307    03272 0                STORE  COF +2
 0642                         22,2310    77650 1                GOTO
 0643   REF   7  LAST  357    22,2311    44744 0                       LOCSKIRT
```

```
R0644    MATRIX OPERATIONS

 0645                           13,2207                           BANK    13
 0646    REF    1               22,2000                           SETLOC  KALCMON2
 0647                           22,2312                           BANK

 0648    REF    6  LAST   353   E6,1675                           EBANK=  BCDU

 0649                           22,2312    76601 1   MXM3         SETPD   VLOAD*       MXM3 MULTIPLIES 2 3X3 MATRICES
 0650                           22,2313    00001 0                        0            AND LEAVES RESULT IN PD LIST
 0651                           22,2314    00001 0                        0,1          AND MPAC
 0652                           22,2315    62703 1                VXM*    PDVL*
 0653                           22,2316    77776 1                        0,2
 0654                           22,2317    00007 0                        6,1
 0655                           22,2320    62703 1                VXM*    PDVL*
 0656                           22,2321    77776 1                        0,2
 0657                           22,2322    00015 0                        12D,1
 0658                           22,2323    41503 1                VXM*    PUSH
 0659                           22,2324    77776 1                        0,2
 0660                           22,2325    77616 0                RVQ

R0661                                            RETURN WITH M1XM2 IN PD LIST
R0662
 0663                           22,2326    76601 1   TRANSPOS     SETPD   VLOAD*       TRANSPOS TRANSPOSES A 3X3 MATRIX
 0664                           22,2327    00001 0                        0             AND LEAVES RESULT IN PD LIST
 0665                           22,2330    00001 0                        0,1          MATRIX ADDRESS IN XR1
 0666                           22,2331    62713 0                PDVL*   PDVL*
 0667                           22,2332    00007 0                        6,1
 0668                           22,2333    00015 0                        12D,1
 0669                           22,2334    77606 1                PUSH                 MATRIX IN PD
 0670                           22,2335    77776 1   TRNSPSPD     EXIT                 ENTER WITH MATRIX AT 0 IN PD LIST
 0671    REF    9  LAST   300   22,2336    50 120 1               INDEX   FIXLOC
 0672                           22,2337    52 013 1               DXCH    12
 0673    REF   10  LAST   358   22,2340    50 120 1               INDEX   FIXLOC
 0674                           22,2341    52 017 0               DXCH    16
 0675    REF   11  LAST   358   22,2342    50 120 1               INDEX   FIXLOC
 0676                           22,2343    52 013 1               DXCH    12
 0677    REF   12  LAST   358   22,2344    50 120 1               INDEX   FIXLOC
 0678                           22,2345    52 015 1               DXCH    14
 0679    REF   13  LAST   358   22,2346    50 120 1               INDEX   FIXLOC
 0680                           22,2347    52 005 0               DXCH    4
 0681    REF   14  LAST   358   22,2350    50 120 1               INDEX   FIXLOC
 0682                           22,2351    52 015 1               DXCH    14
 0683    REF   15  LAST   358   22,2352    50 120 1               INDEX   FIXLOC
 0684                           22,2353    52 003 0               DXCH    2
 0685    REF   16  LAST   358   22,2354    50 120 1               INDEX   FIXLOC
 0686                           22,2355    52 007 1               DXCH    6
 0687    REF   17  LAST   358   22,2356    50 120 1               INDEX   FIXLOC
 0688                           22,2357    52 003 0               DXCH    2
 0689  REF  16  LAST  353  22,2360  0 6042 1            TC     INTPRET
 0690                      22,2361   77616 0            RVQ

 0691                      15,2050                      BANK   15
 0692  REF   2  LAST  353  22,2000                      SETLOC KALCMON1
 0693                      22,2362                      BANK

 0694  REF   7  LAST  358  E6,1675                      EBANK= BCDU

 0695                      22,2362   00013 0  MINANG    2DEC   0.00069375
 0695                      22,2363   13563 0
 0696                      22,2364   17070 0  MAXANG    2DEC   0.472222222
 0696                      22,2365   34343 1
R0697           GIMBAL LOCK CONSTANTS

R0698  D = MGA CORRESPONDING TO GIMBAL LOCK = 60 DEGREES
R0699           NGL = BUFFER ANGLE (TO AVOID DIVISIONS BY ZERO) = 2 DEGREES

 0700                      22,2366   15666 0  SD        2DEC   .433015          = SIN(D)                      $2
 0700                      22,2367   20443 0
 0701                      22,2370   33555 1  K3S1      2DEC   .86603           = SIN(D)                      $1
 0701                      22,2371   01106 1
 0702                      22,2372   67777 1  K4        2DEC   -.25             = -COS(D)                     $2
 0702                      22,2373   77777 0
 0703                      22,2374   04000 0  K4SQ      2DEC   .125             = COS(D)COS(D)                $2
 0703                      22,2375   00000 1
 0704                      22,2376   00216 1  SNGLCD    2DEC   .008725          = SIN(NGL)COS(D)              $2
 0704                      22,2377   36323 0
 0705                      22,2400   17773 1  CNGL      2DEC   .499695          COS(NGL)                      $2
 0705                      22,2401   00057 0
 0706                      22,2402   14344 1  LOCKANGL  DEC    .388889          = 70 DEGREES
R0707  INTERPRETIVE SUBROUTINE TO READ THE CDU ANGLES

 0708  REF   5  LAST  255  22,2403  3 0034 0  READCDUK  CA     CDUZ             LOAD T(MPAC) WITH CDU ANGLES
 0709  REF  67  LAST  338  22,2404  54 156 1            TS     MPAC +2
 0710                      22,2405  0 0006 1            EXTEND
 0711  REF   7  LAST  307  22,2406  3 0033 1            DCA    CDUX             AND CHANGE MODE TO TRIPLE PRECISION
 0712  REF   1             22,2407  1 6501 1            TCF    TLOAD +6


 0713                      22,2410   66370 0  CDUTODCM  AXT,1  SSP
 0714                      22,2411   00003 1            OCT    3
 0715  REF   1             22,2412   00051 0                   S1
 0716                      22,2413   00001 0            OCT    1                SET XR1, S1, AND PD FOR LOOP
 0717                      22,2414   00010 0            STORE  7
 0718                      22,2415   77601 0            SETPD
 0719                      22,2416   00001 0                   0
 0720                      22,2417   47133 0  LOOPSIN   SLOAD* RTB
 0721                      22,2420   00013 0                   10D,1
 0722  REF   9  LAST  326  22,2421   21577 1                   CDULOGIC
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0723                     22,2422   00013 0         STORE   10D          LOAD PD WITH 0 SIN(PHI)
0724                     22,2423   65356 1         SIN     PDDL                      2 COS(PHI)
0725                     22,2424   00013 0                 10D                       4 SIN(THETA)
0726                     22,2425   41546 0         COS     PUSH                      6 COS(THETA)
0727                     22,2426   71300 1         TIX,1   DLOAD                     8 SIN(PSI)
0728     REF   1         22,2427   44417 0                 LOOPSIN                  10 COS(PSI)
0729                     22,2430   00007 0                 6
0730                     22,2431   72405 0         DMP     SL1
0731                     22,2432   00013 0                 10D
0732                     22,2433   10001 1         STORE   0,2          C0=COS(THETA)COS(PSI)
0733                     22,2434   41345 0         DLOAD   DMP
0734                     22,2435   00005 1                 4
0735                     22,2436   00001 0                 0
0736                     22,2437   41325 0         PDDL    DMP          (PD6 SIN(THETA)SIN(PHI))
0737                     22,2440   00007 0                 6
0738                     22,2441   00011 1                 8D
0739                     22,2442   72405 0         DMP     SL1
0740                     22,2443   00003 1                 2
0741                     22,2444   72421 0         BDSU    SL1
0742                     22,2445   00015 0                 12D
0743                     22,2446   10003 0         STORE   2,2          C1=-COS(THETA)SIN(PSI)COS(PHI)
0744                     22,2447   41345 0         DLOAD   DMP
0745                     22,2450   00003 1                 2
0746                     22,2451   00005 1                 4
0747                     22,2452   41325 0         PDDL    DMP          (PD7 COS(PHI)SIN(THETA)) SCALED 4
0748                     22,2453   00007 0                 6
0749                     22,2454   00011 1                 8D
0750                     22,2455   72405 0         DMP     SL1
0751                     22,2456   00001 0                 0
0752                     22,2457   72415 1         DAD     SL1
0753                     22,2460   00017 1                 14D
0754                     22,2461   10005 0         STORE   4,2          C2=COS(THETA)SIN(PSI)SIN(PHI)
0755                     22,2462   77745 1         DLOAD
0756                     22,2463   00011 1                 8D
0757                     22,2464   10007 1         STORE   6,2          C3=SIN(PSI)
0758                     22,2465   77745 1         DLOAD
0759                     22,2466   00013 0                 10D
0760                     22,2467   72405 0         DMP     SL1
0761                     22,2470   00003 1                 2
0762                     22,2471   10011 0         STORE   8D,2         C4=COS(PSI)COS(PHI)
0763                     22,2472   41345 0         DLOAD   DMP
0764                     22,2473   00013 0                 10D
0765                     22,2474   00001 0                 0
0766                     22,2475   72476 1         DCOMP   SL1
0767                     22,2476   10013 1         STORE   10D,2        C5=-COS(PSI)SIN(PHI)
0768                     22,2477   41345 0         DLOAD   DMP
0769                     22,2500   00005 1                 4
0770                     22,2501   00013 0                 10D
0771                     22,2502   72476 1         DCOMP   SL1
0772                     22,2503   10015 1         STORE   12D,2        C6=-SIN(THETA)COS(PSI)
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 0773                          22,2504   77745 1             DLOAD
 0774                          22,2505   72405 0             DMP     SL1             (PUSH UP 7)
 0775                          22,2506   00011 1                     80
 0776                          22,2507   41325 0             PDDL    DMP             (PD7 COS(PHI)SIN(THETA)SIN(PSI)) SCALE4
 0777                          22,2510   00007 0                     6
 0778                          22,2511   00001 0                     0
 0779                          22,2512   72415 1             DAD     SL1             (PUSH UP 7)
 0780                          22,2513   77626 0             STADR                  C7=COS(PHI)SIN(THETA)SIN(PSI)
 0781                          22,2514   67760 1             STORE   14D,2           +COS(THETA)SIN(PHI)
 0782                          22,2515   77745 1             DLOAD
 0783                          22,2516   72405 0             DMP     SL1             (PUSH UP 6)
 0784                          22,2517   00011 1                     80
 0785                          22,2520   41325 0             PDDL    DMP             (PD6 SIN(THETA)SIN(PHI)SIN(PSI)) SCALE4
 0786                          22,2521   00007 0                     6
 0787                          22,2522   00003 1                     2
 0788                          22,2523   72425 1             DSU     SL1             (PUSH UP 6)
 0789                          22,2524   77626 0             STADR
 0790                          22,2525   67756 1             STORE   16D,2          C8=-SIN(THETA)SIN(PHI)SIN(PSI)
 0791                          22,2526   77616 0             RVQ                     +COS(THETA)COS(PHI)

R0792   CALCULATION OF THE MATRIX DEL.......

R0793           *      *              --T          *
R0794           DEL = (IDMATRIX)COS(A)+UU (1-COS(A))+UX SIN(A)          SCALED 1

R0795                 -
R0796           WHERE U IS A UNIT VECTOR (DP SCALED 2) ALONG THE AXIS OF ROTATION.
R0798           A IS THE ANGLE OF ROTATION (DP SCALED 2)
R0799                                             -
R0800           UPON ENTRY THE STARTING ADDRESS OF U IS COF, AND A IS IN MPAC

 0801                          22,2527   41401 1  DELCOMP    SETPD   PUSH           MPAC CONTAINS THE ANGLE A
 0802                          22,2530   00001 0                     0
 0803                          22,2531   65356 1             SIN     PDDL           PD0 = SIN(A)
 0804                          22,2532   41546 0             COS     PUSH           PD2 = COS(A)
 0805                          22,2533   65302 0             SR2     PDDL           PD2 = COS(A)                          $8
 0806                          22,2534   41021 1             BDSU    BOVB
 0807   REF   2  LAST  355     22,2535   06522 1                     DPHALF
 0808   REF   2  LAST  355     22,2536   21713 1                     SIGNMPAC
 0809                          22,2537   77725 1             PDDL                   PD4 = 1-COS(A)

R0810   COMPUTE THE DIAGONAL COMPONENTS OF DEL

 0811   REF  27  LAST  357     22,2540   03270 1                     COF
 0812                          22,2541   41316 0             DSQ     DMP
 0813                          22,2542   00005 1                     4
 0814                          22,2543   52415 0             DAD     SL3
 0815                          22,2544   00003 1                     2
 0816                          22,2545   77604 0             BOVB
 0817   REF   3  LAST  361     22,2546   21713 1                     SIGNMPAC
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L         ATTITUDE MANEUVER ROLTINE

 0818   REF   1                22,2547   16231 0        STDOL  KEL            UX UX(1-CCS(A)) +CCS(A)          $1
 0819   REF  28  LAST  361     22,2550   03272 0               CDF +2
 0820                          22,2551   41316 0        OSC    OMP
 0821                          22,2552   00005 1               4
 0822                          22,2553   52415 0        DAC    SL3
 0823                          22,2554   C0003 1               2
 0824                          22,2555   77604 0        BDV8
 0825   REF   4  LAST  361     22,2556   21713 1               SIGNMPAC
 0826   REF   2  LAST  362     22,2557   16241 1        STOOL  KEL +80        UY UY(1-COS(A)) +CCS(A)          $1
 0827   REF  29  LAST  362     22,2560   03274 0               COF +4
 0828                          22,2561   41316 0        DSC    DMP
 0829                          22,2562   00005 1               4
 0830                          22,2563   52415 0        OAC    SL3
 0831                          22,2564   C0003 1               2
 0832                          22,2565   77604 0        80V8
 0833   REF   5  LAST  362     22,2566   21713 1               SIGNMPAC
 0834   REF   3  LAST  362     22,2567   C2251 0        STORE  KEL +160       UZ UZ(1-COS(A)) +CCS(A)          $1

R0835     CCMPUTE THE OFF CIAGCNAL TERMS CF OEL

 0836                          22,2570   41345 0        OLOAD  OMP
 0837   REF  30  LAST  362     22,2571   03270 1               COF
 0838   REF  31  LAST  362     22,2572   03272 0               CDF +2
 0839                          22,2573   72405 0        DMP    SL1
 0840                          22,2574   00005 1               4
 0841                          22,2575   41325 0        PDOL   DMP            06  UX UY (1-COS A)              $ 4
 0842   REF  32  LAST  362     22,2576   03274 0               COF +4
 0843                          22,2577   00001 0               0
 0844                          22,2600   43206 1        PUSH   DAD            08  UZ SIN A                     $ 4
 0845                          22,2601   00007 0               6
 0846                          22,2602   41112 0        SL2    80V8
 0847   REF   6  LAST  362     22,2603   21713 1               SIGNMPAC
 0848   REF   4  LAST  362     22,2604   16237 0        STDOL  KEL +6
 0849                          22,2605   62421 1        8DSU   SL2
 0850                          22,2606   77604 0        80V8
 0851   REF   7  LAST  362     22,2607   21713 1               SIGNMPAC
 0852   REF   5  LAST  362     22,2610   16233 1        STCOL  KEL +2
 0853   REF  33  LAST  362     22,2611   03270 1               COF
 0854                          22,2612   41205 0        OMP    OMP
 0855   REF  34  LAST  362     22,2613   03274 0               COF +4
 0856                          22,2614   00005 1               4
 0857                          22,2615   65352 0        SL1    PDDL           06  UX UZ (1-COS A )             $ 4
 0858   REF  35  LAST  362     22,2616   03272 0               CDF +2
 0859                          22,2617   41405 0        DMF    PUSH           08  UY SIN(A)
 0860                          22,2620   00001 0               0
 0861                          22,2621   62415 0        DAO    SL2
 0862                          22,2622   00007 0               6
 0863                          22,2623   77604 0        8CVB
 0864   REF   8  LAST  362     22,2624   21713 1               SIGNMPAC
 0865   REF   6  LAST  362     22,2625   16235 1        STCOL  KEL +4         UX UZ (1-CDS(A))+UY SIN(A)
 0866                           22,2626   62421 1          BDSU   SL2
 0867                           22,2627   77604 0          BOVB
 0868   REF   9  LAST   362     22,2630   21713 1                 SIGNMPAC
 0869   REF   7  LAST   362     22,2631   16245 0          STODL  KEL +12D          UX UZ (1-COS(A))-UY SIN(A)
 0870   REF  36  LAST   362     22,2632   03272 0                 COF +2
 0871                           22,2633   41205 0          DMP    DMP
 0872   REF  37  LAST   363     22,2634   03274 0                 COF +4
 0873                           22,2635   00005 1                 4
 0874                           22,2636   65352 0          SL1    PDDL              D6  UY UZ (1-COS(A))               $ 4
 0875   REF  38  LAST   363     22,2637   03270 1                 COF
 0876                           22,2640   41405 0          DMP    PUSH              D8  UX SIN(A)
 0877                           22,2641   00001 0                 0
 0878                           22,2642   62415 0          DAD    SL2
 0879                           22,2643   00007 0                 6
 0880                           22,2644   77604 0          BOVB
 0881   REF  10  LAST   363     22,2645   21713 1                 SIGNMPAC
 0882   REF   8  LAST   363     22,2646   16247 1          STODL  KEL +14D          UY UZ(1-COS(A)) +UX SIN(A)
 0883                           22,2647   62421 1          BDSU   SL2
 0884                           22,2650   77604 0          BOVB
 0885   REF  11  LAST   363     22,2651   21713 1                 SIGNMPAC
 0886   REF   9  LAST   363     22,2652   02243 0          STORE  KEL +10D          UY UZ (1-COS(A)) -UX SIN(A)
 0887                           22,2653   77616 0          RVQ


R0888   DIRECTION COSINE MATRIX TO CDU ANGLE ROUTINE
R0889   X1 CONTAINS THE COMPLEMENT OF THE STARTING ADDRESS FOR MATRIX (SCALED 2)
R0890   LEAVES CDU ANGLES SCALED 2PI IN V(MPAC)
R0891   COS(MGA) WILL BE LEFT IN S1 (SCALED 1)

R0892   THE DIRECTION COSINE MATRIX RELATING S/C AXES TO STABLE MEMBER AXES CAN BE WRITTEN AS***

R0894              C =COS(THETA)COS(PSI)
R0895               0
R0896              C =-COS(THETA)SIN(PSI)COS(PHI)+SIN(THETA)SIN(PHI)
R0897               1
R0898              C =COS(THETA)SIN(PSI)SIN(PHI) + SIN(THETA)COS(PHI)
R0899               2
R0900              C =SIN(PSI)
R0901               3
R0902              C =COS(PSI)COS(PHI)
R0903               4
R0904              C =-COS(PSI)SIN(PHI)
R0905               5
R0906              C =-SIN(THETA)COS(PSI)
R0907               6
R0908              C =SIN(THETA)SIN(PSI)COS(PHI)+COS THETA)SIN(PHI)
R0909               7
R0910              C =-SIN(THETA)SIN(PSI)SIN(PHI)+COS(THETA)COS(PHI)
R0911               8
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RD912              WHERE PHI = CGA
RD913                    THETA = IGA
R0914                    PSI = MGA

 0915                                22,2654   67543 1  DCMTOCDU DLOAD* ARCSIN
 0916                                22,2655   00007 0                  6,1
 0917                                22,2656   71406 0           PUSH   COS             PD +0   PSI
 0918                                22,2657   41152 1           SL1    BOVB
 0919   REF  12  LAST  363           22,2660   21713 1                  SIGNMPAC
 0920   REF   2  LAST  359           22,2661   00051 0           STORE  S1
 0921                                22,2662   57543 1           DLOAD* DCOMP
 0922                                22,2663   00015 0                  12D,1
 0923                                22,2664   67471 1           DDV    ARCSIN
 0924   REF   3  LAST  364           22,2665   00051 0                  S1
 0925                                22,2666   51123 0           PDDL*  BPL             PD +2  THETA
 0926                                22,2667   00001 0                  0,1             MUST CHECK THE SIGN OF COS(THETA)
 0927   REF   1                      22,2670   44702 1                  OKTHETA         TO DETERMINE THE PROPER QUADRANT
 0928                                22,2671   57545 1           DLDAD  DCOMP
 0929                                22,2672   43244 1           BPL    DAD
 0930   REF   1                      22,2673   44677 1                  SUHALFA
 0931   REF   3  LAST  361           22,2674   06522 1                  DPHALF
 0932                                22,2675   77650 1           GOTO
 0933   REF   1                      22,2676   44701 1                  CALCPHI
 0934                                22,2677   77625 0  SUHALFA  DSU
 0935   REF   4  LAST  364           22,2700   06522 1                  DPHALF
 0936                                22,2701   77606 1  CALCPHI  PUSH
 0937                                22,2702   57543 1  OKTHETA  DLOAD* DCOMP
 0938                                22,2703   00013 0                  10D,1
 0939                                22,2704   67471 1           DDV    ARCSIN
 0940   REF   4  LAST  364           22,2705   00051 0                  S1
 0941                                22,2706   51123 0           PDDL*  BPL             PUSH DOWN PHI
 0942                                22,2707   00011 1                  8D,1
 0943   REF   1                      22,2710   44722 0                  OKPHI
 0944                                22,2711   57545 1           DLDAD  DCOMP           PUSH UP PHI
 0945                                22,2712   43244 1           BPL    DAD
 0946   REF   1                      22,2713   44717 0                  SUHALFAP
 0947   REF   5  LAST  364           22,2714   06522 1                  DPHALF
 0948                                22,2715   77650 1           GOTO
 0949   REF   1                      22,2716   44723 1                  VECOFANG
 0950                                22,2717   52025 1  SUHALFAP DSU    GOTO
 0951   REF   6  LAST  364           22,2720   06522 1                  DPHALF
 0952   REF   2  LAST  364           22,2721   44723 1                  VECOFANG
 0953                                22,2722   77745 1  OKPHI    DLOAD                  PUSH UP PHI
 0954                                22,2723   43466 1  VECOFANG VDEF   RVQ
```

```
L        ATTITUDE MANEUVER ROUTINE

P0955    ROUTINES FOR TERMINATING THE AUTOMATIC MANEUVER AND RETURNING TO USER

 0956                          22,2724    77776 1  TOOBADF   EXIT
 0957    REF   18  LAST  270   22,2725   0 5567 0            TC      ALARM
 0958                          22,2726    00401 1            OCT     00401

 0959    REF    1              22,2727   1 2732 1            TCF     NOGO             DO NOT ZERO ATTITUDE ERRORS

 0960    REF   66  LAST  342   22,2730   0 4616 1            TC      BANKCALL
 0961    REF    2  LAST  287   22,2731    40154 0            CADR    ZATTEROR         ZERO ATTITUDE ERRORS

 0962    REF   67  LAST  365   22,2732   0 4616 1  NOGO      TC      BANKCALL
 0963    REF    2  LAST  290   22,2733    40166 1            CADR    STOPRATE         STOP RATES

 0964    REF   13  LAST  334   22,2734   3 4752 0            CAF     TWO
 0965                          22,2735   0 0004 0            INHINT                   ALL RETURNS ARE NOW MADE VIA GOODEND
 0966    REF   12  LAST  298   22,2736   0 5203 0            TC      WAITLIST
 0967    REF    8  LAST  359   E6,1675                       EBANK=  BCDU
 0968    REF    1              22,2737    03234 1            2CADR   GOODMANU
 0968    REF    1              22,2740    44066 1
 0969    REF   31  LAST  338   22,2741   1 5155 1            TCF     ENDOFJOB

 0970                          22,2742    77776 1  TOOBADI   EXIT
 0971    REF    2  LAST  365   22,2743   1 2732 1            TCF     NOGO
 0001                          15,2050                          BANK    15

 0002    REF   3  LAST  359    22,2000                          SETLOC  KALCMON1
 0003                          22,2744                          BANK

R0004
R0005    DETECTING GIMBAL LOCK
 0006    REF   1               22,2744                 LOCSKIRT EQUALS  NOGIMLOC

 0007                          22,2744    77614 1      NOGIMLOC SET
 0008    REF   1               22,2745    01074 0                       CALCMAN3
 0009                          22,2746    70740 0      WCALC    LXC,1   DLOAD*
 0010    REF   3  LAST  296    22,2747    01322 0                       RATEINDX          CHOOSE THE DESIRED MANEUVER RATE
 0011    REF   1               22,2750    04772 1                       ARATE,1           FROM A LIST OF FOUR
 0012                          22,2751    45002 1               SR4     CALL              COMPUTE THE INCREMENTAL ROTATION MATRIX
 0013    REF   1               22,2752    44527 1                       DELCOMP           DCM CORRESPONDING TO A 1 SEC ROTATION
A0014                                                                                     ABOUT COF
 0015                          22,2753    74343 0               DLOAD*  VXSC
 0016    REF   2  LAST  366    22,2754    04772 1                       ARATE,1
 0017    REF  39  LAST  363    22,2755    03270 1                       COF
 0018    REF   1               22,2756    17325 0               STODL   BRATE             COMPONENT MANEUVER RATES 45 DEG/SEC
 0019    REF   3  LAST  354    22,2757    03335 1                       AM
 0020                          22,2760    55605 1               DMP     DDV*
 0021    REF   1               22,2761    05002 0                       ANGLTIME
 0022    REF   2  LAST  366    22,2762    04772 1                       ARATE,1
 0023                          22,2763    77661 0               SR
 0024                          22,2764    20606 0                       5
 0025    REF   1               22,2765    03333 1               STORE   TM                MANEUVER EXECUTION TIME SCALED AS T2
 0026                          22,2766    77614 1               SETGO
 0027    REF   1               22,2767    01035 0                       CALCMAN2          0(OFF) = CONTINUE MANEUVER
 0028    REF   1               22,2770    45010 1                       NEWANGL +1        1(ON) = START MANEUVER
R0029                THE FOUR SELECTABLE FREE FALL MANEUVER RATES SELECTED BY
R0030                LOADING RATEINDX WITH 0,2,4,6, RESPECTIVELY


 0031                          22,2771    00221 0      ARATE    2DEC    .0088888888       = 0.2 DEG/SEC        $ 22.5 DEG/SEC
 0031                          22,2772    24255 0
 0032                          22,2773    00554 0               2DEC    .0222222222       = 0.5 DEG/SEC        $ 22.5 DEG/SEC
 0032                          22,2774    02660 0
 0033                          22,2775    02660 0               2DEC    .0888888888       = 2.0 DEG/SEC        $ 22.5 DEG/SEC
 0033                          22,2776    13301 1
 0034                          22,2777    16161 0               2DEC    .4444444444       = 10.0 DEG/SEC       $ 22.5 DEG/SEC
 0034                          22,3000    30707 1
 0035                          22,3001    00003 1      ANGLTIME 2DEC    .0001907349       = 100B-19      FUDGE FACTOR TO CONVERT
 0035                          22,3002    04000 0
A0036                                                                                     MANEUVER ANGLE TO MANEUVER TIME
```

```
L        KALCMANU STEERING                                                          USER'S PAGE NO.  1       EO S3

R0001    GENERATION OF STEERING COMMANDS FOR DIGITAL AUTOPILOT FREE FALL MANEUVERS

R0003    NEW COMMANDS WILL BE GENERATED EVERY ONE SECOND DURING THE MANEUVER

 0004    REF   1                E6,1706                      EBANK= TTEMP

 0005    REF  68  LAST  365     22,3003  0 4616 1  NEWDELHI TC      BANKCALL         CHECK FOR AUTO STABILIZATION
 0006    REF   1                22,3004   54266 1           CADR    ISITAUTO         ONLY
 0007    REF  95  LAST  334     22,3005  10 000 0           CCS     A
 0008    REF   3  LAST  365     22,3006  1 2730 0           TCF     NOGO -2
 0009    REF  17  LAST  359     22,3007  0 6042 1  NEWANGL  TC      INTPRET
 0010                           22,3010   75160 1           AXC,1   AXC,2
 0011    REF   6  LAST  353     22,3011   03245 1                   MIS              COMPUTE THE NEW MATRIX FROM S/C TO
 0012    REF  10  LAST  363     22,3012   02230 1                   KEL              STABLE MEMBER AXES
 0013                           22,3013   77624 1           CALL
 0014    REF   2  LAST  353     22,3014   44312 1                   MXM3
 0015                           22,3015   45575 1           VLOAD   STADR
 0016    REF   7  LAST  367     22,3016   50515 0           STOVL   MIS +12D         CALCULATE NEW DESIRED CDU ANGLES
 0017                           22,3017   77626 0           STADP
 0018    REF   8  LAST  367     22,3020   50523 0           STOVL   MIS +6D
 0019                           22,3021   77626 0           STADP
 0020    REF   9  LAST  367     22,3022   74531 0           STORE   MIS
 0021                           22,3023   45160 1           AXC,1   CALL
 0022    REF  10  LAST  367     22,3024   03245 1                   MIS
 0023    REF   1                22,3025   44654 0                   DCMTOCDU         PICK UP THE NEW CDU ANGLES FROM MATRIX
 0024                           22,3026   77634 0           RTB
 0025    REF   1                22,3027   21621 1                   V1STO2S
 0026    REF   1                22,3030   03303 1           STORE   NCDU             NEW CDU ANGLES
 0027                           22,3031   77414 0           BONCLR  EXIT
 0028    REF   2  LAST  366     22,3032   01215 0                   CALCMAN2
 0029    REF   1                22,3033   45122 1                   MANUSTAT         TO START MANEUVER
 0030    REF  14  LAST  365     22,3034  3 4752 0           CAF     TWO                    +0 OTHERWISE
 0031    REF   1                22,3035  55'261 1  INCRDCDU TS      SPNDX
 0032    REF   2  LAST  367     22,3036  51'261 0           INDEX   SPNDX
 0033    REF   9  LAST  365     22,3037  3 1675 1           CA      BCDU             INITIAL CDU ANGLES
 0034                           22,3040  0 0006 1           EXTEND                   OR PREVIOUS DESIRED CDU ANGLES
 0035    REF   3  LAST  367     22,3041  5 1261 0           INDEX   SPNDX
 0036    REF   2  LAST  367     22,3042  21'702 1           MSU     NCDU
 0037                           22,3043  0 0006 1           EXTEND
 0038    REF   4  LAST  366     22,2000                     SETLOC  KALCMON1
 0039                           22,3044                     BANK

 0040    REF   1                22,3044  7 3121 1           MP      DT/TAU
 0041    REF  96  LAST  367     22,3045  10 000 0           CCS     A                CONVERT TO 2S COMPLEMENT
 0042    REF  17  LAST  341     22,3046  6 4753 1           AD      ONE
 0043                           22,3047  1 3051 1           TCF     +2
 0044                           22,3050  4 0000 0           COM
 0045    REF   4  LAST  367     22,3051  51'261 0           INDEX   SPNDX
 0046    REF   1                22,3052  55'637 0           TS      DELDCDU          ANGLE INCREMENTS TO BE ADDED TO
 0047    REF   5  LAST  367     22,3053  51'261 0           INDEX   SPNDX            CDUXD, CDUYD, CDUZD EVERY TENTH SECOND
```

```
L        KALCMANU STEERING                                                               USER'S PAGE NO.  2       E6 S3

 0048    REF   3  LAST  367    22,3054   3 1702 0                CA      NCDU            BY LEM DAP
 0049    REF   6  LAST  367    22,3055  51'261 0                 INDEX   SPNDX
 0050    REF  10  LAST  367    22,3056  57'675 1                 XCH     BCDU
 0051    REF   7  LAST  368    22,3057  51'261 0                 INDEX   SPNDX
 0052    REF   7  LAST  354    22,3060  55'634 0                 TS      CDUXD
 0053    REF   8  LAST  368    22,3061  11'261 1                 CCS     SPNDX
 0054    REF   1               22,3062   1 3035 0                TCF     INCRDCDU        LOOP FOR THREE AXES

 0055                          22,3063   0 0003 1                RELINT

R0056    COMPARE PRESENT TIME WITH TIME TO TERMINATE MANEUVER

 0057    REF   1               22,3064   0 3075 0   TMANUCHK     TC      TIMECHK
 0058    REF   1               22,3065   1 3170 0                TCF     CONTMANU
 0059    REF  18  LAST  367    22,3066   3 4753 1                CAF     ONE
 0060                          22,3067   0 0004 0   MANUSTAL     INHINT                  END MAJOR PART OF MANEUVER WITHIN 1 SEC
 0061    REF  13  LAST  365    22,3070   0 5203 0                TC      WAITLIST        UNDER WAITLIST CALL TO MANUSTOP
 0062    REF   2  LAST  367    E6,1706                           EBANK=  TTEMP
 0063    REF   1               22,3071    03213 1                2CADR   MANUSTOP
 0063    REF   1               22,3072    44066 1
 0064                          22,3073   0 0003 1                RELINT
 0065    REF  32  LAST  365    22,3074   1 5155 1                TCF     ENDOFJOB



 0066                          22,3075   0 0006 1   TIMECHK      EXTEND
 0067    REF  11  LAST  308    22,3076   4 0025 1                DCS     TIME2
 0068    REF   3  LAST  368    22,3077  53'707 1                 DXCH    TTEMP
 0069                          22,3100   0 0006 1                EXTEND
 0070    REF   2  LAST  366    22,3101   3 1733 1                DCA     TM
 0071    REF   4  LAST  368    22,3102  21'707 1                 DAS     TTEMP
 0072    REF   5  LAST  368    22,3103  11'706 0                 CCS     TTEMP
 0073    REF  36  LAST  338    22,3104   0 0002 0                TC      Q
 0074                          22,3105   1 3107 0                TCF     +2
 0075    REF   1               22,3106   1 3117 1                TCF     2NDRETRN
 0076    REF   6  LAST  368    22,3107  11'707 1                 CCS     TTEMP +1
 0077    REF  37  LAST  368    22,3110   0 0002 0                TC      Q
 0078    REF   1               22,3111   1 3113 0                TCF     MANUOFF
 0079                          22,3112   4 0000 0                COM
 0080    REF   1               22,3113   6 3166 0   MANUOFF      AD      ONESEK +1
 0081                          22,3114   0 0006 1                EXTEND
 0082    REF   2  LAST  368    22,3115   6 3117 0                BZMF    2NDRETRN
 0083    REF  38  LAST  368    22,3116  24 002 0                 INCR    Q
 0084    REF  39  LAST  368    22,3117  24 002 0    2NDRETRN     INCR    Q
 0085    REF  40  LAST  368    22,3120   0 0002 0                TC      Q

 0086                          22,3121    03146 1   DT/TAU       DEC     .1

 0087                          22,3122    77776 1   MANUSTAT     EXIT                    INITIALIZATION ROUTINE
 0088                          22,3123   0 0006 1                EXTEND                  FOR AUTOMATIC MANEUVERS
 0089    REF  12  LAST  368    22,3124   3 0025 0                DCA     TIME2
 0090   REF    3  LAST  368    22,3125  21'733 0             DAS    TM              TM+TO     MANEUVER COMPLETION TIME
 0091                          22,3126  0 0006 1             EXTEND
 0092   REF    2  LAST  368    22,3127  4 3166 1             DCS    ONESEK
 0093   REF    4  LAST  369    22,3130  21'733 0             DAS    TM              (TM+TO)-1
 0094                          22,3131  0 0004 0             INHINT
 0095   REF   15  LAST  367    22,3132  3 4752 0             CAF    TWO
 0096   REF    2  LAST  136    22,3133  55'700 0  RATEBIAS  TS     KSPNDX
 0097                          22,3134  6 0000 1             DOUBLE
 0098   REF    2  LAST  136    22,3135  55'701 1             TS     KDPNDX
 0099   REF   97  LAST  367    22,3136  50 000 1             INDEX  A
 0100   REF    2  LAST  366    22,3137  3 1724 1             CA     BRATE
 0101   REF    3  LAST  369    22,3140  51'700 1             INDEX  KSPNDX          STORE MANEUVER RATE IN
 0102   REF    4  LAST  197    22,3141  55'642 1             TS     OMEGAPD         OMEGAPD, OMEGAQD, OMEGARD
 0103                          22,3142  0 0006 1             EXTEND
 0104                          22,3143  6 3145 1             BZMF   +2              COMPUTE ATTITUDE ERROR
 0105                          22,3144  4 0000 0             COM                    OFFSET = (WX)ABS(WX)/2AJX
 0106                          22,3145  0 0006 1             EXTEND                 WHERE AJX= 2-JET ACCELERATION
 0107   REF    1               22,3146  7 3167 0             MP     BIASCALE        = -1/16
 0108                          22,3147  0 0006 1             EXTEND
 0109   REF    3  LAST  369    22,3150  5 1701 0             INDEX  KDPNDX
 0110   REF    3  LAST  369    22,3151  7 1724 0             MP     BRATE
 0111                          22,3152  0 0006 1             EXTEND
 0112   REF    4  LAST  369    22,3153  5 1700 1             INDEX  KSPNDX
 0113   REF    4  LAST  134    22,3154  11'530 1             DV     1JACC           =AJX   $ 90 DEG/SEC-SEC
 0114   REF    5  LAST  369    22,3155  51'700 1             INDEX  KSPNDX
 0115   REF    1               22,3156  55'274 0             TS     DELPEROR             $ 180 DEG
 0116   REF    6  LAST  369    22,3157  11'700 0             CCS    KSPNDX
 0117   REF    1               22,3160  1 3133 1             TCF    RATEBIAS

 0120   REF    3  LAST  336    22,3161  3 0025 0             CA     TIME1
 0121   REF    3  LAST  369    22,3162  6 3166 0             AD     ONESEK +1
 0122   REF    1               22,3163  57'705 1             XCH    NEXTIME
 0123   REF    2  LAST  368    22,3164  1 3034 1             TCF    INCRDCDU -1

 0124                          22,3165   00000 1  ONESEK    DEC    0
 0125                          22,3166   00144 0            DEC    100

 0126                          22,3167   75777 1  BIASCALE  OCT    75777           = -1/16

 0127   REF    4  LAST  369    22,3170  4 0025 1  CONTMANU  CS     TIME1           RESET FOR NEXT DCDU UPDATE
 0128   REF    2  LAST  369    22,3171  6 1705 1             AD     NEXTIME
 0129   REF   98  LAST  369    22,3172  10 000 0             CCS    A
 0130   REF   19  LAST  368    22,3173  6 4753 1             AD     ONE
 0131   REF    1               22,3174  1 3177 1             TCF    MANUCALL
 0132   REF    1               22,3175  6 4735 1             AD     NEGMAX
 0133                          22,3176  4 0000 0             COM
 0134                          22,3177  0 0004 0  MANUCALL  INHINT                 CALL FOR NEXT UPDATE VIA WAITLIST
 0135   REF   14  LAST  368    22,3200  0 5203 0             TC     WAITLIST
 0136   REF    7  LAST  368    E6,1706                       EBANK= TTEMP
 0137   REF    1               22,3201   03206 0             2CADR  UPDTCALL
 0137   REF    1               22,3202   44066 1
```

```
L         KALCMANU STEERING

 0138     REF    4  LAST   369     22,3203   3 3166 0                CAF      ONESEK +1       INCREMENT TIME FOR NEXT UPDATE
 0139     REF    3  LAST   369     22,3204  27'705 0                 ADS      NEXTTIME
 0140     REF   33  LAST   368     22,3205   1 5155 1                TCF      ENDOFJOB


 0141     REF    1                 22,3206   3 7717 1   UPDTCALL CAF      PRIO26          SATELLITE PROGRAM TO CALL FOR UPDATE
 0142     REF   13  LAST   301     22,3207   0 5105 0                TC       FINDVAC         OF STEERING COMMANDS
 0143     REF    8  LAST   369     E6,1706                           EBANK=   TTEMP
 0144     REF    1                 22,3210    03003 1                2CADR    NEWDELHI
 0144     REF    1                 22,3211    44066 1
 0145     REF    5  LAST   284     22,3212   0 5261 1                TC       TASKOVER
```

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P0146    RCUTINF FOR TERMINATING AUTCMATIC MANEUVERS

 0147    REF  39  LAST  338    22,3213  3 4755 1  MANUSTOP CAF     ZERC              ZERO MANEUVER RATES
 0148    REF   1               22,3214  55'641 1           TS      DELOCOU2
 0149    REF   1               22,3215  55'644 1           TS      OMEGARC
 0150    REF   1               22,3216  55'276 1           TS      DELRERCR
 0151    REF   1               22,3217  55'640 0           TS      DELOCOU1
 0152    REF   1               22,3220  55'643 0           TS      OMEGAQD
 0153    REF   1               22,3221  55'275 1           TS      DELQERDR
 0154    REF   2  LAST  353    22,3222  3 0323 0           CA      CPSI              SET DESIRED GIMBAL ANGLFS TO
 0155    REF   1               22,3223  55'636 1           TS      COUZD             DESIRED FINAL GIMBAL ANGLES
 0156    REF   1               22,3224  3 0322 1           CA      CTHETA
 0157    REF   1               22,3225  55'635 1           TS      COUYD
 0158    REF   4  LAST  354    22,3226  3 0321 1  ENDROLL  CA      CPHI              NO FINAL YAW
 0159    REF   8  LAST  368    22,3227  55'634 0           TS      COUXD
 0160    REF  40  LAST  371    22,3230  3 4755 1           CAF     ZERO
 0161    REF   5  LAST  369    22,3231  55'642 1           TS      OMEGAPD           I.E. MANEUVER DIC NCT GC THRU
 0162    REF   2  LAST  367    22,3232  55'637 0           TS      DELOCOU           GIMBAL LOCK ORIGINALLY
 0163    REF   2  LAST  369    22,3233  55'274 0           TS      DELPERCR
 0164    REF   1               22,3234  3 1306 0  GODDMANU CA      ATTPRIO           RFSTORE USERS PRIO
 0165    REF   2  LAST  234    22,3235  54 063 0           TS      NEWPRIC

 0166    REF  41  LAST  371    22,3236  3 4755 1           CA      ZERC              ZERC ATTCADR
 0167    REF   3  LAST  224    22,3237  53'305 1           DXCH    ATTCADR

 0168    REF   2  LAST  234    22,3240  0 5116 1           TC      SPVAC             RETURN TO USER

 0169    REF   6  LAST  370    22,3241  0 5261 1           TC      TASKOVER
```

```
L        SYSTEM TEST STANDARD LEAD INS                                              USER'S PAGE NO.  1      EO S3

 0001    REF   4  LAST  322    E5,1642                    EBANK= XSM

 0002                          33,2045                    BANK    33
 0003    REF   1               04,2000                    SETLOC E/PROG
 0004    .                     04,2562                    BANK

 0005    REF   1                                          COUNT* $$/P07

R0006              SPECIAL PROGRAMS TO EASE THE PANGS OF ERASABLE MEMORY PROGRAMS.

R0007    E/BKCALL   FOR DOING BANKCALLS FROM AND RETURNING TO ERASABLE.

R0008              THIS ROUTINE IS CALLABLE FROM ERASABLE OR FIXED.  LIKE BANKCALL, HOWEVER, SWITCHING BETWEEN S3 AND S4
R0010    IS NOT POSSIBLE.

R0011              THE CALLING SEQUENCE IS:

A0012                                                     TC      BANKCALL
A0013                                                     CADR    E/BKCALL
A0014                                                     CADR    ROUTINE         WHERE YOU WANT TO GO IN FIXED.
A0015                                                     RETURN HERE FROM DISPLAY TERMINATE, BAD STALL OR TC Q.
A0016                                                     RETURN HERE FROM DISPLAY PROCEED OR GOOD RETURN FROM STALL.
A0017                                                     RETURN HERE FROM DISPLAY ENTER OR RECYCLE.

R0018              THIS ROUTINE REQUIRES TWO ERASABLES (EBUF2, +1) IN UNSWITCHED WHICH ARE UNSHARED BY INTERRUPTS AND
R0020    OTHER EMEMORY PROGRAMS.

R0021              A + L ARE PRESERVED THROUGH BANKCALL AND E/BKCALL.

 0022    REF   3  LAST  246    04,2562  52 134 0  E/BKCALL DXCH    BUF2            SAVE A,L AND GET DP RETURN.
 0023    REF   1               04,2563  53'167 1           DXCH    EBUF2           SAVE DP RETURN.
 0024    REF   2  LAST  372    04,2564  25'166 1           INCR    EBUF2           RETURN +1 BECAUSE DOUBLE CADR.
 0025    REF  11  LAST  221    04,2565  3 0006 1           CA      BBANK
 0026    REF   3  LAST  306    04,2566  7 5012 0           MASK    LOW10           GET CURRENT EBANK.  (SBANK SOMEDAY)
 0027    REF   3  LAST  372    04,2567  27'167 1           ADS     EBUF2 +1        FORM BBCON.  (WAS FBANK)
 0028    REF   4  LAST  372    04,2570  51'166 1           NDX     EBUF2
 0029                          04,2571  2'7777 0           CA      0 -1            GET CADR OF ROUTINE.
 0030    REF   2  LAST  219    04,2572  0 4622 0           TC      SWCALL          GO TO ROUTINE, SETTING Q TO SWRETURN
A0031                                                                              AND RESTORING A + L.
 0032                          04,2573  0 2577 0           TC      +4              TX Q, V34, OR BAD STALL RETURN.
 0033                          04,2574  0 2576 1           TC      +2              PROCEED OR GOOD STALL RETURN.
 0034    REF   5  LAST  372    04,2575  25'166 1           INCR    EBUF2           ENTER OR RECYCLE RETURN.
 0035    REF   6  LAST  372    04,2576  25'166 1           INCR    EBUF2
 0036    REF   7  LAST  372    04,2577  53'167 1  E/SWITCH DXCH    EBUF2
 0037                          04,2600  52 006 0           DTCB
```

```
L        SYSTEM TEST STANDARD LEAD INS                                                      USER'S PAGE NO.   2      E5 S3

PD038    E/CALL          FOR CALLING A FIXED MEMORY INTERPRETIVE SUBROUTINE FROM ERASABLE AND RETURNING TO ERASABLE.

R0040              THE CALLING SEQUENCE IS...
A0041                                                              RTB
A0042                                                                       E/CALL
A0043                                                              CADR     ROUTINE              THE INTERPRETIVE SUBROUTINE YOU WANT.
A0044                                                                                            RETURNS HERE IN INTERPRETIVE.

 0045    REF   1                  04,2601  22 164 1  E/CALL        LXCH     LOC                  ADRES -1 OF CADR.
 0046    REF  33  LAST  338       04,2602  50 001 0                INDEX    L
 0047    REF  34  LAST  373       04,2603  3 0001 0                CA       L                    CADR IN A.
 0048    REF  35  LAST  373       04,2604  24 001 0                INCR     L
 0049    REF  36  LAST  373       04,2605  24 001 0                INCR     L                    RETURN ADRES IN L.
 0050    REF   8  LAST  372       04,2606  53'167 1                DXCH     EBUF2                STORE CADR AND RETURN.
 0051    REF  18  LAST  367       04,2607  0 6042 1                TC       INTPRET
 0052                             04,2610   77624 1                CALL
 0053    REF   9  LAST  373       04,2611   01166 1                         EBUF2                INDIRECTLY EXECUTE ROUTINE.  IT MUST
 0054                             04,2612   77776 1                EXIT                          LEAVE VIA RVQ OR EQUIVALENT.
 0055    REF  10  LAST  373       04,2613  23'167 0                LXCH     EBUF2 +1             PICK UP RETURN.
 0056    REF  19  LAST  373       04,2614  1 6044 0                TCF      INTPRET +2           SET LOC AND RETURN TO CALLER.
```

```
L        SYSTEM TEST STANDARD LEAD INS                                              USER'S PAGE NO.   3       E5 S3

P0057    E/JOBWAK          FOR WAKING UP ERASABLE MEMORY JOBS.

R0058              THIS ROUTINE MUST BE CALLED IN INTERRUPT OR WITH INTERRUPTS INHIBITED.

R0060              THE CALLING SEQUENCE IS:

A0061                                                          INHINT
A0062                                                            .
A0063                                                            .
A0064                                                          CA      WAKEADR          ADDRESS OF SLEEPING JOB
A0065                                                          TC      IBNKCALL
A0066                                                          CADR    E/JOBWAK
A0067                                                            .                      RETURNS HERE
A0068                                                            .
A0069                                                            .
A0070                                                          RELINT                   IF YOU DID AN INHINT.

 0071                              33,2045                     BANK    33
 0072    REF    2  LAST  372       04,2000                     SETLOC  E/PROG
 0073                              04,2615                     BANK

 0074    REF    2 LAST  372 TO  374:      27     27*           COUNT*  $$/P07

 0075    REF    1                  04,2615  0 5137 1  E/JOBWAK TC      JOBWAKE          ARRIVE IWTH ADRES IN A.
 0076    REF   17  LAST  256       04,2616  4 4741 0           CS      BIT11
 0077    REF    1                  04,2617  50 064 0           NDX     LOCCTR
 0078    REF    2  LAST  373       04,2620  26 164 0           ADS     LOC              KNOCK FIXED MEMORY BIT OUT OF ADRES.
 0079    REF    1                  04,2621  0 0072 1           TC      RUPTREG3         RETURN
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L         IMU PERFORMANCE TESTS 2                                                                      USER'S PAGE NO.   1       EO S3

R0001     NAME- IMU PERFORMANCE TESTS 2

R0002     DATE- MARCH 20,1967

R0003     BY- SYSTEM TEST GROUP 864-6900 EXT. 1274

R0004     MODNO.- ZERO

R0005     FUNCTIONAL DESCRIPTION

R0006     POSITIONING ROUTINES FOR THE IMU PERFORMANCE TESTS AS WELL AS SOME OF
R0007     THE TESTS THEMSELVES. FOR A DESCRIPTION OF THESE SUBROUTINES AND THE
R0008     OPERATING PROCEDURES (TYPICALLY) SEE STG MEMO 685. THEORETICAL REF.E-1973

 0009                                33,2045                            BANK    33
 0010    REF   2  LAST   44          37,2000                            SETLOC  IMU2
 0011                                37,2002                            BANK
 0012    REF   2  LAST  128          E5,1416                            EBANK=  POSITON
 00121   REF   2 LAST    44 TO   44:        2       2*                  COUNT*  $$/P07

 00122   REF   1                     37,2002   0 5311 1  REDO           TC      NEWMODEX
 00124                               37,2003    00007 0                 MM      07

 0021    REF   1                     37,2004   0 2325 1  GEOIMUTT       TC      IMUZERR
 0022    REF  42  LAST  371          37,2005   3 4755 1  IMUBACK        CA      ZERO
 0023    REF   2  LAST  128          37,2006   55'414 0                 TS      NDXCTR
 0024    REF   1                     37,2007   55'440 1                 TS      TORQNDX
 0025    REF   2  LAST  375          37,2010   55'441 0                 TS      TORQNDX +1
 00251   REF   1                     37,2011   55'576 0                 TS      OVFLOWCK
 0026    REF   1                     37,2012   3 4361 1  NBPOSPL        CA      DEC17
 0027    REF   1                     37,2013   55'571 1                 TS      ZERONDX
 0028    REF   1                     37,2014   3 2476 0                 CA      XNBADR
 0029    REF   1                     37,2015   0 2367 1                 TC      ZEROING
 0030    REF   3  LAST  336          37,2016   3 4736 1                 CA      HALF
 0031    REF   1                     37,2017   55'664 0                 TS      XNB
 0032    REF  20  LAST  373          37,2020   0 6042 1  GUESS          TC      INTPRET
 0033                                37,2021    62545 1  LATAZCHK       DLOAD   SL2
 0034    REF   2  LAST  128          37,2022    02403 1                         LATITUDE
 0035    REF  13  LAST  319          37,2023    15046 1                 STODL   OSPTEM1 +1
 0036    REF   2  LAST  128          37,2024    02401 0                         AZIMUTH
 0037                                37,2025    77434 1                 RTB     EXIT
 0038    REF   1                     37,2026    21615 0                         1STO2S
 0039    REF  68  LAST  359          37,2027   56 154 1                 XCH     MPAC
 0040    REF  14  LAST  375          37,2030   55'044 1                 TS      OSPTEM1
 0041    REF   1                     37,2031   3 2473 0                 CAF     VN0641
 0042    REF  69  LAST  367          37,2032   0 4616 1                 TC      BANKCALL
 0043    REF   4  LAST  342          37,2033    20477 1                 CADR    GOFLASH
 0044    REF   1                     37,2034   0 2270 0                 TC      ENDTEST1
 0045                                37,2035   0 2037 1                 TC      +2
 0046                                37,2036   0 2031 1                 TC      -5
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0047    REF  21   LAST  375    37,2037   0 6042 1              TC       INTPRET
0048                           37,2040    47135 0              SLOAD    RTB
0049    REF  15   LAST  375    37,2041    01045 1                       DSPTEM1
0050    REF  10   LAST  359    37,2042    21577 1                       CDULOGIC
0051    REF   3   LAST  375    37,2043    02401 0              STORE    AZIMUTH
0052                           37,2044    60535 1              SLOAD    SR2
0053    REF  16   LAST  376    37,2045    01046 1                       DSPTEM1 +1
0054    REF   3   LAST  375    37,2046    02403 1              STORE    LATITUDE
0055                           37,2047    57546 1              COS      DCOMP
0056                           37,2050    77752 1              SL1
0057    REF   1                37,2051    16437 0              STODL    WANGI
0058    REF   4   LAST  376    37,2052    02403 1                       LATITUDE
0059                           37,2053    72556 1              SIN      SL1
0060    REF   1                37,2054    16435 1              STODL    WANGO
0061    REF   4   LAST  376    37,2055    02401 0                       AZIMUTH
0062                           37,2056    73406 1              PUSH     SIN
0063    REF   1                37,2057    02675 1              STORE    YNB +2
0064    REF   1                37,2060    16705 1              STODL    ZNB +4
0065                           37,2061    77746 1              COS
0066    REF   2   LAST  376    37,2062    02677 0              STORE    YNB +4
0067                           37,2063    77676 0              DCOMP
0068    REF   2   LAST  376    37,2064    36703 0  POSGMBL     STCALL   ZNB +2
0069    REF   1                37,2065    47355 1                       CALCGA
0070                           37,2066    77776 1              EXIT
0071    REF  70   LAST  375    37,2067   0 4616 1              TC       BANKCALL
0072    REF   2   LAST  269    37,2070    16771 1              CADR     IMUCOARS
0073    REF  35   LAST  295    37,2071   3 4736 1              CAF      BIT14          IF BIT14 SET, GIMBAL LOCK
0074    REF   9   LAST  282    37,2072   7 0077 0              MASK     FLAGWRD3
0075                           37,2073   0 0006 1              EXTEND
0076                           37,2074   1 2076 0              BZF      +2
0077    REF   3   LAST  375    37,2075   25'414 1              INCR     NDXCTR         +1 IF IN GIMBAL LOCK,OTHERWISE 0
0078    REF  32   LAST  342    37,2076   0 5516 0              TC       DOWNFLAG
0079    REF   2   LAST  231    37,2077    00056 1              ADRES    GLOKFAIL       RESET GIMBAL LOCK FLAG
0080    REF   1                37,2100   0 2315 1              TC       IMUSLLLG
0081    REF   4   LAST  376    37,2101   11'414 0              CCS      NDXCTR         IF ONE GO AND DO A PIPA TEST ONLY
0082    REF   1                37,2102   0 2126 0              TC       PIPACHK        ALIGN AND MEASURE VERTICAL PIPA RATE
0084    REE   1                37,2103   0 2320 1              TC       FINIMUDO
0085                           37,2104   0 0006 1              EXTEND
00851   REF   1                37,2105   3 1575 1              DCA      PERFDLAY
00852   REF   1                37,2106   0 5277 0              TC       LONGCALL       DELAY WHILE SUSPENSION STABILIZES
008525  REF   3   LAST  375    E5,1416                         EBANK=   POSITON
00853   REF   1                37,2107    02113 0              2CADR    GOESTIMS
00853   REF   1                37,2110    76065 0
/00854  REF   1                37,2111   3 2116 0              CA       ESTICADR
00855   REF   1                37,2112   0 5133 0              TC       JOBSLEEP
00856   REF   2   LAST  376    37,2113   3 2116 0  GOESTIMS    CA       ESTICADR
00857   REF   2   LAST  374    37,2114   0 5137 1              TC       JOBWAKE
00858   REF   7   LAST  371    37,2115   0 5261 1              TC       TASKOVER
00859   REF   1                37,2116    76500 0  ESTICADR    CADR     ESTIMS
0086    REF  43   LAST  375    37,2117   3 4755 1  TORQUE      CA       ZERO
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 0087   REF   7  LAST  319   37,2120  55'047 1           TS       DSPTEM2
 0088   REF   1              37,2121  3 1504 1           CA       DRIFTI
 0089   REF   8  LAST  377   37,2122  55'050 1           TS       DSPTEM2 +1
 0090   REF   4  LAST  376   37,2123  51'416 0           INDEX    POSITON
 0091   REF   2  LAST  128   37,2124  55'420 1           TS       SOUTHDR -1
 0092   REF   1              37,2125  0 2457 0           TC       SHOW

 0093   REF   5  LAST  376   37,2126  51'414 1 PIPACHK   INDEX    NDXCTR               PIPA TEST
 0094                        37,2127  0 2130 1           TC       +1
 0095   REF   1              37,2130  0 2447 1           TC       EARTHR*
 0096   REF   2  LAST  375   37,2131  3 4361 1           CA       DEC17                ALLOW PIP COUNTER TO OVERFLOW 17 TIMES
 0097   REF   1              37,2132  55'476 1           TS       DATAPL +4            IN THE ALLOTED TIME INTERVAL
 0098   REF   1              37,2133  3 2474 1           CA       DEC58
 0099   REF   2  LAST  128   37,2134  55'412 0           TS       LENGTHCT
 0100   REF  20  LAST  369   37,2135  3 4753 1           CA       ONE
 0101   REF   1              37,2136  55'537 0           TS       RESULTCT
 0102   REF  44  LAST  376   37,2137  3 4755 1           CA       ZERO
 0103   REF   2  LAST  128   37,2140  51'415 0           INDEX    PIPINDEX
 0104   REF   2  LAST  307   37,2141  54 037 1           TS       PIPAX
 0105   REF   2  LAST  377   37,2142  55'472 0           TS       DATAPL
 0106   REF   1              37,2143  0 2332 1           TC       CHECKG
 0107                        37,2144  0 0004 0           INHINT
 0108   REF  16  LAST  369   37,2145  3 4752 0           CAF      TWO
 0109   REF   1              37,2146  0 5173 1           TC       TWIDDLE
 0110   REF   5  LAST  372   E5,1642                     EBANK=   XSM
 0111   REF   1              37,2147   02151 0           ADRES    PIPATASK
 0112   REF  34  LAST  370   37,2150  0 5155 0           TC       ENDOFJOB


 0113                        37,2151  0 0006 1 PIPATASK  EXTEND
 0114   REF   3  LAST  377   37,2152  27'412 0           DIM      LENGTHCT
 0115   REF   4  LAST  377   37,2153  3 1412 1           CA       LENGTHCT
 0116                        37,2154  0 0006 1           EXTEND
 0117   REF   1              37,2155  6 2161 0           BZMF     STARTPIP
 0118   REF  19  LAST  336   37,2156  3 4742 1           CAF      BIT10
 0119   REF   2  LAST  377   37,2157  0 5173 1           TC       TWIDDLE
 0120   REF   6  LAST  377   E5,1642                     EBANK=   XSM
 0121   REF   2  LAST  377   37,2160   02151 0           ADRES    PIPATASK
 0122   REF   2  LAST  270   37,2161  3 4736 1 STARTPIP  CAF      PRIO20
 0123   REF  14  LAST  370   37,2162  0 5105 0           TC       FINDVAC
 0124   REF   7  LAST  377   E5,1642                     EBANK=   XSM
 0125   REF   1              37,2163   02166 1           2CADR    PIPJOBB
 0125   REF   1              37,2164   76065 0
 0126   REF   8  LAST  376   37,2165  0 5261 1           TC       TASKOVER


 0127   REF   6  LAST  377   37,2166  51'414 1 PIPJOBB   INDEX    NDXCTR
 0128                        37,2167  0 2170 0           TC       +1
 0129   REF   2  LAST  377   37,2170  0 2447 1           TC       EARTHR*
 0130   REF   5  LAST  377   37,2171  3 1412 1           CA       LENGTHCT
 0131                          37,2172  0 0006 1             EXTEND
 0132                          37,2173  6 2175 0             BZMF    +2
 0133  REF  35  LAST  377      37,2174  0 5155 0             TC      ENODFJOB

 0134  REF   7  LAST  262      37,2175  3 4756 1             CA      FIVE
 0135 .REF   2  LAST  377      37,2176  55'537 0             TS      RESULTCT
 0136  REF   2  LAST  377      37,2177  0 2332 1             TC      CHECKG
 0137  REF   3  LAST  377      37,2200  11'473 1             CCS     OATAPL +1
 0138                          37,2201  0 2205 1             TC      +4
 0139  REF   1                 37,2202  0 5675 0             TC      CCSHOLE
 0140  REF   4  LAST  378      37,2203  4 1476 1             CS      DATAPL +4
 0141  REF   5  LAST  378      37,2204  55'476 1             TS      OATAPL +4
 0142                          37,2205  0 0006 1             EXTEND
 0143  REF   6  LAST  378      37,2206  4 1473 1             DCS     OATAPL
 0144  REF   7  LAST  378      37,2207  21'477 0             DAS     OATAPL +4

 0145  REF  22  LAST  376      37,2210  0 6042 1             TC      INTPRET
 0146                          37,2211   45345 1             DLOAD   OSU
 0147  REF   8  LAST  378      37,2212   02501 1                      OATAPL +6
 0148  REF   9  LAST  378      37,2213   02475 0                     DATAPL +2
 0149                          37,2214   45044 0             BPL     CALL
 0150  REF   1                 37,2215   76217 1                     AINGOTN
 0151  REF   1                 37,2216   76275 0                     OVERFFIX
 0152                          37,2217   56325 0  AINGDTN    PDDL    ODV
 0153  REF  10  LAST  378      37,2220   02477 1                     DATAPL +4
 0154                          37,2221   47075 0             OMPR    RT8
 0155  REF   1                 37,2222   37056 0                     OEC585          DEC585 HAS BEEN REDEFINED FOR LEM
 0156  REF   1                 37,2223   21613 0                     SGNAGREE
 0157  REF   9  LAST  377      37,2224   01050 0             STORE   OSPTEM2
 0158                          37,2225   77776 1             EXIT
 0159  REF   7  LAST  377      37,2226  11'414 0             CCS     NOXCTR
 0160  REF   1                 37,2227  0 2301 1             TC      CDAALIGN         TAKE PLATFORM OUT OF GIMBAL LOCK
 0161  REF   2  LAST  377      37,2230  0 2457 0             TC      SHOW
 0162  REF   1                 37,2231  3 2471 1  VERTDRFT   CA      3990DEC          ABOUT 1 HOUR VERTICAL DRIFT TEST
 0163  REF   6  LAST  377      37,2232  55'412 0             TS      LENGTHOT
 0164  REF   5  LAST  377      37,2233  51'416 0             INDEX   POSITON
 0165  REF   3  LAST  377      37,2234  4 1417 0             CS      SOUTHDR -2
 0166  REF   1                 37,2235  55'442 0             TS      ORIFTT
 01661 REF   3  LAST  377      37,2236  11'415 1             CCS     PIPINDEX         OFFSET PLATFORM TO MISS PIP DEAD-ZONES
 01662 REF   1                 37,2237  1 2245 1             TCF     PON4             Z UP IN POS 4
 01663 REF  19  LAST  302      37,2240  4 4747 0  PON2       CS      BIT5             X UP
 01664 REF   1                 37,2241  27'565 1             ADS     ERCOMP +2
 01665 REF  20  LAST  378      37,2242  3 4747 1             CA      BIT5
 01666 REF   2  LAST  378      37,2243  27'567 0             ADS     ERCOMP +4
 01667 REF   1                 37,2244  1 2251 1             TCF     PON
 01668 REF  21  LAST  378      37,2245  4 4747 0  PON4       CS      BIT5
 01669 REF   3  LAST  378      37,2246  27'565 1             ADS     ERCOMP +2
 016691 REF 22  LAST  378      37,2247  3 4747 1             CA      BIT5
 016692 REF  4  LAST  378      37,2250  27'563 1             ADS     ERCOMP
 0167  REF   3  LAST  377      37,2251  0 2447 1  PON        TC      EARTHR*
 0168   REF  45  LAST  377    37,2252  3 4755 1              CA      ZERO               ALLOW ONLY SOUTH GYRO EARTH RATE COMPENS
 0169   REF   2  LAST  128    37,2253  55'404 1              TS      ERVECTOR
 0170   REF   3  LAST  379    37,2254  55'405 0              TS      ERVECTOR +1
 0171   REF   4  LAST  221    37,2255  3 4733 1  GUESS1      CAF     POSMAX
 0172   REF   3  LAST  375    37,2256  55'440 1              TS      TORQNDX
 0173   REF   4  LAST  379    37,2257  55'441 0              TS      TORQNDX +1
 0174   REF   8  LAST  359    37,2260  3 0032 0              CA      CDUX
 0175   REF   2  LAST  128    37,2261  55'413 1              TS      LOSVEC
 0176   REF   2  LAST  376    37,2262  0 2500 0              TC      ESTIMS
 0177   REF   1               37,2263  3 1502 1  VALMIS      CA      DRIFTO
 0178   REF  10  LAST  378    37,2264  55'050 1              TS      DSPTEM2 +1
 0179   REF  46  LAST  379    37,2265  3 4755 1              CA      ZERO
 0180   REF  11  LAST  379    37,2266  55'047 1              TS      DSPTEM2
 0181   REF   3  LAST  378    37,2267  0 2457 0              TC      SHOW


 0182   REF  33  LAST  376    37,2270  0 5516 0  ENDTEST1    TC      DOWNFLAG
 0183   REF   3  LAST  289    37,2271   00007 0              ADRES   IMUSE
 0184   REF  47  LAST  379    37,2272  4 4755 0              CS      ZERO
 0185   REF   2  LAST  234    37,2273  0 5314 1              TC      NEWMODEA
 0186   REF  29  LAST  342    37,2274  0 5472 0              TC      ENDEXT
 0187                               37,2275   43215 0  OVERFFIX DAO     OAO
 0188    REF    3  LAST  302        37,2276   06532 0                   OPPOSMAX
 0189    REF    1                   37,2277   37064 1                   ONEOPP
 0190                               37,2300   77616 0           RVQ


 0191                               37,2301  0 0006 1  COAALIGN EXTEND                           COARSE ALIGN SUBROUTINE
 0192    REF    2  LAST  375        37,2302  23'571 0           QXCH    ZERONDX
 0193    REF   48  LAST  379        37,2303  3 4755 1           CA      ZERO
 0194    REF    7  LAST  307        37,2304  54 321 0           TS      THETAD
 0195    REF    8  LAST  380        37,2305  54 322 0           TS      THETAD +1
 0196    REF    9  LAST  380        37,2306  54 323 1           TS      THETAD +2
 0197    REF   71  LAST  376        37,2307  0 4616 1           TC      BANKCALL
 0198    REF    3  LAST  376        37,2310   16771 1           CADR    IMUCOARS
 0199    REF   72  LAST  380        37,2311  0 4616 1  ALIGNCOA TC      BANKCALL
 0200    REF    7  LAST  335        37,2312   17707 1           CADR    IMUSTALL
 0201    REF    1                   37,2313  0 3047 1           TC      SOMERR2
 0202    REF    3  LAST  380        37,2314  0 1571 0           TC      ZERONDX


 0203                               37,2315  0 0006 1  IMUSLLLG EXTEND
 0204    REF    4  LAST  380        37,2316  23'571 0           QXCH    ZERONDX
 0205    REF    1                   37,2317  0 2311 0           TC      ALIGNCOA

 0206                               37,2320  0 0006 1  FINIMUDD EXTEND
 0207    REF    5  LAST  380        37,2321  23'571 0           QXCH    ZERONDX
 0208    REF   73  LAST  380        37,2322  0 4616 1           TC      BANKCALL
 0209    REF    2  LAST  275        37,2323   17201 1           CADR    IMUFINE
 0210    REF    2  LAST  380        37,2324  0 2311 0           TC      ALIGNCOA

 0211                               37,2325  0 0006 1  IMUZERR  EXTEND
 0212    REF    6  LAST  380        37,2326  23'571 0           QXCH    ZERONDX
 0213    REF   74  LAST  380        37,2327  0 4616 1           TC      BANKCALL
 0214    REF    3  LAST  266        37,2330   16705 1           CADR    IMUZERO
 0215    REF    3  LAST  380        37,2331  0 2311 0           TC      ALIGNCOA


 0216                               37,2332  0 0006 1  CHECKG   EXTEND                          PIP PULSE CATCHING ROUTINE
 0217    REF    4  LAST  292        37,2333  23'417 1           QXCH    QPLACE
 0218                               37,2334  0 2342 0           TC      +6
 0219                               37,2335  0 0003 1  CHECKG1  RELINT
 0220    REF    3  LAST  264        37,2336  3 0067 0           CA      NEWJOB
 0221                               37,2337  0 0006 1           EXTEND
 0222                               37,2340  6 2346 1           BZMF    +6
 0223    REF    2  LAST  264        37,2341  0 5122 0           TC      CHANG1
 0224                               37,2342  0 0004 0           INHINT
 0225    REF    4  LAST  378        37,2343  51'415 0           INDEX   PIPINDEX
 0226    REF    3  LAST  377        37,2344  4 0037 1           CS      PIPAX
 0227    REF    7  LAST  380        37,2345  55'571 1           TS      ZERONDX
 0228                               37,2346  0 0004 0           INHINT
 0229    REF   5  LAST  380   37,2347  51'415 0            INDEX   PIPINDEX
 0230    REF   4  LAST  380   37,2350  3 0037 0            CA      PIPAX
 0231    REF   6  LAST  380   37,2351  6 1571 0            AD      ZERONDX
 0232                         37,2352  0 0006 1            EXTEND
 0233    REF   1              37,2353  1 2335 1            BZF     CHECKG1
 0234    REF   6  LAST  381   37,2354  51'415 0            INDEX   PIPINDEX
 0235    REF   5  LAST  381   37,2355  3 0037 0            CA      PIPAX
 0236    REF   3  LAST  378   37,2356  51'537 1            INDEX   RESULTCT
 0237    REF  11  LAST  378   37,2357  55'472 0            TS      DATAPL
 0238    REF   1              37,2360  0 4102 0            TC      FINETIME
 0239    REF   4  LAST  381   37,2361  51'537 1            INDEX   RESULTCT
 0240    REF  12  LAST  381   37,2362  55'473 1            TS      DATAPL  +1
 0241    REF   5  LAST  381   37,2363  51'537 1            INDEX   RESULTCT
 0242    REF  13  LAST  381   37,2364  23'474 1            LXCH    DATAPL  +2
 0243                         37,2365  0 0003 1            RELINT
 0244    REF   5  LAST  380   37,2366  0 1417 1  ENDCHKG   TC      OPLACE


 0245    REF  37  LAST  373   37,2367  54 001 1  ZEROING   TS      L
 0246                         37,2370  1 2372 1            TCF     +2
 0247    REF   9  LAST  381   37,2371  55'571 1  ZEROING1  TS      ZERONDX
 0248    REF  49  LAST  380   37,2372  3 4755 1            CAF     ZERO
 0249    REF  38  LAST  381   37,2373  50 001 0            INDEX   L
 0250                         37,2374  54 000 0            TS      0
 0251    REF  39  LAST  381   37,2375  24 001 0            INCR    L
 0252    REF  10  LAST  381   37,2376  11'571 1            CCS     ZERONDX
 0253    REF   1              37,2377  1 2371 1            TCF     ZEROING1
 0254    REF  41  LAST  368   37,2400  0 0002 0            TC      Q
 0258                          37,2401   65345 0  ERTHRVSE DLOAD  PDDL
 0259   REF   1                37,2402   37057 1                  SCHZEROS        PD24 = (SIN          -COS     0)(OMEG/MS)
 0260   REF   5  LAST  376     37,2403   02403 1                  LATITUDE
 0261                          37,2404   57546 1           COS    DCOMP
 0262                          37,2405   73525 1           PDDL   SIN
 0263   REF   6  LAST  382     37,2406   02403 1                  LATITUDE
 0264                          37,2407   74266 0           VDEF   VXSC
 0265   REF   1                37,2410   36001 0                  OMEG/MS
 0266   REF   4  LAST  379     37,2411   02405 1           STORE  ERVECTOR
 0267                          37,2412   77634 0           RTB
 0268   REF   3  LAST  341     37,2413   21574 1                  LOADTIME
 0269   REF   2  LAST  128     37,2414   26433 1           STOVL  TMARK
 0270   REF   2  LAST  382     37,2415   37057 1                  SCHZEROS
 0271   REF   5  LAST  378     37,2416   02564 1           STORE  ERCOMP
 0272                          37,2417   77616 0           RVQ

 0276                          37,2420   47020 0  EARTHR   ITA    RTB
 0277   REF   3  LAST  325     37,2421   00051 0                  S2
 0278   REF   4  LAST  382     37,2422   21574 1                  LOADTIME
 0279   REF   2  LAST  128     37,2423   02431 0           STORE  TEMPTIME
 0280                          37,2424   51025 1           DSU    BPL
 0281   REF   3  LAST  382     37,2425   02433 1                  TMARK
 0282   REF   1                37,2426   76431 0                  ERTHR
 0283                          37,2427   77624 1           CALL
 0284   REF   2  LAST  378     37,2430   76275 0                  OVERFIX
 0285                          37,2431   74261 1  ERTHR    SL     VXSC
 0286                          37,2432   20212 1                  90
 0287   REF   5  LAST  382     37,2433   02405 1                  ERVECTOR
 0288                          37,2434   53321 1           MXV    VAD
 0289   REF   8  LAST  377     37,2435   02643 1                  XSM
 0290   REF   6  LAST  382     37,2436   02564 1                  ERCOMP
 0291   REF   7  LAST  382     37,2437   16564 1           STODL  ERCOMP
 0292   REF   3  LAST  382     37,2440   02431 0                  TEMPTIME
 0293   REF   4  LAST  382     37,2441   02433 1           STORE  TMARK
 0294                          37,2442   47170 1           AXT,1  RTB
 0295   REF   8  LAST  382     37,2443   02563 0           ECADR  ERCOMP
 0296   REF   1                37,2444   21706 0                  PULSEIMU
 0297                          37,2445   77650 1           GOTO
 0298   REF   4  LAST  382     37,2446   00051 0                  S2

 02991                         37,2447   0 0006 1  EARTHR*  EXTEND
 02992  REF   2  LAST  128     37,2450   23 420 0           QXCH   QPLACES
 02993  REF  23  LAST  378     37,2451   0 6042 1           TC     INTPRET
 02994                         37,2452   77624 1           CALL
 02995  REF   1                37,2453   76420 0                  EARTHR
 02996                         37,2454   77776 1           EXIT
 02997  REF   2  LAST  376     37,2455   0 2315 1           TC     IMUSLLLG
 02998  REF   3  LAST  382     37,2456   0 1420 0           TC     QPLACES

 0300                          37,2457   0 0006 1  SHOW     EXTEND
 0301   REF   6  LAST  381    37,2460  23'417 1            OXCH     OPLACF
 D3D2   REF   6  LAST  378    37,2461  3 1416 0  SHOW1     CA       POSITCN
 03D3   REF  12  LAST  379    37,2462  55'051 D            TS       OSPTEM2 +2
 03D4   REF   1               37,2463  3 2472 1            CA       V8D6N98
 D305   REF  75  LAST  38D    37,2464  0 4616 1            TC       8ANKCALL
 03D6   REF   5  LAST  375    37,2465   20477 1            CADR     GDFLASH
 0307   REF   2  LAST  375    37,2466  C 2270 0            TC       ENOTEST1         V 34
 0308   REF   7  LAST  383    37,2467  0 1417 1            TC       OPLACE            V33
 0309   REF   1               37,2470  1 2461 1            TCF      SHCW1


 0311                         37,2471   07626 1  3990DEC   OEC      3990
 0312                         37,2472   01542 0  VB06N98   VN       0698
 D313                         37,2473   01451 0  VN0641    VN       0641
 0315   REF   2  LAST  273       4361            OEC17     =        NOI
 0316                         37,2474   00072 1  DEC58     OEC      58
 0317   REF   9  LAST  319    37,2475   C2737 0  OGCPL     FCADR    OGC
 0318   REF   3  LAST  302       4777            1SECX     =        1SEC
 0319   REF   2  LAST  375    37,2476   D1664 1  XNBADR    GENAOR   XNB
 0320   REF   9  LAST  382    37,2477   C1642 0  XSMADR    GENADR   XSM
 0322                            4102                      8LOCK    2
 0323   REF   1                                            COUNT*   $$/P07
 0324                            4102  0 0004 D  FINETIMF  INHINT                    RETURNS WITH INTERRUPT INHIBITED
 D325                            41D3  D 0006 1            EXTENO
 0326   REF   1                  4104  0C 004 0            READ     LOSCALAR
 0327   REF  40  LAST  381       4105  54 001 1            TS       L
 0328                            4106  C 0006 1            EXTENO
 0329   REF   2  LAST  383       4107  C6 C04 0            RXOR     LOSCALAR
 D330                            4110  0 0006 1            FXTENO
 0331                            4111  1 4115 1            8ZF      +4
 0332                            4112  0 0006 1            FXTEND
 D333   REF   3  LAST  383       4113  00 D04 0            REAO     LOSCALAR
 0334   REF  41  LAST  383       4114  54 001 1            TS       L
 0335   REF   5  LAST  379       4115  4 4733 D  +4        CS       PDSMAX
 0336   REF  42  LAST  383       4116  6 0001 0            AD       L
 0337                            4117  C 0006 1            EXTEND
 0338   REF   2  LAST  381       4120  1 4103 D            8ZF      FINETIME +1
 D339                            4121  0 0006 1            FXTENO
 034D   REF   1                  4122  00 003 1            RFAD     HISCALAR
 0341   REF  42  LAST  381       4123  0 0002 0            TC       Q
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R0001    PROGRAM-IMU PERFORMANCE TESTS 4
R0002    DATE-NOV 15,1966
R0003    BY- GEORGE SCHMIDT IL7-146 EXT 1126
R0004    MOD NO-ZERO


R0005    FUNCTIONAL DESCRIPTION

R0006    THIS SECTION CONSISTS OF THE FILTER FOR THE GYRO DRIFT TESTS. NO COMPASS
R0007    IS DONE IN LEM. FOR A DESCRIPTION OF THE FILTER SEE E-1973. THIS
R0008    SECTION IS ENTERED FROM IMU 2. IT RETURNS THERE AT END OF TEST.

R0009    EARTHR,OGC ZERO,ERTHRVSE

R0010    NORMAL EXIT

R0011    LENGTHOT GOES TO ZERO-RETURN TO IMU PERF TESTS 2 CONTROL

R0012    ALARMS

R0013    1600 OVERFLOW IN DRIFT TEST
R0014    1601     BAD IMU MODING IN ANY ROUTINE THAT USES IMUSTALL
R0015    OUTPUT

R0016    FLASHING DISPLAY OF RESULTS-CONTROLLED IN IMU PERF TESTS 2

R0017    DEBRIS

R0018    ALL CENTRALS-ALL OF EBANK XSM
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 0019                          33,2045                          BANK    33
 0020    REF   1               37,2000                          SETLOC  IMU4
 0021                          37,2500                          BANK
 0022    REF   3 LAST  375 TO  383:    318    320*              COUNT*  $$/P07

 0023    REF  10  LAST  383    E5,1642                          EBANK=  XSM


 0024                          37,2500  0 0004 0  ESTIMS        INHINT
 0025    REF   1               37,2501  31'572 0                CAE     1SECXT
 0026    REF   3  LAST  377    37,2502  0 5173 1                TC      TWIDDLE
 0027    REF  11  LAST  385    E5,1642                          EBANK=  XSM
 0028    REF   1               37,2503   02536 0                ADRES   ALLOOP
 0029    REF  50  LAST  381    37,2504  3 4755 1                CAF     ZERO                ZERO THE PIPAS
 0030    REF   6  LAST  381    37,2505  54 037 1                TS      PIPAX
 0031    REF   1               37,2506  54 040 1                TS      PIPAY
 0032    REF   1               37,2507  54 041 0                TS      PIPAZ
 0033                          37,2510  0 0003 1                RELINT
 0034    REF   1               37,2511  3 3075 0                CA      77DECML
 0035    REF  11  LAST  381    37,2512  55'571 1                TS      ZERONDX
 0036    REF   1               37,2513  3 3076 0                CA      ALXXXZ
 0037    REF   2  LAST  375    37,2514  0 2367 1                TC      ZEROING
 0038    REF  24  LAST  382    37,2515  0 6042 1                TC      INTPRET
 0039                          37,2516   77735 0                SLOAD
 0040    REF   3  LAST  382    37,2517   37057 1                        SCHZEROS
 0041    REF  10  LAST  338    37,2520   25477 1                STOVL   GCOMPSW -1
 0042    REF   1               37,2521   37070 1                        INTVAL +2
 0043    REF   1               37,2522   26445 0                STOVL   ALX1S
 0044    REF   4  LAST  385    37,2523   37057 1                        SCHZEROS
 0045    REF   6  LAST  331    37,2524   00325 0                STORE   DELVX
 0046    REF  23  LAST  339    37,2525   01472 1                STORE   GCOMP
 00461                         37,2526   77735 0                SLOAD
 00462   REF   5  LAST  379    37,2527   02441 1                        TORQNDX
 00463                         37,2530   50076 0                BCOMP   BMN
 00464   REF   1               37,2531   76534 1                        VERTSKIP
 0047                          37,2532   77624 1                CALL
 00471   REF   1               37,2533   76401 0                        ERTHRVSE
 00472                         37,2534   77776 1  VERTSKIP      EXIT
 0048    REF   1               37,2535  0 3035 1                TC      SLEEPIE +1
 00481  REF   2  LAST  375    37,2536  3 1576 1  ALLOOP   CA      OVFLOWCK
 004815                       37,2537  0 0006 1           EXTEND
 00482                        37,2540  1 2542 1           BZF     +2
 00483  REF   9  LAST  377    37,2541  0 5261 1           TC      TASKOVER
 0049   REF   1               37,2542  11'530 1           CCS     ALTIM
 0050   REF  99  LAST  369    37,2543  3 0000 1           CA      A                        SHOULD NEVER HIT THIS LOCATION
 0051   REF   1               37,2544  55'531 0           TS      ALTIMS
 0052   REF 100  LAST  386    37,2545  4 0000 0           CS      A
 0053   REF   2  LAST  386    37,2546  55'530 1           TS      ALTIM
 00531  REF  21  LAST  377    37,2547  4 4753 0           CS      ONE
 00532  REF   1               37,2550  6 1562 1           AD      GEOCOMPS
 00533                        37,2551  0 0006 1           EXTEND
 00534                        37,2552  1 2556 1           BZF     +4
 0054   REF   7  LAST  378    37,2553  3 1412 1           CA      LENGTHOT
 0055                         37,2554  0 0006 1           EXTEND
 0056                         37,2555  6 2562 1           BZMF    +5
 0057   REF   2  LAST  365    37,2556  31'572 0           CAE     1SECXT
 0058   REF   4  LAST  385    37,2557  0 5173 1           TC      TWIDDLE
 0059   REF  12  LAST  385    E5,1642                     EBANK=  XSM
 0060   REF   2  LAST  385    37,2560   02536 0           ADRES   ALLOOP
 0061   REF  51  LAST  385    37,2561  3 4755 1           CAF     ZERO
 0062   REF   7  LAST  385    37,2562  56 037 0           XCH     PIPAX
 0063   REF   7  LAST  385    37,2563  54 324 0           TS      DELVX
 0064   REF  52  LAST  386    37,2564  3 4755 1           CAF     ZERO
 0065   REF   2  LAST  385    37,2565  56 040 0           XCH     PIPAY
 0066   REF   4  LAST  331    37,2566  54 326 1           TS      DELVY
 0067   REF  53  LAST  386    37,2567  3 4755 1           CAF     ZERO
 0068   REF   2  LAST  385    37,2570  56 041 1           XCH     PIPAZ
 0069   REF   3  LAST  332    37,2571  54 330 0           TS      DELVZ
 0070   REF   3  LAST  377    37,2572  3 4736 1  SPECSTS  CAF     PRIO20
 0071   REF  15  LAST  377    37,2573  0 5105 0           TC      FINDVAC
 0072   REF  13  LAST  386    E5,1642                     EBANK=  XSM
 0073   REF   1               37,2574   02577 0           2CADR   ALFLT                    START THE JOB
 0073   REF   1               37,2575   76065 0
 0074   REF  10  LAST  386    37,2576  0 5261 1           TC      TASKOVER
 0075    REF   2  LAST  386    37,2577  11'562 0  ALFLT    CCS    GEOCCMPS
 0076                          37,2600  0 2602 1           TC     +2
 00761   REF   1               37,2601  0 2604 1           TC     NCRMLOP
 0077    REF  76  LAST  383    37,2602  C 4616 1           TC     BANKCALL
 0078    REF   1               37,2603   15271 1           CACR   1/PIPA
 0079    REF  25  LAST  385    37,2604  C 6042 1  NCRMLCP  TC     INTPRET
 0080                          37,2605   77745 1           OLOAD
 0081    REF   2  LAST  385    37,2606   37066 0                  INTVAL
 0082    PEF   5  LAST  364    37,2607   24C51 0           STCVL  S1
 00821   REF   8  LAST  386    37,2610   00325 0                  DELVX
 00822                         37,2611   76505 0           VXM    VSL1
 008231 REF  14  LAST  386    37,2612   02643 1                  XSM
 008232                        37,2613   57545 1           OLOAO  OCOMP
 008233 REF  69  LAST  375    37,2614   00160 0                  MPAC +3
 008234 REF   1               37,2615   16523 1           STOOL  OPIPAY
 008235 REF  70  LAST  387    37,2616   00162 1                  MPAC +5
 008236 REF   1               37,2617   C2527 0           STORE  OPIPAZ

 008237                        37,2620   76001 1           SETPO  AXT,1
 00824                         37,2621   00001 0                  0
 00825                         37,2622   00010 0                  80
 00826                         37,2623   57535 0           SLOAO  DCOMP
 00827   REF   3  LAST  387    37,2624   02563 0                  GEOCOMPS
 00828                         37,2625   77640 0           BMN
 00829   REF   1               37,2626   76772 1                  PERFERAS
 0083                          37,2627   50135 0  ALCGKK   SLOAO  8MN
 0084    REF   2  LAST  386    37,2630   02532 1                  ALTIMS
 0085    REF   1               37,2631   76644 0                  ALFLT3
 0086                          37,2632   72174 0  ALKCG    AXT,2  LXA,1            LOAOS SLOPFS ANO TIME CONSTANTS AT RQST
 0087                          37,2633   00014 1                  120
 0088    REF   2  LAST  385    37,2634   02444 1                  ALXIS
 0089                          37,2635   62143 0  ALKCG2   OLOAO* INCR,1
 0090    REF   1               37,2636   02243 0                  ALFOK +1440,1
 0091                          37,2637   77775 1           OEC    -2
 0092    PEF   1               37,2640   12545 0           STORE  ALOK +100,2
 0093                          37,2641   66104 1           TIX,2  SXA,1
 0094    REF   1               37,2642   76635 0                  ALKCG2
 0095    REF   3  LAST  387    37,2643   02444 1                  ALXIS

 01074                         37,2644   77770 1  ALFLT3   AXT,1
 01075                         37,2645   00010 0                  80
 0108                          37,2646   41343 0  CELMLP   OLCAO* OMP
 0109    REF   2  LAST  387    37,2647   02533 0                  OPIPAY +80,1
 0110    REF   1               37,2650   37100 1                  PIPASC
 0111                          37,2651   43661 1           SLR    80SU*
 0112                          37,2652   21212 0                  90
 0113    REF   1               37,2653   02501 1                  INTY +8C,1
 0114    REF   2  LAST  387    37,2654   06501 0           STCRE  INTY +8C,1
 0115                          37,2655   40725 0           POOL   OMP*
 0116    REF   1               37,2656   37102 0                  VELSC
 0117   REF   1                  37,2657   02521 0                     VLAUN +8D,1
 0118                            37,2660   77732 1            SL2R
 0119                            37,2661   45425 0            DSU      STADR
 0120   REF   1                  37,2662   71216 1            STORE    DELM +8D,1
 0121   REF   2  LAST   388      37,2663   06563 1            STORE    DELM +10D,1
 0122                            37,2664   77100 0            TIX,1    AXT,2
 0123   REF   1                  37,2665   76646 1                     DELMLP
 0124                            37,2666   00004 0                     4
 0125                            37,2667   56743 1  ALILP     DLOAD*   DMPR*
 0126   REF   2  LAST   129      37,2670   75324 0                     ALK +4,2
 0127   REF   2  LAST   367      37,2671   75240 0                     ALDK +4,2
 0128   REF   3  LAST   368      37,2672   12453 0            STORE    ALK +4,2
 0129                            37,2673   77104 1            TIX,2    AXT,2
 0130   REF   1                  37,2674   76667 1                     ALILP
 0131                            37,2675   00010 0                     8D
 0132                            37,2676   66140 1  ALKLP     LXC,1    SXA,1
 0133   REF   1                  37,2677   02445 0                     CMPX1
 0134   REF   2  LAST   388      37,2700   02445 0                     CMPX1
 0135                            37,2701   56743 1            DLOAD*   DMPR*
 0136   REF   4  LAST   388      37,2702   02450 1                     ALK +1,1
 0137   REF   3  LAST   388      37,2703   75216 0                     DELM +8D,2
 0138                            37,2704   77613 0            DAD*
 0139   REF   3  LAST   387      37,2705   75276 0                     INTY +8D,2
 0140   REF   4  LAST   388      37,2706   12501 0            STORE    INTY +8D,2
 0141                            37,2707   42743 1            DLOAD*   DAD*
 0142   REF   5  LAST   388      37,2710   75314 0                     ALK +12D,2
 0143   REF   3  LAST   388      37,2711   75230 1                     ALDK +12D,2
 0144   REF   6  LAST   388      37,2712   12463 0            STORE    ALK  +12D,2
 0145                            37,2713   42673 0            DMPR*    DAD*
 0146   REF   4  LAST   388      37,2714   75216 0                     DELM +8D,2
 0147   REF   5  LAST   388      37,2715   75266 1                     INTY +16D,2
 0148   REF   6  LAST   388      37,2716   12511 1            STORE    INTY +16D,2
 0149                            37,2717   40743 0            DLOAD*   DMP*
 0150   REF   1                  37,2720   37105 1                     ALSK +1,1
 0151   REF   5  LAST   388      37,2721   75216 0                     DELM +8D,2
 0152                            37,2722   42772 0            SL1R     DAD*
 0153   REF   2  LAST   388      37,2723   75256 1                     VLAUN +8D,2
 0154   REF   3  LAST   388      37,2724   12521 1            STORE    VLAUN +8D,2
 0155                            37,2725   76104 0            TIX,2    AXT,1
 0156   REF   1                  37,2726   76676 1                     ALKLP
 0157                            37,2727   00010 0                     8D


 0158                            37,2730   64743 0  LOCSE     DLOAD*   PDDL*
 0159   REF   1                  37,2731   02523 1                     ACCWD +8D,1
 0160   REF   4  LAST   388      37,2732   02521 0                     VLAUN +8D,1
 0161                            37,2733   55523 0            PDDL*    VDEF
 0162   REF   1                  37,2734   02531 1                     POSNV +8D,1
 0163                            37,2735   76521 0            MXV      VSL1
 0164   REF   2  LAST   118      37,2736   02001 1                     TRANSM1
 0165                              37,2737   77745 1            DLOAD
 0166    REF  71  LAST  387        37,2740   00155 0                    MPAC
 0167    REF   2  LAST  388        37,2741   06531 0            STORE   PDSNV +80,1
 0168                              37,2742   77745 1            DLDAO
 0169    REF  72  LAST  389        37,2743   CC16D 0                    MPAC +3
 0170    REF   5  LAST  388        37,2744   06521 1            STOKE   VLAUN +8D,1
 0171                              37,2745   77745 1            DLCAO
 0172    REF  73  LAST  389        37,2746   C0162 1                    MPAC +5
 0173    REF   2  LAST  388        37,2747   06523 D            STORE   ACCWO +8D,1
 0174                              37,275D   77700 0            TIX,1
 0175    REF   1                   37,2751   76730 1                    LODSE


 D176                              37,2752   76174 1            AXT,2   AXT,1               EVALUATE SINES ANO COSINES
 0177                              37,2753   00006 1                    6
 C178                              37,2754   0D002 0                    2
 0179                              37,2755   57343 1  80CP      DLCAD*  DMPR
 0180    REF   1                   37,2756   02503 D                    ANGX +2,1
 0181    REF   1                   37,2757   37110 D                    GEDRGEJ
 0182                              37,2760   77722 D            SR2R
 0183                              37,2761   73406 1            PUSH    SIN
 0184                              37,2762   56072 1            SL3R    XAO,1
 0185    REF   2  LAST  253        37,2763   CC046 0                    X1
 0186                              37,2764   10021 0            STORE   16D,2
 0187                              37,2765   77745 1            DLCAD
 0188                              37,2766   77746 1            CDS
 0189                              37,2767   10027 0            STORE   22D,2               COSINES
 0190                              37,2770   77704 1            TIX,2
 0191    REF   1                   37,2771   76755 1                    8DOP


 0192                              37,2772   77776 1  PERFERAS  EXIT
 0193    REF   1                   37,2773   3 5016 0           CA      F8ANK7
 0194    REF  11  LAST  338        37,2774   54 003 0           TS      E8ANK
 0195    REF   1                   E7,1400                      E8ANK=  ATIGINC
 0196    REF   2  LAST  389        37,2775   C 1400 1           TC      ATIGINC             GOTO ERASA8LE TO CALCULATE CNLY TO RETN

R0197                   CALTICN

R0198     THE ERASA8LE PROGRAM THAT DCES THE CALCULATICNS MUST 8E LOADED
R0199     8EFORE ANY ATTEMPT IS MACE TC RUN THE IMU PERFORMANCE TEST

 01995   REF   5  LAST  376        E5,1400                      EBANK=  AZIMUTH
 0290    REF   8  LAST  386        37,2776   11'412 0           CCS     LENGTHCT
 0291    REF   2  LAST  385        37,2777   0 3034 D           TC      SLEEPIE
 0292    REF   6  LAST  385        37,3000   11'440 1           CCS     TORQNDX
 0293                              37,3001   1 3003 D           TCF     +2
 0294    REF   1                   37,3002   C 3005 1           TC      SETUPER1
 0295    REF   9  LAST  379        37,3003   3 C032 D           CA      CDUX
 0296    REF   3  LAST  379        37,3004   55'414 0           TS      LOSVEC +1           FOR TROU8LESHCCTING VD POSNS 2$4
 0297   REF  26  LAST  387   37,3005  0 6042 1  SETUPER1 TC     INTPRET         ANGLES FROM DRIFT TEST ONLY
 0298                        37,3006   65345 0           DLOAD  PDDL
 0299   REF   1              37,3007   02473 0                  ANGZ
 0300   REF   1              37,3010   02477 1                  ANGY
 0301                        37,3011   55525 0           PDDL   VDEF
 0302   REF   2  LAST  389   37,3012   02501 1                  ANGX
 0303                        37,3013   74276 1           VCOMP  VXSC
 0304   REF   2  LAST  389   37,3014   37110 0                  GEORGEJ
 0305                        37,3015   74521 1           MXV    VSR1
 0306   REF  15  LAST  387   37,3016   02643 1                  XSM
 0307   REF  10  LAST  383   37,3017   02740 0           STORE  OGC
 0308                        37,3020   77776 1           EXIT


 0309   REF   1              37,3021  3 2475 0           CA     OGCPL
 0310   REF  77  LAST  387   37,3022  0 4616 1           TC     BANKCALL
 0311   REF   3  LAST  335   37,3023   17314 1           CADR   IMUPULSE
 0312   REF   3  LAST  382   37,3024  0 2315 1           TC     IMUSLLLG
 0313   REF   7  LAST  389   37,3025  11'440 1  GEOSTRT4 CCS    TORQNDX         ONLY POSITIVE IF IN VERTICAL DRIFT TEST
 0314   REF   1              37,3026  0 2263 1           TC     VALMIS
 0315   REF  27  LAST  390   37,3027  0 6042 1           TC     INTPRET
 03151                       37,3030   77624 1           CALL
 03152  REF   2  LAST  385   37,3031   76401 0                  ERTHRVSE
 03153                       37,3032   77776 1           EXIT
 0316   REF   1              37,3033  0 2117 1           TC     TORQUE


 0317   REF   9  LAST  389   37,3034  55'412 0  SLEEPIE  TS     LENGTHOT        TEST NOT OVER-DECREMENT LENGTHOT
 0318   REF   8  LAST  390   37,3035  11'440 1           CCS    TORQNDX         ARE WE DOING VERTDRIFT
 0319   REF   4  LAST  378   37,3036  0 2447 1           TC     EARTHR*
 0320   REF  36  LAST  378   37,3037  0 5155 0           TC     ENDOFJOB


 0321   REF   1              37,3040  3 5014 1  SOMEERRR CA     EBANK5
 03211  REF  12  LAST  389   37,3041  54 003 0           TS     EBANK
 03212  REF  22  LAST  386   37,3042  3 4753 1           CA     ONE
 03213  REF   3  LAST  386   37,3043  55'576 0           TS     OVFLOWCK        STOP ALLCOP FROM CALLING ITSELF
 03214  REF  19  LAST  365   37,3044  0 5567 0           TC     ALARM
 0322                        37,3045   01600 0           OCT    1600
 0323   REF   3  LAST  383   37,3046  0 2270 0           TC     ENDTEST1
 0324   REF   1              37,3047  3 3054 0  SOMERR2  CAF    OCT1601
 0325   REF   2  LAST  182   37,3050  0 5734 1           TC     VARALARM
 0330   REF  34  LAST  379   37,3051  0 5516 0           TC     DOWNFLAG
 0331   REF   4  LAST  379   37,3052   00007 0           ADRES  IMUSE
 0332   REF  37  LAST  390   37,3053  0 5155 0           TC     ENDOFJOB


 0333                        37,3054   01601 1  OCT1601  OCT    01601
 0334                        37,3055   06200 0  DEC585   OCT    06200           3200 B+14  ORDER IS IMPORTANT
 0335                        37,3056   00000 1  SCHZEROS 2DEC   .00000000
 0335                        37,3057   00000 1
 0336                             37,3060   00000 1             2DEC     .00000000
 0336                             37,3061   00000 1
 0337                             37,3062   00000 1             OCT      00000
 0338                             37,3063   00000 1  ONEDPP     OCT      00000              ORDER IS IMPORTANT
 0339                             37,3064   00001 0             OCT      00001


 0340                             37,3065   00004 0  INTVAL     OCT      4
 0341                             37,3066   00002 0             OCT      2
 0342                             37,3067   00220 1             DEC      144
 0343                             37,3070   77776 1             DEC      -1
 0344                             37,3071   35730 0  SOUPLY     2DEC     .93505870          INITIAL GAINS FOR PIP OUTPUTS
 0344                             37,3072   00035 1
 0345                             37,3073   10317 0             2DEC     .26266423          INITIAL GAINS/4 FOR ERECTION ANGLES
 0345                             37,3074   17550 1


 0346                             37,3075   00115 1  77DECML    DEC      77
 0347    REF    4   LAST   387    37,3076   01443 0  ALXXXZ     GENADR   ALX1S -1
 0348                             37,3077   04133 1  PIPASC     2DEC     .13055869
 0348                             37,3100   02265 1
 0349                             37,3101   57223 0  VELSC      2DEC     -.52223476         512/980.402
 0349                             37,3102   66451 1
 0350                             37,3103   05427 0  ALSK       2DEC     .17329931         SSWAY VEL GAIN X 980.402/4096
 0350                             37,3104   12577 1
 0351                             37,3105   77567 0             2DEC     -.00835370        SSWAY ACCEL GAIN X 980.402/4096
 0351                             37,3106   44202 1


 0352                             37,3107   24276 1  GEORGEJ    2DEC     .63661977
 0352                             37,3110   14066 1
 0353                             37,3111   23073 1  GEORGEK    2DEC     .59737013
 0353                             37,3112   11773 1
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R0001    PROGRAM NAME - KEYBOARD AND DISPLAY PROGRAM
R0002    MOD NO - 4       DATE - 27 APRIL 1967       ASSEMBLY - PINDANCE REV 18
R0003    MOD BY - FILENE
R0004    LOG SECTION - PINBALL GAME  BUTTONS AND LIGHTS

R0009    FUNCTIONAL DESCRIPTION-

R0010       THE KEYBOARD AND DISPLAY SYSTEM PROGRAM OPERATES UNDER EXECUTIVE
R0011    CONTROL AND PROCESSES INFORMATION EXCHANGED BETWEEN THE AGC AND THE
R0012    COMPUTER OPERATOR.  THE INPUTS TO THE PROGRAM ARE FROM THE KEYBOARD,
R0013    FROM INTERNAL PROGRAMS, AND FROM THE UPLINK.
R0014       THE LANGUAGE OF COMMUNICATION WITH THE PROGRAM IS A PAIR OF WORDS
R0015    KNOWN AS VERB AND NOUN.  EACH OF THESE IS REPRESENTED BY A 2 CHARACTER
R0016    DECIMAL NUMBER.  THE VERB CODE INDICATES WHAT ACTION IS TO BE TAKEN, THE
R0017    NOUN CODE INDICATES TO WHAT THIS ACTION IS APPLIED.  NOUNS USUALLY
R0018    REFER TO A GROUP OF ERASABLE REGISTERS.

R0020    VERBS ARE GROUPED INTO DISPLAYS, LOADS, MONITORS (DISPLAYS THAT ARE
R0021    UPDATED ONCE PER SECOND), SPECIAL FUNCTIONS, AND EXTENDED VERBS(THESE
R0022    ARE OUTSIDE OF THE DOMAIN OF PINBALL AND CAN BE FOUND UNDER LOG SECTION
R0023    :EXTENDED VERBS:).
R0024    A LIST OF VERBS AND NOUNS IS GIVEN IN LOG SECTION :ASSEMBLY AND
R0025    OPERATION INFORMATION:.


R0026    CALLING SEQUENCES-

R0027    KEYBOARD:
R0028       EACH DEPRESSION OF A KEYBOARD BUTTON ACTIVATES INTERRUPT KEYRUPT1
R0029    AND PLACES THE 5 BIT KEY CODE INTO CHANNEL 15.  KEYRUPT1 PLACES THE KEY
R0030    CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE KEYBOARD AND DISPLAY
R0031    PROGRAM (AT :CHARIN:), AND EXECUTES A RESUME.

R0032    UPLINK:
R0033       EACH WORD RECEIVED BY THE UPLINK ACTIVATES INTERRUPT UPRUPT WHICH
R0034    PLACES THE 5 BIT KEY CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE
R0035    KEYBOARD AND DISPLAY PROGRAM (AT:CHARIN:) AND EXECUTES A RESUME.

R0036    INTERNAL PROGRAMS:
R0037       INTERNAL PROGRAMS CALL PINBALL AT :NVSUB: WITH THE DESIRED VERB/NOUN
R0038    CODE IN A (LOW 7 BITS FOR NOUN, NEXT 7 BITS FOR VERB).  DETAILS
R0039    DESCRIBED ON REMARKS CARDS JUST BEFORE :NVSUB: AND :NVSBWAIT: (SEE
R0040    SYMBOL TABLE FOR PAGE NUMBERS).


R0045    NORMAL EXIT MODES-

R0046       IF PINBALL WAS CALLED BY EXTERNAL ACTION, THERE ARE FOUR EXITS:
R004605           1) ALL BUT (2), (3), AND (4) EXIT DIRECTLY TO ENDOFJOB.
R00461            2) EXTENDED VERBS GO TO THE EXTENDED VERB FAN AS PART OF THE
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R004615              PINBALL EXECUTIVE JOB WITH PRIORITY 30000.  IT IS THE
R00462               RESPONSIBILITY OF THE EXTENDED VERB CALLED TO EVENTUALLY
R00463               CHANGE PRIORITY (IF NECESSARY) AND DO AN ENDOFJOB.
R004635              ALSO PINBALL IS A NOVAC JOB. EBANK SET FOR COMMON.
R00464            3) VERB 37. CHANGE OF PROGRAM (MAJOR MODE) CALLS :V37: IN THE
R00465               SERVICE ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO
R00466               30000.  THE NEW PROGRAM CODE (MAJOR MODE) IS LEFT IN A.
R00467            4) KEY RELEASE BUTTON CALLS :PINBRNCH: IN THE DISPLAY INTERFACE
R00468               ROUTINES AS PART OF THE PINBALL EXEC JOB WITH PRIO 30000 IF
R00469               THE KEY RELEASE LIGHT IS OFF AND :CADRSTOR: IS NOT +0.

R0047       IF PINBALL WAS CALLED BY INTERNAL PROGRAMS, EXIT FROM PINBALL IS BACK
R0048    TO CALLING ROUTINE.  DETAILS DESCRIBED IN REMARKS CARDS JUST BEFORE
R0049    :NVSUB: AND :NVSBWAIT: (SEE SYMBOL TABLE FOR PAGE NUMBERS).


R0050    ALARM OR ABORT EXIT MODES-

R0051    EXTERNAL INITIATION:
R0052       IF SOME IMPROPER SEQUENCE OF KEY CODES IS DETECTED, THE OPERATOR
R0053    ERROR LIGHT IS TURNED ON AND EXIT IS TO :ENDOFJOB:.

R0054    INTERNAL PROGRAM INITIATION:
R0055       IF AN ILLEGAL V/N COMBINATION IS ATTEMPTED, AN ABORT IS CAUSED
R0056    (WITH OCTAL 01501).
R00561      IF A SECOND ATTEMPT IS MADE TO GO TO SLEEP IN PINBALL, AN ABORT IS
R00562   CAUSED (WITH OCTAL 01206). THERE ARE TWO WAYS TO GO TO SLEEP IN PINBALL:
R00563            1) ENDIDLE OR DATAWAIT.
R00564            2) NVSBWAIT, PRENVBSY, OR NVSUBUSY.

R0057    CONDITIONS LEADING TO THE ABOVE ARE DESCRIBED IN FORTHCOMING MIT/IL
R0058    E-REPORT DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.


R0059    OUTPUT-

R0060       INFORMATION TO BE SENT TO THE DISPLAY PANEL IS LEFT IN THE :DSPTAB:
R0061    BUFFERS REGISTERS (UNDER EXEC CONTROL).  :DSPOUT: (A PART OF T4RUPT)
R0062    HANDLES THE PLACING OF THE :DSPTAB: INFORMATION INTO OUTPUT CHANNEL 10
R0063    IN INTERRUPT.


R0064    ERASABLE INITIALIZATION-

R0065       FRESH START AND RESTART INITIALIZE THE NECESSARY E REGISTERS FOR
R0066    PINBALL IN :STARTSUB:.   REGISTERS ARE:  DSPTAB BUFFER, CADRSTOR,
R0067    REQRET, CLPASS, DSPLOCK, MONSAVE, MONSAVE1, VERBREG, NOUNREG, DSPLIST,
R0068    DSPCOUNT, NOUT.

R0069    A COMPLETE LIST OF ALL THE ERASABLES (BOTH RESERVED AND TEMPORARIES) FOR
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R0070   PINBALL IS GIVEN BELOW.


R0071   THE FOLLOWING ARE OF GENERAL INTEREST-

R0072      REMARKS CARDS PRECEDE THE REFERENCED SYMBOL DEFINITION.  SEE SYMBOL
R0073   TABLE TO FIND APPROPRIATE PAGE NUMBERS.

R0074      NVSUB   CALLING POINT FOR INTERNAL USE OF PINBALL.
R0075                 OF RELATED INTEREST    NVSBWAIT
R0076                                        NVSUBUSY
R0077                                        PRENVBSY

R0083      ENDIDLE   ROUTINE FOR INTERNAL PROGRAMS WISHING TO GO TO SLEEP WHILE
R0084                AWAITING OPERATORS RESPONSE.

R00851     DSPMM   ROUTINE BY WHICH AN INTERNAL PROGRAM MAY DISPLAY A DECIMAL
R00852             PROGRAM CODE (MAJOR MODE) IN THE PROGRAM (MAJOR MODE) LIGHTS.
R008525            (DSPMM DOES NOT DISPLAY DIRECTLY BUT ENTERS EXEC REQUEST
R008527            FOR DSPMMJB WITH PRIO 30000 AND RETURNS TO CALLER.)

R00853     BLANKSUB   ROUTINE BY WHICH AN INTERNAL PROGRAM MAY BLANK ANY
R00854                COMBINATION OF THE DISPLAY REGISTERS R1, R2, R3.

R00855     JAMTERM   ROUTINES BY WHICH AN INTERNAL PROGRAM MAY PERFORM THE
R00856     JAMPROC   TERMINATE (V 34) OR PROCEED (V 33) FUNCTION.

R0086      MONITOR   VERBS FOR PERIODIC ( 1 PER SEC) DISPLAY.

R00861     PLEASE PERFORM, PLEASE MARK SITUATIONS
R00862                    REMARKS DESCRIBING HOW AN INTERNAL ROUTINE SHOULD HANDLE
R00863                    THESE SITUATIONS CAN BE FOUND JUST BEFORE :NVSUB: (SEE
R00864                    SYMBOL TABLE FOR PAGE NUMBER).

R0087      THE NOUN TABLE FORMAT IS DESCRIBED ON A PAGE OF REMARKS CARDS JUST
R0088      BEFORE :DSPABC: (SEE SYMBOL TABLE FOR PAGE NUMBER).

R0089      THE NOUN TABLES THEMSELVES ARE FOUND IN LOG SECTION :PINBALL NOUN
R00891     TABLES:.


R0090   FOR FURTHER DETAILS ABOUT OPERATION OF THE KEYBOARD AND DISPLAY SYSTEM
R0091   PROGRAM, SEE THE MISSION PLAN AND/OR MIT/IL E-2129
R0092   DESCRIBING KEYBOARD AND DISPLAY OPERATION FOR 278.


R0150   THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COURTESY OF THE AUTHORS.

R0151         ::IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT
R0152   USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
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R0153   CHRISTIAN EAR CAN ENDURE TO HEAR.::

R0154                          HENRY 6, ACT 2, SCENE 4


R0155   THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE


R0156   RESERVED FOR PINBALL EXECUTIVE ACTION

R0157   DSPCOUNT ERASE                        DISPLAY POSITION INDICATOR
R0158   DECBRNCH ERASE                        +DEC, - DEC, OCT INDICATOR
R0159   VERBREG  ERASE                        VERB CODE
R0160   NOUNREG  ERASE                        NOUN CODE
R0161   XREG     ERASE                        R1 INPUT BUFFER
R0162   YREG     ERASE                        R2 INPUT BUFFER
R0163   ZREG     ERASE                        R3 INPUT BUFFER
R0164   XREGLP   ERASE                        LO PART OF XREG (FOR DEC CONV ONLY)
R0165   YREGLP   ERASE                        LO PART OF YREG (FOR DEC CONV ONLY)
R0166   HITEMOUT =        YREGLP              TEMP FOR DISPLAY OF HRS, MIN, SEC
R0167                                                  MUST = LOTEMOUT-1.
R0168   ZREGLP   ERASE                        LO PART OF ZREG (FOR DEC CONV ONLY)
R0169   LOTEMOUT =        ZREGLP              TEMP FOR DISPLAY OF HRS, MIN, SEC
R0170                                                  MUST = HITEMOUT+1.
R0171   MODREG   ERASE                        MODE CODE
R0172   DSPLOCK  ERASE                        KEYBOARD/SUBROUTINE CALL INTERLOCK
R0173   REQRET   ERASE                        RETURN REGISTER FOR LOAD
R0174   LOADSTAT ERASE                        STATUS INDICATOR FOR LOADTST
R0175   CLPASS   ERASE                        PASS INDICATOR CLEAR
R0176   NOUT     ERASE                        ACTIVITY COUNTER FOR DSPTAB
R0177   NOUNCADR ERASE                        MACHINE CADR FOR NOUN
R0178   MONSAVE  ERASE                        N/V CODE FOR MONITOR. (= MONSAVE1-1)
R0179   MONSAVE1 ERASE                        NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R01795  MONSAVE2 ERASE                        NVMONOPT OPTIONS
R0180   DSPTAB   ERASE           +13D         0-10,DISPLAY PANEL BUFFER.11-13,C RELAYS
R0181   CADRSTOR ERASE                        ENDIDLE STORAGE
R0182   NVQTEM   ERASE                        NVSUB STORAGE FOR CALLING ADDRESS
R0183                                         MUST = NVBNKTEM-1
R0184   NVBNKTEM ERASE                        NVSUB STORAGE FOR CALLING BANK
R0185                                         MUST = NVQTEM+1
R0186   VERBSAVE ERASE                        NEEDED FOR RECYCLE
R0187   DSPLIST  ERASE                        WAITING REG FOR DSP SYST INTERNAL USE
R0188   EXTVBACT REASE                        EXTENDED VERB ACTIVITY INTERLOCK
R0189   DSPTEM1  ERASE           +2           BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0190   DSPTEM2  ERASE           +2           BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
R0191   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0192   TEMPORARIES FOR PINBALL EXECUTIVE ACTION
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R0193   DSEXIT    =      INTB15+             RETURN FOR DSPIN
R0194   EXITEM    =      INTB15+             RETURN FOR SCALE FACTOR ROUTINE SELECT
R0195   BLANKRET  =      INTB15+             RETURN FOR 2BLANK

R0196   WRDRET    =      INTBIT15            RETURN FOR 5BLANK
R0197   WDRET     =      INTBIT15            RETURN FOR DSPWD
R0198   DECRET    =      INTBIT15            RETURN FOR PUTCOM(DEC LOAD)
R0199   21/22REG  =      INTBIT15            TEMP FOR CHARIN

R0200   UPDATRET  =      POLISH              RETURN FOR UPDATNN, UPDATVB
R0201   CHAR      =      POLISH              TEMP FOR CHARIN
R0202   ERCNT     =      POLISH              COUNTER FOR ERROR LIGHT RESET
R0203   DECOUNT   =      POLISH              COUNTER FOR SCALING AND DISPLAY (DEC)

R0204   SGNON     =      VBUF                TEMP FOR +,- ON
R0205   NOUNTEM   =      VBUF                COUNTER FOR MIXNOUN FETCH
R0206   DISTEM    =      VBUF                COUNTER FOR OCTAL DISPLAY VERBS
R0207   DECTEM    =      VBUF                COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0208   SGNOFF    =      VBUF     +1         TEMP FOR +,- ON
R0209   NVTEMP    =      VBUF     +1         TEMP FOR NVSUB
R0210   SFTEMP1   =      VBUF     +1         STORAGE FOR SF CONST HI PART(=SFTEMP2-1)
R0211   HITEMIN   =      VBUF     +1         TEMP FOR LOAD OF HRS, MIN, SEC
R0212                                                  MUST = LOTEMIN-1.
R0213   CODE      =      VBUF     +2         FOR DSPIN
R0214   SFTEMP2   =      VBUF     +2         STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
R0215   LOTEMIN   =      VBUF     +2         TEMP FOR LOAD OF HRS, MIN, SEC
R0216                                                  MUST = HITEMIN+1.
R0217   MIXTEMP   =      VBUF     +3         FOR MIXNOUN DATA
R0218   SIGNRET   =      VBUF     +3         RETURN FOR +,- ON

R0219   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

R0220   ENTRET    =      DOTINC              EXIT FROM ENTER

R0221   WDCNT     =      DOTRET              CHAR COUNTER FOR DSPWD
R0222   INREL     =      DOTRET              INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R0223   DSPMMTEM  =      MATINC              DSPCOUNT SAVE FOR DSPMM
R0224   MIXBR     =      MATINC              INDICATOR FOR MIXED OR NORMAL NOUN

R0225   TEM1      ERASE                      EXEC TEMP
R0226   DSREL     =      TEM1                REL ADDRESS FOR DSPIN

R0227   TEM2      ERASE                      EXEC TEMP
R0228   DSMAG     =      TEM2                MAGNITUDE STORE FOR DSPIN
R0229   IDADDTEM  =      TEM2                MIXNOUN INDIRECT ADDRESS STORAGE

R0230   TEM3      ERASE                      EXEC TEMP
R0231   COUNT     =      TEM3                FOR DSPIN
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R0232   TEM4      ERASE                   EXEC TEMP
R0233   LSTPTR    =       TEM4            LIST POINTER FOR GRABUSY
R0234   RELRET    =       TEM4            RETURN FOR RELDSP
R0235   FREERET   =       TEM4            RETURN FOR FREEDSP
R0236   DSPWDRET  =       TEM4            RETURN FOR DSPSIGN
R0237   SEPSCRET  =       TEM4            RETURN FOR SEPSEC
R0238   SEPMNRET  =       TEM4            RETURN FOR SEPMIN

R0239   TEM5      ERASE                   EXEC TEMP
R0240   NOUNADD   =       TEM5            TEMP STORAGE FOR NOUN ADDRESS

R0241   NNADTEM   ERASE                   TEMP FOR NOUN ADDRESS TABLE ENTRY
R0242   NNTYPTEM  ERASE                   TEMP FOR NOUN TYPE TABLE ENTRY
R0243   IDADITEM  ERASE                   TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0244                                     MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0245   IDAD2TEM  ERASE                   TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0246                                     MUST = IDADITEM+1, = IDAD3TEM-1.
R0247   IDAD3TEM  ERASE                   TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0248                                     MUST = IDADITEM+2, = IDAD2TEM+1.
R0249   RUTMXTEM  ERASE                   TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0250   END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION


R02501  ADDITIONAL TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R02502  MPAC, THRU MPAC +6
R02503  BUF, +1, +2
R02504  BUF2, +1, +2
R02506  MPTEMP
R02507  ADDRWD
R02509    END OF ADDITIONAL TEMPS FOR PINBALL EXEC ACTION


R0251   RESERVED FOR PINBALL INTERRUPT ACTION

R0252   DSPCNT    ERASE                   COUNTER FOR DSPOUT
R0253   UPLOCK    ERASE                   BIT1 = UPLINK INTERLOCK (ACTIVATED BY
R0254                                                                    RECEPTION OF A BAD MESSAGE IN UPLINK)
R0255   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0256   TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0257   KEYTEMP1  =       WAITEXIT        TEMP FOR KEYRUPT, UPRUPT
R0258   DSRUPTEM  =       WAITEXIT        TEMP FOR DSPOUT
R0259   KEYTEMP2  =       RUPTAGN         TEMP FOR KEYRUPT, UPRUPT
R0260   END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
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R0261   THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE,
R0262   0          10000
R0263   1          00001
R0264   9          01001
R0265   VERB       10001
R0266   ERROR RES10010
R0267   KEY RLSE 11001
R0268   +          11010
R0269   -          11011
R0270   ENTER      11100
R0271   CLEAR      11110
R0272   NOUN       11111


R0273   OUTPUT FORMAT FOR DISPLAY PANEL. SET OUT0 TO  AAAABCCCCCDDDDD.
R0274   A-S SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0275   ENERGIZED.
R0276   B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0277   C-S  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0278   D-S  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0279   THE PANEL APPEARS AS FOLLOWS,
R0280   MD1     MD2                             (MAJOR MODE)
R0281   VD1     VD2 (VERB)     ND1     ND2      (NOUN)
R0282   R1D1    R1D2    R1D3   R1D4    R1D5     (R1)
R0283   R2D1    R2D2    R2D3   R2D4    R2D5     (R2)
R0284   R3D1    R3D2    R3D3   R3D4    R3D5     (R3)

R0285   EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0286   MD1    25      R2D1  11          ALL ARE OCTAL
R0287   MD2    24      R2D2  10
R0288   VD1    23      R2D3   7
R0289   VD2    22      R2D4   6
R0290   ND1    21      R2D5   5
R0291   ND2    20      R3D1   4
R0292   R1D1  16       R3D2   3
R0293   R1D2  15       R3D3   2
R0294   R1D3  14       R3D4   1
R0295   R1D4  13       R3D5   0
R0296   R1D5  12


R0297   THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0298   DSPTAB RELAYWD        BIT11      BITS 10-6      BITS 5-1
R0299   RELADD
R0300   10      1011                     MD1  (25)      MD2  (24)
R0301   9       1010                     VD1  (23)      VD2  (22)
R0302   8       1001                     ND1  (21)      ND2  (20)
R0303   7       1000                                    R1D1 (16)
```

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R0304   6        0111            +R1       R1D2 (15)       R1D3 (14)
R0305   5        0110            -R1       R1D4 (13)       R1D5 (12)
R0306   4        0101            +R2       R2D1 (11)       R2D2 (10)
R0307   3        0100            -R2       R2D3 (7)        R2D4 (6)
R0308   2        0011                      R2D5 (5)        R3D1 (4)
R0309   1        0010            +R3       R3D2 (3)        R3D3 (2)
R0310   0        0001            -R3       R3D4 (1)        R3D5 (0)
R0311            0000   NO RELAYWORD


R0312   THE 5 BIT OUTPUT RELAY CODES ARE:
R0313   BLANK         00000
R0314   0             10101
R0315   1             00011
R0316   2             11001
R0317   3             11011
R0318   4             01111
R0319   5             11110
R0320   6             11100
R0321   7             10011
R0322   8             11101
R0323   9             11111


R03231  OUTPUT BITS USED BY PINBALL:

R03232                KEY RELEASE LIGHT     - BIT 5 OF CHANNEL 11
R03233                VERB/NOUN FLASH       - BIT 6 OF CHANNEL 11
R03234                OPERATOR ERROR LIGHT  - BIT 7 OF CHANNEL 11
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P0324   START OF EXECUTIVE SECTION OF PINBALL


 0325                              40,2077                          BANK    40
 032501 REF    2  LAST  301        40,2000                          SETLOC  PINBALL1
 032502                            40,2077                          BANK

 03258  REF    1                                                    COUNT*  $$/PIN
 0330   REF   23  LAST  390        40,2077  3 4753 1  CHARIN        CAF     ONE            BLOCK DISPLAY SYST
 0331   REF    2  LAST  224        40,2100  57'011 0                XCH     DSPLOCK        MAKE DSP SYST BUSY, BUT SAVE OLD
 0332   REF    1                   40,2101  54 115 0                TS      21/22REG       C(DSPLOCK) FOR ERROR LIGHT RESET.
 03321  REF    2  LAST  224        40,2102  11'041 1                CCS     CADRSTOR       ALL KEYS EXCEPT ER TURN ON KR LITE IF
 03322                             40,2103  0 2105 1                TC      +2             CADRSTOR IS FULL.  THIS REMINDS OPERATOR
 03323  REF    1                   40,2104  0 2112 1                TC      CHARIN2        TO RE-ESTABLISH A FLASHING DISPLAY
 03324  REF    1                   40,2105  4 2156 0                CS      ELRCODE1       WHICH HE HAS OBSCURED WITH DISPLAYS OF
 03325  REF   74  LAST  389        40,2106  6 0154 1                AD      MPAC           HIS OWN (SEE REMARKS PRECEDING ROUTINE
 03326                             40,2107  0 0006 1                EXTEND                 VBRELDSP).
 03327  REF    2  LAST  400        40,2110  1 2112 0                BZF     CHARIN2
 03328  REF    1                   40,2111  0 4374 0                TC      RELDSPON
 0333   REF   75  LAST  400        40,2112  56 154 1  CHARIN2       XCH     MPAC
 0334   REF    1                   40,2113  54 117 1                TS      CHAR
 0335   REF  101  LAST  386        40,2114  50 000 1                INDEX   A
 0336                              40,2115  0 2116 0                TC      +1             INPUT CODE      FUNCTION
 0337   REF    1                   40,2116  0 3470 1                TC      CHARALRM       0
 0338   REF    1                   40,2117  0 2175 0                TC      NUM            1
 0339   REF    2  LAST  400        40,2120  0 2175 0                TC      NUM            2
 0340   REF    3  LAST  400        40,2121  0 2175 0                TC      NUM            3
 0341   REF    4  LAST  400        40,2122  0 2175 0                TC      NUM            4
 0342   REF    5  LAST  400        40,2123  0 2175 0                TC      NUM            5
 0343   REF    6  LAST  400        40,2124  0 2175 0                TC      NUM            6
 0344   REF    7  LAST  400        40,2125  0 2175 0                TC      NUM            7
 0345   REF    1                   40,2126  0 2161 0                TC      89TEST         10              8
 0346   REF    2  LAST  400        40,2127  0 2161 0                TC      89TEST         11              9
 0347   REF    2  LAST  400        40,2130  0 3470 1                TC      CHARALRM       12
 0348   REF    3  LAST  400        40,2131  0 3470 1                TC      CHARALRM       13
 0349   REF    4  LAST  400        40,2132  0 3470 1                TC      CHARALRM       14
 0350   REF    5  LAST  400        40,2133  0 3470 1                TC      CHARALRM       15
 0351   REF    6  LAST  400        40,2134  0 3470 1                TC      CHARALRM       16
 0352   REF    7  LAST  400        40,2135  0 3470 1                TC      CHARALRM       17
 0353   REF    8  LAST  400        40,2136  0 2173 0                TC      NUM     -2     20              0
 0354   REF    1                   40,2137  0 2354 1                TC      VERB           21              VERB
 0355   REF    1                   40,2140  0 3646 0                TC      ERROR          22              ERROR LIGHT RESET
 0356   REF    8  LAST  400        40,2141  0 3470 1                TC      CHARALRM       23
 0357   REF    9  LAST  400        40,2142  0 3470 1                TC      CHARALRM       24
 0358   REF   10  LAST  400        40,2143  0 3470 1                TC      CHARALRM       25
 0359   REF   11  LAST  400        40,2144  0 3470 1                TC      CHARALRM       26
 0360   REF   12  LAST  400        40,2145  0 3470 1                TC      CHARALRM       27
 0361   REF   13  LAST  400        40,2146  0 3470 1                TC      CHARALRM       30
 0362   REF    1                   40,2147  0 3524 1                TC      VBRELDSP       31              KEY RELEASE
 0363   REF    1                   40,2150  0 2407 0                TC      POSGN          32              +
 0364   REF   1               40,2151  0 2374 0             TC      NEGSGN          33                 -
 0365   REF   1               40,2152  0 2157 0             TC      ENTERJMP        34                 ENTER
 0366   REF  14  LAST  400    40,2153  0 3470 1             TC      CHARALRM        35
 0367   REF   1               40,2154  0 2467 0             TC      CLEAR           36                 CLEAR
 0368   REF   1               40,2155  0 2370 1             TC      NOUN            37                 NOUN


 03685                        40,2156   00022 1  ELRCODE1 OCT     22
 0369   REF  17  LAST  301    40,2157  0 4635 0  ENTERJMP TC      POSTJUMP
 0370   REF   1               40,2160   62002 1           CADR    ENTER

 0371   REF   3  LAST  225    40,2161  10 776 0  89TEST   CCS     DSPCOUNT
 0372                         40,2162  0 2166 1           TC      +4              +
 0373                         40,2163  0 2166 1           TC      +3              +0
 0374   REF  38  LAST  390    40,2164  0 5155 0           TC      ENDOFJOB        - BLOCK DATA IN IF DSPCOUNT IS - OR -0
 0375   REF  39  LAST  401    40,2165  0 5155 0           TC      ENDOFJOB        -0
 0376   REF   4  LAST  341    40,2166  3 6250 0           CAF     THREE
 0377   REF   1               40,2167  7 0777 1           MASK    DECBRNCH
 0378   REF 102  LAST  400    40,2170  10 000 0           CCS     A
 0379   REF   9  LAST  400    40,2171  0 2175 0           TC      NUM             IF DECBRNCH IS +, 8 OR 9 OK
 0380   REF  15  LAST  401    40,2172  0 3470 1           TC      CHARALRM        IF DECBRNCH IS +0, REJECT 8 OR 9


R0381   NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0382   WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0383   OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0384   YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0385   DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0386   IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

 0387   REF  54  LAST  386    40,2173  3 4755 1             CAF     ZERO
 0388   REF   2  LAST  400    40,2174  54 117 1             TS      CHAR
 0389   REF   4  LAST  401    40,2175  10 776 0  NUM        CCS     DSPCOUNT
 0390                         40,2176  0 2202 0             TC      +4              +
 0391                         40,2177  0 2202 0             TC      +3              +0
 0392                         40,2200  0 2201 0             TC      +1              -BLOCK DATA IN IF DSPCOUNT IS -
 0393   REF  40  LAST  401    40,2201  0 5155 0             TC      ENDOFJOB        -0
 0394   REF   1               40,2202  0 2324 0             TC      GETINREL
 0395   REF   2  LAST  224    40,2203  11'014 1             CCS     CLPASS          IF CLPASS IS + OR +0, MAKE IT +0.
 0396   REF  55  LAST  401    40,2204  3 4755 1             CAF     ZERO
 0397   REF   3  LAST  401    40,2205  55'014 1             TS      CLPASS
 0398                         40,2206  0 2207 0             TC      +1
 0399   REF   3  LAST  401    40,2207  50 117 0             INDEX   CHAR
 0400   REF   2  LAST  159    40,2210  3 4066 0             CAF     RELTAB
 0401   REF   1               40,2211  7 4346 0             MASK    LOW5
 0402   REF   1               40,2212  54 124 1             TS      CODE
 0403   REF   5  LAST  401    40,2213  3 0776 1             CA      DSPCOUNT
 0404   REF   1               40,2214  54 143 0             TS      COUNT
 0405   REF   1               40,2215  0 3356 1             TC      DSPIN
 0406   REF   5  LAST  401    40,2216  3 6250 0             CAF     THREE
 0407   REF   2  LAST  401    40,2217   7 0777 1              MASK    DECBRNCH
 0408   REF 103  LAST  401    40,2220  10 000 0               CCS     A                   +0, OCTAL.  +1, + DEC.  +2, - DEC.
 0409   REF   1               40,2221   0 2232 0              TC      DECTOBIN            +
 0410   REF   1               40,2222  50 137 1               INDEX   INREL               +0 OCTAL
 0411   REF   2  LAST  224    40,2223  57'000 0               XCH     VERBREG
 0412   REF   1               40,2224  54 022 0               TS      CYL
 0413   REF   2  LAST  402    40,2225   4 0022 0              CS      CYL
 0414   REF   3  LAST  402    40,2226   4 0022 0              CS      CYL
 0415   REF   4  LAST  402    40,2227  56 022 1               XCH     CYL
 0416   REF   4  LAST  401    40,2230   6 0117 0              AD      CHAR
 0417   REF   1               40,2231   0 2247 1              TC      ENDNMTST
 0418   REF   2  LAST  402    40,2232  50 137 1    DECTOBIN  INDEX   INREL
 0419   REF   3  LAST  402    40,2233  57'000 0               XCH     VERBREG
 0420   REF  76  LAST  400    40,2234  54 154 0               TS      MPAC                SUM X 2EXP-14 IN MPAC
 0421   REF  56  LAST  401    40,2235   3 4755 1              CAF     ZERO
 0422   REF  77  LAST  402    40,2236  54 155 1               TS      MPAC     +1
 0423   REF   4  LAST  224    40,2237   3 4363 0              CAF     TEN                 10 X 2EXP-14
 0424   REF   1               40,2240   0 7312 0              TC      SHORTMP             10SUM X 2EXP-28 IN MPAC, MPAC+1
 0425   REF  78  LAST  402    40,2241  56 155 0               XCH     MPAC     +1
 0426   REF   5  LAST  402    40,2242   6 0117 0              AD      CHAR
 0427   REF  79  LAST  402    40,2243  54 155 1               TS      MPAC     +1
 0428   REF   2  LAST  402    40,2244   0 2247 1              TC      ENDNMTST            NO DP
 0429   REF  80  LAST  402    40,2245  26 154 0               ADS     MPAC                DP MUST BE 5TH CHAR
 0430   REF   1               40,2246   0 2265 1              TC      DECEND
 0431   REF   3  LAST  402    40,2247  50 137 1    ENDNMTST  INDEX   INREL
 0432   REF   4  LAST  402    40,2250  55'000 1               TS      VERBREG
 0433   REF   6  LAST  401    40,2251   4 0776 0              CS      DSPCOUNT
 0434   REF   4  LAST  402    40,2252  50 137 1               INDEX   INREL
 0435   REF   1               40,2253   6 2315 1              AD      CRITCON
 0436                         40,2254   0 0006 1              EXTEND
 0437   REF   1               40,2255   1 2257 1              BZF     ENDNUM              -0, DSPCOUNT = CRITCON
 0438   REF   1               40,2256   0 2312 0              TC      MORNUM              - , DSPCOUNT G/ CRITCON
 0439   REF   6  LAST  401    40,2257   3 6250 0   ENDNUM     CAF     THREE
 0440   REF   3  LAST  402    40,2260   7 0777 1              MASK    DECBRNCH
 0441   REF 104  LAST  402    40,2261  10 000 0               CCS     A
 0442   REF   2  LAST  402    40,2262   0 2265 1              TC      DECEND
 0443   REF   7  LAST  402    40,2263   4 0776 0   ENDALL     CS      DSPCOUNT            BLOCK NUMIN BY PLACING DSPCOUNT
 0444   REF   2  LAST  402    40,2264   0 2313 1              TC      MORNUM   +1         NEGATIVELY
 0445   REF  24  LAST  400    40,2265   4 4753 0   DECEND     CS      ONE
 0446   REF   5  LAST  402    40,2266   6 0137 1              AD      INREL
 0447                         40,2267   0 0006 1              EXTEND
 0448   REF   1               40,2270   6 2263 1              BZMF    ENDALL              IF INREL=0,1(VBREG,NNREG), LEAVE WHOLE
 0449   REF   1               40,2271   0 7106 1              TC      DMP                 IF INREL=2,3,4(R1,R2,R3),CONVERT TO FRAC
A0450                                                                                     MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
 0451   REF   1               40,2272    02322 0              ADRES   DECON               2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
 0452   REF   7  LAST  402    40,2273   3 6250 0              CAF     THREE               IN MPAC, +1, +2.
 0453   REF   4  LAST  402    40,2274   7 0777 1              MASK    DECBRNCH
 0454   REF 105  LAST  402    40,2275  50 000 1               INDEX   A
 0455                         40,2276   0 2276 0              TC      +0
 0456   REF   1               40,2277   0 2303 0              TC      +DECSGN
 0457                          40,2300  0 0006 1            EXTEND                       - CASE
 0458   REF  81  LAST  402     40,2301  4 0156 1            DCS      MPAC     +1
 0459   REF  82  LAST  403     40,2302  52 156 1            DXCH     MPAC     +1
 0460   REF  83  LAST  403     40,2303  56 156 0  +DECSGN   XCH      MPAC     +2
 0461   REF   6  LAST  402     40,2304  50 137 1            INDEX    INREL
 0462   REF   1                40,2305  55'003 1            TS       XREGLP   -2
 0463   REF  84  LAST  403     40,2306  56 155 0            XCH      MPAC     +1
 0464   REF   7  LAST  403     40,2307  50 137 1            INDEX    INREL
 0465   REF   5  LAST  402     40,2310  55'000 1            TS       VERBREG
 0466   REF   2  LAST  402     40,2311  0 2263 1            TC       ENDALL
 0467   REF   8  LAST  402     40,2312  10 776 0  MORNUM    CCS      DSPCOUNT          DECREMENT DSPCOUNT
 0468   REF   9  LAST  403     40,2313  54 776 0            TS       DSPCOUNT
 0469   REF  41  LAST  401     40,2314  0 5155 0            TC       ENDOFJOB

 0470                          40,2315   00022 1  CRITCON   OCT      22                (DEC 18)
 0471                          40,2316   00020 0            OCT      20                (DEC 16)
 0472                          40,2317   00012 1            OCT      12                (DEC 10)
 0473                          40,2320   00005 1            OCT      5
 0474                          40,2321   00000 1            OCT      0

 0475                          40,2322   05174 0  DECON     2DEC     E-5 B14           2EXP14/10EXP5 = .16384 DEC
 0475                          40,2323   13261 0


R0476   GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0477   PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

 0478   REF  10  LAST  403     40,2324  50 776 1  GETINREL  INDEX    DSPCOUNT
 0479   REF   1                40,2325  3 2330 0            CAF      INRELTAB
 0480   REF   8  LAST  403     40,2326  54 137 0            TS       INREL             (A TEMP, REG)
 0481   REF  43  LAST  383     40,2327  0 0002 0            TC       Q

 0482                          40,2330   00004 0  INRELTAB  OCT      4                 R3D5 (DSPCOUNT = 0)
 0483                          40,2331   00004 0            OCT      4                 R3D4          =(1)
 0484                          40,2332   00004 0            OCT      4                 R3D3          =(2)
 0485                          40,2333   00004 0            OCT      4                 R3D2          =(3)
 0486                          40,2334   00004 0            OCT      4                 R3D1          =(4)
 0487                          40,2335   00003 1            OCT      3                 R2D5          =(5)
 0488                          40,2336   00003 1            OCT      3                 R2D4          =(6)
 0489                          40,2337   00003 1            OCT      3                 R2D3          =(7)
 0490                          40,2340   00003 1            OCT      3                 R2D2          =(8D)
 0491                          40,2341   00003 1            OCT      3                 R2D1          =(9D)
 0492                          40,2342   00002 0            OCT      2                 R1D5          =(10D)
 0493                          40,2343   00002 0            OCT      2                 R1D4          =(11D)
 0494                          40,2344   00002 0            OCT      2                 R1D3          =(12D)
 0495                          40,2345   00002 0            OCT      2                 R1D2          =(13D)
 0496                          40,2346   00002 0            OCT      2                 R1D1          =(14D)
 0497   REF   2  LAST  378     40,2347  0 5675 0            TC       CCSHOLE           NO DSPCOUNT NUMBER = 15D
 0498                          40,2350   00001 0            OCT      1                 ND2           =(16D)
 0499                          40,2351   00001 0            OCT      1                 ND1           =(17D)
 0500                              40,2352   00000 1              OCT      0                 VD2          =(180)
 0501                              40,2353   00000 1              OCT      0                 VD1          =(190)


 0502  REF  57  LAST  402          40,2354   3 4755 1  VERB       CAF      ZERO
 0503  REF   6  LAST  403          40,2355   55'000 1             TS       VERBREG
 0504  REF   2  LAST  225          40,2356   3 4360 0             CAF      VD1
 0505  REF  11  LAST  403          40,2357   54 776 0  NVCOM      TS       DSPCOUNT
 0506  REF   1                     40,2360   0 2601 1             TC       2BLANK
 0507  REF  25  LAST  402          40,2361   3 4753 1             CAF      ONE
 0508  REF   5  LAST  402          40,2362   54 777 1             TS       DECBRNCH          SET FOR DEC V/N CODE
 0509  REF  58  LAST  404          40,2363   3 4755 1             CAF      ZERO
 0510  REF   2  LAST  224          40,2364   55'012 1             TS       REQRET            SET FOR ENTPAS0
 0511  REF   1                     40,2365   3 4217 1             CAF      ENDINST           IF DSPALARM OCCURS BEFORE FIRST ENTPAS0
 0512  REF   1                     40,2366   54 136 1             TS       ENTRET            OR NVSUB, ENTRET MUST ALREADY BE SET
A0513                                                                                        TO TC ENDOFJOB
 0514  REF  42  LAST  403          40,2367   0 5155 0             TC       ENDOFJOB
 0515  REF  59  LAST  404          40,2370   3 4755 1  NOUN       CAF      ZERO
 0516  REF   7  LAST  306          40,2371   55'001 0             TS       NOUNREG
 0517  REF   3  LAST  383          40,2372   3 4361 1             CAF      ND1               ND1, OCT 21 (DEC 17)
 0518  REF   1                     40,2373   0 2357 1             TC       NVCOM


 0519  REF   1                     40,2374   0 2446 0  NEGSGN     TC       SIGNTEST
 0520  REF   1                     40,2375   0 2433 1             TC       -ON
 0521  REF  17  LAST  377          40,2376   3 4752 0             CAF      TWO
 0522  REF   9  LAST  403          40,2377   50 137 1  BOTHSGN    INDEX    INREL             SET DEC COMP BIT TO 1 (IN DECBRNCH)
 0523  REF  18  LAST  193          40,2400   6 4745 0             AD       BIT7              BIT 5 FOR R1,  BIT 4 FOR R2,
 0524  REF   6  LAST  404          40,2401   26 777 1             ADS      DECBRNCH          BIT 3 FOR R3.
 0525  REF   4  LAST  401          40,2402   11'014 1  FIXCLPAS   CCS      CLPASS            IF CLPASS IS + OR +0, MAKE IT +0.
 0526  REF  60  LAST  404          40,2403   3 4755 1             CAF      ZERO
 0527  REF   5  LAST  404          40,2404   55'014 1             TS       CLPASS
 0528                              40,2405   0 2406 1             TC       +1
 0529  REF  43  LAST  404          40,2406   0 5155 0             TC       ENDOFJOB

 0530  REF   2  LAST  404          40,2407   0 2446 0  POSGN      TC       SIGNTEST
 0531  REF   1                     40,2410   0 2413 0             TC       +ON
 0532  REF  26  LAST  404          40,2411   3 4753 1             CAF      ONE
 0533  REF   1                     40,2412   0 2377 0             TC       BOTHSGN

 0534  REF  44  LAST  403          40,2413   22 002 0  +ON        LXCH     Q
 0535  REF   2  LAST  401          40,2414   0 2324 0             TC       GETINREL
 0536  REF  10  LAST  404          40,2415   50 137 1             INDEX    INREL
 0537  REF   1                     40,2416   3 2441 1             CAF      SGNTAB  -2
 0538  REF   1                     40,2417   54 123 0             TS       SGNOFF
 0539  REF  27  LAST  404          40,2420   6 4753 1             AD       ONE
 0540  REF   1                     40,2421   54 122 1             TS       SGNON
 0541  REF  61  LAST  404          40,2422   3 4755 1  SGNCOM     CAF      ZERO
 0542  REF   2  LAST  401          40,2423   54 124 1             TS       CODE
 0543  REF   2  LAST  404          40,2424   56 123 1             XCH      SGNOFF
 0544  REF   1              40,2425   0 3440 1             TC      11DSPIN
 0545  REF  18  LAST  374   40,2426   3 4741 1             CAF     BIT11
 0546  REF   3  LAST  404   40,2427  54 124 1              TS      CODE
 0547  REF   2  LAST  404   40,2430  56 122 0              XCH     SGNCON
 0548  REF   2  LAST  405   40,2431   0 3440 1             TC      11DSPIN
 0549  REF  43  LAST  383   40,2432   0 0001 0             TC      L
 0550  REF  45  LAST  404   40,2433  22 002 0   -ON        LXCH    Q
 0551  REF   3  LAST  404   40,2434   0 2324 0             TC      GETINREL
 0552  REF  11  LAST  404   40,2435  50 137 1              INDEX   INREL
 0553  REF   2  LAST  404   40,2436   3 2441 1             CAF     SGNTAB  -2
 0554  REF   3  LAST  405   40,2437  54 122 1              TS      SGNON
 0555  REF  28  LAST  404   40,2440   6 4753 1             AD      ONE
 0556  REF   3  LAST  404   40,2441  54 123 0              TS      SGNOFF
 0557  REF   1              40,2442   0 2422 1             TC      SGNCOM

 0558                       40,2443   00005 1   SGNTAB     OCT     5                       -R1
 0559                       40,2444   00003 1              OCT     3                       -R2
 0560                       40,2445   00000 1              OCT     0                       -R3


 0561  REF  46  LAST  405   40,2446  22 002 0   SIGNTEST LXCH    Q                       ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
 0562  REF   8  LAST  402   40,2447   3 6250 0             CAF     THREE                   R2D1, OR R3D1. ALLOWS ONLY FIRST OF
 0563  REF   7  LAST  404   40,2450   7 0777 1             MASK    DECBRNCH                CONSECUTIVE +/- CHARACTERS.
 0564  REF 106  LAST  402   40,2451  10 000 0              CCS     A                       IF LOW2 BITS OF DECBRNCH NOT= 0, SIGN
 0565  REF  44  LAST  404   40,2452   0 5155 0             TC      ENDOFJOB                FOR THIS WORD ALREADY IN. REJECT.
 0566  REF   1              40,2453   4 4317 1             CS      R1D1
 0567  REF   1              40,2454   0 2462 0             TC      SGNTST1
 0568  REF   1              40,2455   4 4320 0             CS      R2D1
 0569  REF   2  LAST  405   40,2456   0 2462 0             TC      SGNTST1
 0570  REF   1              40,2457   4 4321 1             CS      R3D1
 0571  REF   3  LAST  405   40,2460   0 2462 0             TC      SGNTST1
 0572  REF  45  LAST  405   40,2461   0 5155 0             TC      ENDOFJOB                NO MATCH FOUND. SIGN ILLEGAL
 0573  REF  12  LAST  404   40,2462   6 0776 1  SGNTST1    AD      DSPCOUNT
 0574                       40,2463   0 0006 1             EXTEND
 0575                       40,2464   1 2466 0             BZF     +2                      MATCH FOUND
 0576  REF  47  LAST  405   40,2465   0 0002 0             TC      Q
 0577  REF  44  LAST  405   40,2466   0 0001 0             TC      L                       SIGN LEGAL


R0578  CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0579  NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0580  L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0581  THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0582  APPROPRIATE TO BE CLEARED.

R0583  CLPASS    +0  PASS0, CAN BE BACKED UP
R0584            +NZ  HIPASS, CAN BE BACKED UP
R0585            -NZ  PASS0, CANNOT BE BACKED UP
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 0586   REF  13  LAST  405   40,2467  10 776 0  CLEAR     CCS     DSPCOUNT
 0587   REF  29  LAST  405   40,2470  6 4753 1            AD      ONE
 0588                        40,2471  0 2473 0            TC      +2
 0589   REF  30  LAST  406   40,2472  6 4753 1            AD      ONE
 0590   REF 107  LAST  405   40,2473  50 000 1            INDEX   A                    DO NOT CHANGE DSPCOUNT BECAUSE MAY LATER
 0591   REF   2  LAST  403   40,2474  3 2330 0            CAF     INRELTAB             FAIL LEGALTST.
 0592   REF  12  LAST  405   40,2475  54 137 0            TS      INREL                MUST SET INREL, EVEN FOR HIPASS.
 0593   REF   6  LAST  404   40,2476  11'014 1            CCS     CLPASS
 0594   REF   1              40,2477  0 2505 0            TC      CLPASHI              +
 0595                        40,2500  0 2502 1            TC      +2                   +0    IF CLPASS IS +0 OR -, IT IS PASS0
 0596                        40,2501  0 2502 1            TC      +1                   -
 0597   REF  13  LAST  406   40,2502  3 0137 1            CA      INREL
 0598   REF   1              40,2503  0 2527 0            TC      LEGALTST
 0599   REF   1              40,2504  0 2522 0            TC      CLEAR1
 0600   REF  14  LAST  406   40,2505  10 137 0  CLPASHI   CCS     INREL
 0601   REF  15  LAST  406   40,2506  54 137 0            TS      INREL
 0602   REF   2  LAST  406   40,2507  0 2527 0            TC      LEGALTST
 0603   REF   1              40,2510  3 2577 0            CAF     DOUBLK +2            +3 TO - NUMBER. BACKS DATA REQUESTS.
 0604   REF   3  LAST  404   40,2511  27'012 1            ADS     REQRET
 0605   REF  16  LAST  406   40,2512  3 0137 1            CA      INREL
 0606   REF   1              40,2513  54 125 0            TS      MIXTEMP              TEMP STORAGE FOR INREL
 0607                        40,2514  0 0006 1            EXTEND
 0608   REF   7  LAST  404   40,2515  27'000 1            DIM     VERBREG              DECREMENT VERB AND RE-DISPLAY
 0609   REF  78  LAST  390   40,2516  0 4616 1            TC      BANKCALL
 0610   REF   1              40,2517   62342 0            CADR    UPDATVB
 0611   REF   2  LAST  406   40,2520  3 0125 1            CA      MIXTEMP
 0612   REF  17  LAST  406   40,2521  54 137 0            TS      INREL                RESTORE INREL
 0613   REF   1              40,2522  0 2525 1  CLEAR1    TC      CLR5
 0614   REF   7  LAST  406   40,2523  25'014 0            INCR    CLPASS               ONLY IF CLPASS IS + OR +0,
 0615   REF  46  LAST  405   40,2524  0 5155 0            TC      ENDOFJOB             SET FOR HIGHER PASS.
 0616   REF  48  LAST  405   40,2525  22 002 0  CLR5      LXCH    Q                    USES 5BLANK  BUT AVOIDS ITS TC GETINREL
 0617   REF   1              40,2526  0 2540 1            TC      5BLANK  +2
 0618   REF   2  LAST  232   40,2527  6 7751 0  LEGALTST  AD      NEG2
 0619   REF 108  LAST  406   40,2530  10 000 0            CCS     A
 0620   REF  49  LAST  406   40,2531  0 0002 0            TC      Q                    LEGAL  INREL G/ 2
 0621   REF   3  LAST  403   40,2532  0 5675 0            TC      CCSHOLE
 0622   REF  47  LAST  406   40,2533  0 5155 0            TC      ENDOFJOB             ILLEGAL   INREL= 0,1
 0623   REF  50  LAST  406   40,2534  0 0002 0            TC      Q                    LEGAL     INREL = 2

R0624   5BLANK BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG,
R0625   YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
R0626   DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

 0627   REF  14  LAST  406   40,2535  54 776 0            TS      DSPCOUNT             NEEDED FOR BLANKSUB
 0628   REF  51  LAST  406   40,2536  22 002 0  5BLANK    LXCH    Q
 0629   REF   4  LAST  405   40,2537  0 2324 0            TC      GETINREL
 0630   REF  62  LAST  404   40,2540  3 4755 1            CAF     ZERO
 0631   REF  18  LAST  406   40,2541  50 137 1            INDEX   INREL
 0632   REF   8  LAST  406   40,2542  55'000 1            TS      VERBREG              ZERO X, Y, Z REG.
 0633   REF  19  LAST  406   40,2543  50 137 1           INDEX   INREL
 0634   REF   2  LAST  403   40,2544  55'003 1           TS      XREGLP  -2
 0635   REF   4  LAST  405   40,2545  54 124 1           TS      CODE
 0636   REF  20  LAST  407   40,2546  50 137 1           INDEX   INREL                ZERO PERTINENT DEC COMP BIT.
 0637   REF  19  LAST  404   40,2547  4 4745 1           CS      BIT7                 PROTECT OTHERS
 0638   REF   8  LAST  405   40,2550  7 0777 1           MASK    DECBRNCH
 0639   REF   1              40,2551  7 2600 1           MASK    BRNCHCON             ZERO LOW 2 BITS.
 0640   REF   9  LAST  407   40,2552  54 777 1           TS      DECBRNCH
 0641   REF  21  LAST  407   40,2553  50 137 1           INDEX   INREL
 0642   REF   1              40,2554  3 2570 1           CAF     SINBLANK -2          BLANK ISOLATED CHAR SEPARATELY
 0643   REF   2  LAST  401   40,2555  54 143 0           TS      COUNT
 0644   REF   2  LAST  401   40,2556  0 3356 1           TC      DSPIN
 0645   REF  22  LAST  407   40,2557  50 137 1  5BLANK1  INDEX   INREL
 0646   REF   2  LAST  406   40,2560  3 2573 1           CAF     DOUBLK  -2
 0647   REF  15  LAST  406   40,2561  54 776 0           TS      DSPCOUNT
 0648   REF   2  LAST  404   40,2562  0 2601 1           TC      2BLANK
 0649   REF  18  LAST  404   40,2563  4 4752 1           CS      TWO
 0650   REF  16  LAST  407   40,2564  26 776 0           ADS     DSPCOUNT
 0651   REF   3  LAST  407   40,2565  0 2601 1           TC      2BLANK
 0652   REF  23  LAST  407   40,2566  50 137 1           INDEX   INREL
 0653   REF   2  LAST  405   40,2567  3 4315 1           CAF     R101     -2
 0654   REF  17  LAST  407   40,2570  54 776 0           TS      DSPCOUNT             SET DSPCOUNT TO LEFT MOST DSP NUMBER
 0655   REF  45  LAST  405   40,2571  0 0001 0           TC      L                    OF REG. JUST BLANKED

 0656                        40,2572   00016 0  SINBLANK OCT     16                   DEC 14
 0657                        40,2573   00005 1           OCT     5
 0658                        40,2574   00004 0           OCT     4
 0659                        40,2575   00015 0  DOUBLK   OCT     15                   DEC 13
 0660                        40,2576   00011 1           OCT     11                   DEC 9
 0661                        40,2577   00003 1           OCT     3

 0662                        40,2600   77774 0  BRNCHCON OCT     77774

R0663   2BLANK BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR  OF THE PAIR INTO
R0664   DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT

 0665   REF  18  LAST  407   40,2601  3 0776 1  2BLANK   CA      DSPCOUNT
 0666   REF   1              40,2602  54 021 0           TS      SR
 0667   REF   1              40,2603  4 2614 1           CS      BLANKCON
 0668                        40,2604  0 0004 0           INHINT
 0669   REF   2  LAST  407   40,2605  50 021 1           INDEX   SR
 0670   REF  23  LAST  224   40,2606  57'022 0           XCH     DSPTAB
 0671                        40,2607  0 0006 1           EXTEND
 0672                        40,2610  6 2612 0           BZMF    +2                   IF OLD CONTENTS -, NOUT OK
 0673   REF   6  LAST  224   40,2611  25'015 1           INCR    NOUT                 IF OLD CONTENTS +, +1 TO NOUT
 0674                        40,2612  0 0003 1           RELINT                       IF -,NOUT OK
 0675   REF  52  LAST  406   40,2613  0 0002 0           TC      Q
 0676                        40,2614   04000 0  BLANKCON OCT     4000
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R0677    ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TC LOAD
R0678    DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0679    PASSES.


R0680    MACHINE CADR TO BE SPECIFIED (MCT8S) NOUNS DESIRE AN ECADR TO 8E LOADED
R0681    WHEN USED WITH LOAD VER8S, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0682    VER8 = FIXED MEMORY DISPLAY, WHICH REQUIRES AN FCADR).


 0683                             41,2000                     BANK    41
 068301 REF   1                   41,2000                     SETLOC  PIN8ALL?
 068302                           41,2000                     8ANK

 06835  REF   1                                               COUNT*  $$/PIN
 0684   REF   1                   41,2000  0 3557 0  NVSU88   TC      NVSUB1              STANDARD LEAD INS. DONT MOVE.
 0685   REF   1                   41,2001  0 3020 0  LOADLV1  TC      LOADLV
A0686                                                                                     END OF STANDARD LEAD INS.


 0687   REF  63  LAST  406        41,2002  3 4755 1  ENTER    CAF     ZERO
 0688   REF   8  LAST  406        41,2003  55'014 1           TS      CLPASS
 0689   REF   2  LAST  404        41,2004  3 4217 1           CAF     ENDINST
 0690   REF   2  LAST  404        41,2005  54 136 1           TS      ENTRET
 0691   REF   4  LAST  406        41,2006  11'012 1           CCS     REQRET
 0692   REF   1                   41,2007  0 2035 0           TC      ENTPASO             IF +, PASS 0
 0693   REF   2  LAST  408        41,2010  0 2035 0           TC      ENTPASO             IF +, PASS 0
 0694                             41,2011  0 2012 0           TC      +1                  IF -, NOT PASS 0
 0695   REF   1                   41,2012  3 2033 0  ENTPASHI CAF     MMADREF
 0696   REF   5  LAST  408        41,2013  6 1012 0           AD      REQRET              IF L/ 2 CHAR IN FOR MM CODE, ALARM
 0697                             41,2014  0 0006 1           EXTEND                      AND RECYCLE(DECIDE AT MMCHANG+1).
 0698   REF   1                   41,2015  1 2027 1           8ZF     ACCEPTWD
 0699   REF   9  LAST  405        41,2016  3 6250 0           CAF     THREE               IF DEC, ALARM IF L/ 5 CHAR IN FOR DATA,
 0700   REF  10  LAST  407        41,2017  7 0777 1           MASK    DEC8RNCH            BUT LEAVE REQRET - AND FLASH ON, SO
 0701   REF 109  LAST  406        41,2020  10 000 0           CCS     A                   OPERATOR CAN SUPPLY MISSING NUMERICAL
 0702                             41,2021  0 2023 1           TC      +2                  CHARACTERS AND CONTINUE.
 0703   REF   2  LAST  408        41,2022  0 2027 0           TC      ACCEPTWD            OCTAL. ANY NUM8ER OF CHAR OK.
 0704   REF  19  LAST  407        41,2023  10 776 0           CCS     DSPCOUNT
 0705   REF   1                   41,2024  0 2353 0           TC      GODSPALM            LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0706   REF   2  LAST  408        41,2025  0 2353 0           TC      GODSPALM            LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0707                             41,2026  0 2027 0           TC      +1                  5 CHAR IN (DSPCOUNT IS -)
 0708   REF   6  LAST  408        41,2027  4 1012 1  ACCEPTWD CS      REQRET              5 CHAR IN (DSPCOUNT IS -)
 0709   REF   7  LAST  408        41,2030  55'012 1           TS      REQRET              SET REQRET +.
 0710   REF   2  LAST  276        41,2031  0 4433 1           TC      FLASHOFF
 0711   REF   8  LAST  408        41,2032  0 1012 0           TC      REQRET

 0712   REF   3  LAST  408           0136            ENTEXIT  =       ENTRET

 0713   REF   1                   41,2033   03444 0  MMADREF  ADRES   MMCHANG +1          ASSUMES TC REQMM AT MMCHANG.
 0714                       41,2034   00034 0  LOWVERB  DEC      28              LOWER VERB THAT AVOIDS NOUN TEST.

 0715   REF  64  LAST  408  41,2035  3 4755 1  ENTPAS0  CAF      ZERO             NOUN VERB SUB ENTERS HERE
 0716   REF  11  LAST  408  41,2036  54 777 1           TS       DECBRNCH
 0717   REF   3  LAST  404  41,2037  4 4360 1           CS       VD1              BLOCK FURTHER NUM CHAR, SO THAT STRAY
 0718   REF  20  LAST  408  41,2040  54 776 0           TS       DSPCOUNT         CHAR DO NOT GET INTO VERB OR NOUN LTS.
 0719   REF   9  LAST  406  41,2041  4 1000 1  TESTVB   CS       VERBREG          IF VERB IS G/E LOWVB, SKIP NOUN TEST.
 0720   REF   1             41,2042  55'040 0           TS       VERBSAVE         SAVE VERB FOR POSSIBLE RECYCLE.
 0721   REF   1             41,2043  6 2034 1           AD       LOWVERB          LOWVERB - VB
 0722                       41,2044  0 0006 1           EXTEND
 0723   REF   1             41,2045  6 2133 1           BZMF     VERBFAN          VERB G/E LOWVERB
 0724                       41,2046  0 0006 1  TESTNN   EXTEND                    VERB L/ LOWVERB
 0725   REF   1             41,2047  3 2114 1           DCA      LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
 0726   REF   3  LAST  307  41,2050  52 006 0           DXCH     Z                ROUTINE.
 0727   REF   3  LAST  306  41,2051  50 140 1           INDEX    MIXBR
 0728                       41,2052  0 2052 1           TC       +0
 0729                       41,2053  0 2055 0           TC       +2               NORMAL
 0730   REF   1             41,2054  0 2221 1           TC       MIXNOUN          MIXED
 0731   REF   3  LAST  306  41,2055  10 146 0           CCS      NNADTEM          NORMAL
 0732   REF   2  LAST  409  41,2056  0 2131 0           TC       VERBFAN -2             NORMAL IF +
 0733   REF   3  LAST  408  41,2057  0 2353 0           TC       GODSPALM         NOT IN USE   IF +0
 0734   REF   1             41,2060  0 2064 1           TC       REQADD           SPECIFY MACHINE CADR IF -
 0735   REF   1             41,2061  25'016 1           INCR     NOUNCADR         AUGMENT MACHINE CADR IF -0
 0736   REF   1             41,2062  0 4311 0           TC       SETNADD          ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 0737   REF   1             41,2063  0 2120 0           TC       INTMCTBS +2
 0738   REF  22  LAST  296  41,2064  3 4735 1  REQADD   CAF      BIT15            SET CLPASS FOR PASS0 ONLY
 0739   REF   9  LAST  408  41,2065  55'014 1           TS       CLPASS
 0740   REF   3  LAST  408  41,2066  4 4217 0           CS       ENDINST          TEST IF REACHED HERE FROM INTERNAL OR
 0741   REF   1             41,2067  6 0136 0           AD       ENTEXIT                    FROM EXTERNAL
 0742                       41,2070  0 0006 1           EXTEND
 0743                       41,2071  1 2073 0           BZF      +2               EXTERNAL MACH CADR TO BE SPECIFIED
 0744   REF   2  LAST  409  41,2072  0 2116 0           TC       INTMCTBS
 0745   REF   1             41,2073  0 2311 0           TC       REQDATZ          EXTERNAL MACH CADR TO BE SPECIFIED
 0746   REF  12  LAST  409  41,2074  10 777 1           CCS      DECBRNCH         ALARM AND RECYCLE IF DECIMAL USED
 0747   REF   1             41,2075  0 4145 0           TC       ALMCYCLE         FOR MCTBS.
 0748   REF   4  LAST  409  41,2076  4 4360 1           CS       VD1              OCTAL USED  OK
 0749   REF  21  LAST  409  41,2077  54 776 0           TS       DSPCOUNT         BLOCK NUM CHAR IN
 0750   REF   3  LAST  410  41,2100  11'041 1           CCS      CADRSTOR
 0751                       41,2101  0 2104 0           TC       +3               EXTERNAL MCTBS DISPLAY WILL LEAVE FLASH
 0752   REF   1             41,2102  0 2105 1           TC       USEADD           ON IF ENDIDLE NOT = +0.
 0753                       41,2103  0 2104 0           TC       +1
 0754   REF   1             41,2104  0 4427 1           TC       FLASHON
 0755   REF   1             41,2105  57'004 1  USEADD   XCH      ZREG
 0756   REF   1             41,2106  0 4303 0           TC       SETNCADR         ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0757                       41,2107  0 0006 1           EXTEND
 0758   REF   2  LAST  409  41,2110  3 2114 1           DCA      LODNNLOC         SWITCH BANKS TO NOUN TABLE READING
 0759   REF   4  LAST  409  41,2111  52 006 0           DXCH     Z                ROUTINE.
 0760   REF   3  LAST  409  41,2112  0 2133 1           TC       VERBFAN

 0761   REF  22  LAST  409     0776                     EBANK=   DSPCOUNT
 0762   REF   1                41,2113    02103 1  LODNNLOC 2CADR   LODNNTAB
 0762   REF   1                41,2114    64101 0

 0763                          41,2115    77772 0  NEG5     OCT     77772

 0764   REF  85   LAST  403    41,2116  3 0156 0  INTMCTBS CA      MPAC     +2       INTERNAL MACH CADR TO BE SPECIFIED.
 0765   REF   2   LAST  409    41,2117  0 4303 0           TC      SETNCADR          ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0766   REF   8   LAST  378    41,2120  4 4756 0           CS      FIVE              NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
 0767   REF  10   LAST  409    41,2121  6 1000 0           AD      VERBREG           CADR TO BE SPECIFIED.
 0768                          41,2122  0 0006 1           EXTEND
 0769   REF   4   LAST  409    41,2123  1 2133 0           BZF     VERBFAN           DONT DISPLAY CADR IF VB = 05.
 0770   REF   2   LAST  405    41,2124  3 4321 0           CAF     R3D1              VB NOT = 05. DISPLAY CADR.
 0771   REF  23   LAST  409    41,2125  54 776 0           TS      DSPCOUNT
 0772   REF   2   LAST  409    41,2126  3 1016 1           CA      NOUNCADR
 0773   REF   1                41,2127  0 3410 1           TC      DSPDCTWO
 0774   REF   5   LAST  410    41,2130  0 2133 1           TC      VERBFAN

 0775   REF  31   LAST  406    41,2131  6 4753 1           AD      ONE
 0776   REF   3   LAST  410    41,2132  0 4303 0           TC      SETNCADR          ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 0777   REF   1                41,2133  4 2145 1  VERBFAN  CS      LST2CON
 0778   REF  11   LAST  410    41,2134  6 1000 0           AD      VERBREG           VERB-LST2CON
 0779   REF 110   LAST  408    41,2135  10 000 0           CCS     A
 0780   REF  32   LAST  410    41,2136  6 4753 1           AD      ONE               VERB G/ LST2CON
 0781                          41,2137  0 2141 1           TC      +2
 0782   REF   1                41,2140  0 2146 0           TC      VBFANDIR          VERB L/ LST2CON
 0783   REF  86   LAST  410    41,2141  54 154 0           TS      MPAC
 0784   REF   4   LAST  234    41,2142  0 4457 0           TC      RELDSP            RELEASE DISPLAY SYST
 0785   REF  18   LAST  401    41,2143  0 4635 0           TC      POSTJUMP          GO TO GOEXTVB WITH VB-40 IN MPAC.
 0786   REF   1                41,2144    66000 1           CADR    GOEXTVB
 0788                          41,2145    00050 1  LST2CON  DEC     40                FIRST LIST2 VERB (EXTENDED VERB)

 0790   REF  12   LAST  410    41,2146  51'000 0  VBFANDIR INDEX   VERBREG
 0791   REF   1                41,2147  3 2151 0           CAF     VERBTAB
 0792   REF   2   LAST  272    41,2150  0 4640 1           TC      BANKJUMP

 0793   REF   4   LAST  409    41,2151    62353 0  VERBTAB  CADR    GODSPALM          VB00 ILLEGAL
 0794   REF   1                41,2152    62367 1           CADR    DSPA              VB01 DISPLAY OCT COMP 1 (R1)
 0795   REF   1                41,2153    62375 1           CADR    DSPB              VB02 DISPLAY OCT COMP 2 (R1)
 0796   REF   1                41,2154    62402 0           CADR    DSPC              VB03 DISPLAY OCT COMP 3 (R1)
 0797   REF   1                41,2155    62362 1           CADR    DSPAB             VB04 DISPLAY OCT COMP 1,2 (R1,R2)
 0798   REF   1                41,2156    62355 0           CADR    DSPABC            VB05 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
 0799   REF   1                41,2157    62525 1           CADR    DECDSP            VB06 DECIMAL DISPLAY
 0800   REF   1                41,2160    61025 1           CADR    DSPDPDEC          VB07 DP DECIMAL DISPLAY (R1,R2)
 0801   REF   5   LAST  410    41,2161    62353 0           CADR    GODSPALM          VB08 SPARE
 0802   REF   6   LAST  410    41,2162    62353 0           CADR    GODSPALM          VB09 SPARE
 0803   REF   1                41,2163    61454 0           CADR    DSPALARM          VB10 SPARE
 0804   REF   1                41,2164    63255 0           CADR    MONITOR           VB11 MONITOR OCT COMP 1 (R1)
 0805   REF   2   LAST  410    41,2165    63255 0           CADR    MONITOR           VB12 MONITOR OCT COMP 2 (R1)
 0806   REF   3   LAST  410    41,2166    63255 0           CADR    MONITOR           VB13 MONITOR OCT COMP 3 (R1)
 0807   REF   4   LAST  410    41,2167    63255 0           CADR    MONITOR           VB14 MONITOR OCT COMP 1,2 (R1,R2)
 0808    REF    5  LAST  410    41,2170    63255 0                CADR    MONITOR          V815 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
 0809    REF    6  LAST  411    41,2171    63255 0                CADR    MONITOR          V816 MONITOR DECIMAL
 0810    REF    7  LAST  411    41,2172    63255 0                CADR    MONITOR          V817 MONITOR DP DEC  (R1,R2)
 0811    REF    7  LAST  410    41,2173    62353 0                CADR    GODSPALM         V818 SPARE
 0812    REF    8  LAST  411    41,2174    62353 0                CADR    GODSPALM         V819 SPARE
 0813    REF    9  LAST  411    41,2175    62353 0                CADR    GODSPALM         V820 SPARE
 0814    REF    1               41,2176    62755 1                CADR    ALOAD            V821 LOAD COMP 1 (R1)
 0815    REF    1               41,2177    62766 1                CADR    BLOAD            V822 LOAD COMP 2 (R2)
 0816    REF    1               41,2200    63003 1                CADR    CLOAD            V823 LOAD COMP 3 (R3)
 0817    REF    1               41,2201    62726 0                CADR    ABLOAD           V824 LOAD COMP 1,2 (R1,R2)
 0818    REF    1               41,2202    62622 0                CADR    ABCLOAD          V825 LOAD COMP 1,2,3 (R1,R2,R3)
 0819    REF   10  LAST  411    41,2203    62353 0                CADR    GODSPALM         V826 SPARE
 0820    REF    1               41,2204    63400 0                CADR    DSPFMEM          V827 FIXED MEMORY DISPLAY
A0821                                                                                      THE FOLLOWING VERBS MAKE NO NOUN TEST
 0822    REF   11  LAST  411    41,2205    62353 0                CADR    GODSPALM         V828 SPARE
 0823    REF   12  LAST  411    41,2206    62353 0                CADR    GODSPALM         V829 SPARE
 0824    REF    1               41,2207    63501 0     REQEXLOC   CADR    VBRQEXEC         V830 REQUEST EXECUTIVE
 0825    REF    1               41,2210    63525 0                CADR    VBRQWAIT         V831 REQUEST WAITLIST
 0826    REF    1               41,2211    61521 0                CADR    VBRESEQ          V832 RESEQUENCE
 0827    REF    1               41,2212    61476 0                CADR    VBPROC           V833 PROCEED WITHOUT DATA
 0828    REF    1               41,2213    61504 1                CADR    VBTERM           V834 TERMINATE CURRENT TEST OR LOAD REQ
 0829    REF    1               41,2214    63626 0                CADR    VBTSTLTS         V835 TEST LIGHTS
 0830    REF    1               41,2215    12447 0                CADR    SLAP1            V836 FRESH START
 0831    REF    2  LAST  408    41,2216    63443 1                CADR    MMCHANG          V837 CHANGE MAJOR MODE
 0832    REF   13  LAST  411    41,2217    62353 0                CADR    GODSPALM         V838 SPARE
 0833    REF   14  LAST  411    41,2220    62353 0                CADR    GODSPALM         V839 SPARE

R0834    THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.
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P0835    NNAOTAB CONTAINS A RELATIVE ACCRESS, ICACCREL(IN LCW 10 BITS), REFERRING
R0836    TC WHERE 3 CONSECUTIVE AOORESSES ARE STOREO (IN IDAOOTAB).
R0837    MIXNCUN GETS CATA ANC STORES IN MIXTEMP,+1,+2. IT SETS NOUNAOO FOR
R0838     MIXTEMP.

 0839    REF   4  LAST  409    41,2221   10 146 0  MIXNOUN   CCS     NNAOTEM
 0840                          41,2222   0 2226 0            TC      +4                  +   IN USE
 0841    REF  15  LAST  411    41,2223   C 2353 0            TC      GOOSPALM            +0   NOT IN USE
 0842                          41,2224   0 2226 0            TC      +2                  -   IN USE
 0843                          41,2225   0 2226 0            TC      +1                  -0   IN USE
 0844    REF   9  LAST  281    41,2226   4 6245 0            CS      SIX
 0845    REF  13  LAST  410    41,2227   6 1000 0            AO      VERBREG
 0846                          41,2230   0 0006 1            EXTENO
 0847                          41,2231   6 2233 1            BZMF    +2                  VERB L/E 6
 0848    REF   6  LAST  410    41,2232   0 2133 1            TC      VERBFAN             AVOIO MIXNOUN SWAP IF V8 NOT = OISPLAY
 0849    REF  19  LAST  407    41,2233   3 4752 0            CAF     TWC
 0850    REF   1               41,2234   54 117 1  MIXNN1    TS      OECOUNT
 0851    REF   1               41,2235   6 2260 1            AO      MIXAC
 0852    REF   1               41,2236   54 145 0            TS      NOUNAOO             SET NOUNADO TO MIXTEMP + K
 0853    REF   2  LAST  412    41,2237   50 117 0            INOEX   DECOUNT             GET IOAOOTAB ENTRY FCR COMPONENT K
 0854    REF   2  LAST  306    41,2240   3 015C 0            CA      IOADITEM            CF NOUN.
 0855    REF   1               41,2241   54 122 1            TS      NOUNTEM
A0856                                                                                    TEST FOR OP(FOR OCT OISPLAY). IF SO, GET
A0857                                                                                      MINOR PART ONLY.
 0858    REF   1               41,2242   0 3057 0            TC      SFRUTMIX            GET SF ROUT NUMBER IN A
 0859    REF   1               41,2243   C 2261 0            TC      OPTEST
 0860    REF   1               41,2244   0 2246 0            TC      MIXNN2              NO OP
 0861    REF   2  LAST  412    41,2245   24 122 0            INCR    NOUNTEM             OP  GET MINOR PART
 0862    REF   3  LAST  412    41,2246   3 0122 0  MIXNN2    CA      NOUNTEM
 0863    REF   3  LAST  159    41,2247   7 4356 1            MASK    LOW11               ESUBK (NO OP)  CR (ESUBK)+1     FOR OP
 0864    REF   1               41,2250   0 4313 1            TC      SETEBANK            SET EBANK, LEAVE EAORES IN A.
 0865    REF 111  LAST  410    41,2251   50 C00 1            INOEX   A                   PICK UP C(FSUBK)  NOT OP
 0866                          41,2252   3 0000 1            CA      0                   OR C((ESUBK)+1)  FCR OP MINOR PART
 0867    REF   2  LAST  412    41,2253   50 145 1            INOEX   NOUNAOO
 0868                          41,2254   56 000 1            XCH     C                   STORE IN MIXTEM + K
 0869    REF   3  LAST  412    41,2255   10 117 1            CCS     OECOUNT
 0870    REF   1               41,2256   0 2234 0            TC      MIXNN1
 0871    REF   7  LAST  412    41,2257   0 2133 1            TC      VERBFAN

 0872    REF   3  LAST  406    41,2260   0 0125 1  MIXAC     TC      MIXTEMP


R0873    CPTEST    ENTER WITH SF ROUT NUMBER IN A.
R0874              RETURNS TC L+1 IF NC DP.
R0875              RETURNS TO L+2 IF DP.

 0876    REF 112  LAST  412    41,2261   50 000 1  OPTEST    INOEX   A
 0877                          41,2262   1 2263 0            TCF     +1
 0878    REF  53  LAST  407    41,2263   0 0002 0            TC      Q                   OCTAL ONLY  NO DP
 0879    REF  54  LAST  412    41,2264   0 0002 0            TC      Q                   FRACT NO OP
 0880   REF  55  LAST  412    41,2265   0 0002 0             TC       Q                   DEG  NO DP
 0881   REF  56  LAST  413    41,2266   0 0002 0             TC       Q                   ARITH  NO DP
 0882   REF   1               41,2267   1 2303 1             TCF      DPTEST1             DP1OUT
 0883   REF   2  LAST  413    41,2270   1 2303 1             TCF      DPTEST1             DP2OUT
 0884   REF  57  LAST  413    41,2271   0 0002 0             TC       Q                   LRPOSOUT  NO DP (DATA IN CHANNEL 33)
 0885   REF   3  LAST  413    41,2272   1 2303 1             TCF      DPTEST1             DP3OUT
 0886   REF  58  LAST  413    41,2273   0 0002 0             TC       Q                   HMS   NO DP
 0887   REF  59  LAST  413    41,2274   0 0002 0             TC       Q                   M/S   NO DP
 0888   REF   4  LAST  413    41,2275   1 2303 1             TCF      DPTEST1             DP4OUT
 08881  REF  60  LAST  413    41,2276   0 0002 0             TC       Q                   ARITH1   NO DP
 08882  REF  61  LAST  413    41,2277   0 0002 0             TC       Q                   2INTOUT  NO DP TO GET HI PART IN MPAC
 08883  REF  62  LAST  413    41,2300   0 0002 0             TC       Q                   360-CDU   NO DP
 08884  REF  63  LAST  413    41,2301   0 0002 0             TC       Q                   RRANGOUT  NO DP
 08885  REF  64  LAST  413    41,2302   0 0002 0             TC       Q                   RRDOTOUT  NO DP
 0889   REF  65  LAST  413    41,2303  50 002 0   DPTEST1    INDEX    Q
 0890                         41,2304   0 0001 0             TC       1                   RETURN TO L+2


 0891   REF   3  LAST  407    41,2305   3 4317 0  REQDATX    CAF      R1D1
 0892   REF   1               41,2306   1 2312 1             TCF      REQCOM
 0893   REF   2  LAST  405    41,2307   3 4320 1  REQDATY    CAF      R2D1
 0894   REF   2  LAST  413    41,2310   1 2312 1             TCF      REQCOM
 0895   REF   3  LAST  410    41,2311   3 4321 0  REQDATZ    CAF      R3D1
 0896   REF  24  LAST  410    41,2312  54 776 0   REQCOM     TS       DSPCOUNT
 0897   REF  66  LAST  413    41,2313   4 0002 1             CS       Q
 0898   REF   9  LAST  408    41,2314  55'012 1              TS       REQRET
 0899   REF  79  LAST  406    41,2315   0 4616 1             TC       BANKCALL
 0900   REF   2  LAST  406    41,2316    60536 1             CADR     5BLANK
 0901   REF   2  LAST  409    41,2317   0 4427 1             TC       FLASHON
 0902   REF   2  LAST  409    41,2320   0 0136 0  ENDRQDAT   TC       ENTEXIT

 0903   REF   8  LAST  404    41,2321  55'001 0              TS       NOUNREG
 0904   REF  67  LAST  413    41,2322  56 002 0   UPDATNN    XCH      Q
 0905   REF   1               41,2323  54 117 1              TS       UPDATRET
 0906                         41,2324   0 0006 1             EXTEND
 0907   REF   3  LAST  409    41,2325   3 2114 1             DCA      LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 0908   REF   5  LAST  409    41,2326  52 006 0              DXCH     Z                   ROUTINE.
 0909   REF   5  LAST  412    41,2327  10 146 0              CCS      NNADTEM
 0910   REF  33  LAST  410    41,2330   6 4753 1             AD       ONE                 NORMAL
 0911   REF   1               41,2331   1 2334 0             TCF      PUTADD
 0912   REF   2  LAST  413    41,2332   1 2335 1             TCF      PUTADD  +1          MCT8S  DONT CHANGE NOUNADD
 0913   REF   3  LAST  413    41,2333   1 2335 1             TCF      PUTADD  +1          MCTBI  DONT CHANGE NOUNADD
 0914   REF   4  LAST  410    41,2334   0 4303 0  PUTADD     TC       SETNCADR            ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 0915   REF   4  LAST  404    41,2335   3 4361 1             CAF      ND1
 0916   REF  25  LAST  413    41,2336  54 776 0              TS       DSPCOUNT
 0917   REF   9  LAST  413    41,2337   3 1001 1             CA       NOUNREG
 0918   REF   1               41,2340   1 2347 1             TCF      UPDAT1

 0919   REF  14  LAST  412    41,2341  55'000 1              TS       VERBREG
 0920   REF  68  LAST  413    41,2342  56 002 0   UPDATVB    XCH      Q
 0921    REF    2  LAST  413    41,2343  54 117 1            TS       UPDATRET
 0922    REF    5  LAST  409    41,2344   3 4360 0           CAF      VD1
 0923    REF   26  LAST  413    41,2345  54 776 0            TS       DSPCOUNT
 0924    REF   15  LAST  413    41,2346   3 1000 0           CA       VERBREG
 0925    REF   19  LAST  410    41,2347   0 4635 0  UPDAT1   TC       POSTJUMP       CANT USE SWCALL TO GO TO DSPDECVN,SINCE
 0926    REF    1               41,2350    61353 0           CADR     GOVNUPDT       UPDATVB CAN ITSELF BE CALLED BY SWCALL
 0927    REF    3  LAST  414    41,2351   0 0117 0           TC       UPDATRET


 0928    REF    2  LAST  409    41,2352   0 4145 0  GOALMCYC TC       ALMCYCLE       NEEDED BECAUSE BANKJUMP CANT HANDLE F/F.


 0929    REF   20  LAST  414    41,2353   0 4635 0  GODSPALM TC       POSTJUMP
 0930    REF    2  LAST  410    41,2354    61454 0           CADR     DSPALARM
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R0931               NOUN   TABLES
R0932    NOUN CODE L/40, NORMAL NOUN CASE.  NOUN CODE G/E 40, MIXED NOUN CASE.
R0933    FOR NORMAL CASE, NNADTAB CONTAINS ONE        ECADR      FOR EACH NOUN.
R0934    +0 INDICATES NOUN NOT USED.   - ENTRY INDICATES MACHINE CADR(E OR F) TO
R0935    BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
R0936    OF LAST MACHINE CADR SUPPLIED.

R0937    FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
R0938    10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

R0939    NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

R0940    FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
R0941                         N-S ARE THE SF ROUTINE CODE NUMBER.
R0942                         P-S ARE THE SF CONSTANT CODE NUMBER.

R0943    MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER      3 COMPONENT CASE
R0944                N-S ARE THE SF CONSTANT2 CODE NUMBER
R0945                P-S ARE THE SF CONSTANT1 CODE NUMBER
R0946                N-S ARE THE SF CONSTANT2 CODE NUMBER      2 COMPONENT CASE
R0947                P-S ARE THE SF CONSTANT1 CODE NUMBER
R0948                P-S ARE THE SF CONSTANT1 CODE NUMBER       1 COMPONENT CASE

R0949    THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
R0950    EACH ENTRY CONTAINS ONE ECADR.      IDADDREL IS THE RELATIVE ADDRESS OF
R0951    THE FIRST OF THESE ENTRIES.
R0952    THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
R0953    THEY ARE LISTED IN ORDER OF ASCENDING K.

R0954    THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
R0955    CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
R0956          QQQQQRRRRRSSSSS
R0957    Q-S ARE THE SF ROUTINE 3 CODE NUMBER      3 COMPONENT CASE
R0958    R-S ARE THE SF ROUTINE 2 CODE NUMBER
R0959    S-S ARE THE SF ROUTINE 1 CODE NUMBER
R0960    R-S ARE THE SF ROUTINE 2 CODE NUMBER      2 COMPONENT CASE
R0961    S-S ARE THE SF ROUTINE 1 CODE NUMBER


R0962    IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
R0963    COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
R0964    (ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 3 COMPONENT.)


R0967    IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
R0968    COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.

R0969    IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
R0970    BEFORE EACH ENTER. IF NOT, ALARM.
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P0971                  DISPLAY  VERBS
 0972    REF  20  LAST  412    41,2355  4 4752 1  DSPABC     CS       TWO
 0973    REF   1               41,2356  0 2426 0             TC       COMPTEST
 0974    REF   3  LAST  412    41,2357  50 145 1             INDEX    NOUNADD
 0975                          41,2360  4 0002 1             CS       2
 0976    REF  41  LAST  338    41,2361  56 132 1             XCH      BUF       +2
 0977    REF  34  LAST  413    41,2362  4 4753 0  DSPAB      CS       ONE
 0978    REF   2  LAST  416    41,2363  0 2426 0             TC       COMPTEST
 0979    REF   4  LAST  416    41,2364  50 145 1             INDEX    NOUNADD
 0980                          41,2365  4 0001 1             CS       1
 0981    REF  42  LAST  416    41,2366  56 131 1             XCH      BUF       +1
 0982    REF   1               41,2367  0 2445 0  DSPA       TC       DECTEST
 0983    REF   1              .41,2370  0 2470 0             TC       TSTFORDP
 0984    REF   5  LAST  416    41,2371  50 145 1             INDEX    NOUNADD
 0985                          41,2372  4 0000 0             CS       0
 0986    REF  43  LAST  416    41,2373  56 130 0  DSPCOM1    XCH      BUF
 0987    REF   1               41,2374  0 2407 0             TC       DSPCOM2
 0988    REF  35  LAST  416    41,2375  4 4753 0  DSPB       CS       ONE
 0989    REF   1               41,2376  0 2441 1             TC       DCOMPTST
 0990    REF   6  LAST  416    41,2377  50 145 1             INDEX    NOUNADD
 0991                          41,2400  4 0001 1             CS       1
 0992    REF   1               41,2401  0 2373 1             TC       DSPCOM1
 0993    REF  21  LAST  416    41,2402  4 4752 1  DSPC       CS       TWO
 0994    REF   2  LAST  416    41,2403  0 2441 1             TC       DCOMPTST
 0995    REF   7  LAST  416    41,2404  50 145 1             INDEX    NOUNADD
 0996                          41,2405  4 0002 1             CS       2
 0997    REF   2  LAST  416    41,2406  0 2373 1             TC       DSPCOM1
 0998    REF  22  LAST  416    41,2407  4 4752 1  DSPCOM2    CS       TWO                A   B   C   AB   ABC
 0999    REF  16  LAST  414    41,2410  6 1000 0             AD       VERBREG            -1  -0  +1  +2   +3    IN A
 1000    REF 113  LAST  412    41,2411  10 000 0             CCS      A                  +0  +0  +0  +1   +2     IN A AFTER CCS
 1001    REF   1               41,2412  0 2415 0             TC       DSPCOM3
 1002    REF   3  LAST  413    41,2413  0 0136 0             TC       ENTEXIT
 1003                          41,2414  0 2415 0             TC       +1
 1004    REF   1               41,2415  54 122 1  DSPCOM3    TS       DISTEM             +0,+1,+2 INTO DISTEM
 1005    REF 114  LAST  416    41,2416  50 000 1             INDEX    A
 1006    REF   4  LAST  413    41,2417  3 4317 0             CAF      P101
 1007    REF  27  LAST  414    41,2420  54 776 0             TS       DSPCOUNT
 1008    REF   2  LAST  416    41,2421  50 122 0             INDEX    DISTEM
 1009    REF  44  LAST  416    41,2422  4 0130 1             CS       BUF
 1010    REF   2  LAST  410    41,2423  0 3410 1             TC       DSPOCTWO
 1011    REF   3  LAST  416    41,2424  56 122 0             XCH      DISTEM
 1012    REF   2  LAST  416    41,2425  0 2411 1             TC       DSPCOM2 +2

R1013    COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
R1014    GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
 1016    REF   4  LAST  307    41,2426  54 123 0  COMPTEST   TS       SFTEMP1            - VERB COMP
 1017    REF  69  LAST  413    41,2427  22 002 0             LXCH     Q
 1022    REF   1               41,2430  0 2517 0  COMPTST1   TC       GETCOMP
 1023    REF   1               41,2431  0 4331 1             TC       LEFT5
 1024    REF  10  LAST  408    41,2432  7 6250 1             MASK     THREE              NOUN COMP
 1025   REF   5  LAST  416   41,2433  6 0123 1                AD      SFTEMP1              NOUN COMP - VERB COMP
 1026   REF 115  LAST  416   41,2434 10 000  0                CCS     A
 1027   REF  46  LAST  407   41,2435  0 0001 0                TC      L                    NOUN COMP G/ VERB COMP
 1028   REF   4  LAST  406   41,2436  0 5675 0                TC      CCSHOLE
 1029   REF  16  LAST  412   41,2437  0 2353 0                TC      GOOSPALM             NOUN COMP L/ VERB COMP
 1030   REF  47  LAST  417   41,2440  0 0001 0      NOCMPTST  TC      L                    NOUN COMP = VERB COMP


R1031   DCOMPTST ALARMS IF DECIMAL ONLY BIT (BIT4 OF COMP CODE NUMBER) = 1.
R1032   IF NOT, IT PERFORMS REGULAR COMPTEST.
 1033   REF   6  LAST  417   41,2441 54 123  0      DCOMPTST  TS      SFTEMP1              - VERB COMP
 1034   REF  70  LAST  416   41,2442 22 002  0                LXCH    Q
 1035   REF   2  LAST  416   41,2443  0 2445 0                TC      DECTEST
 1036   REF   1              41,2444  0 2430 1                TC      COMPTST1

 1037                        41,2445  0 0006 1      DECTEST   EXTEND                       ALARMS IF DEC ONLY BIT = 1 (BIT4 OF COMP
 1038   REF  87  LAST  410   41,2446 22 156  0                DXCH    MPAC     +2          CODE NUMBER). RETURNS IF NOT.
 1039   REF   2  LAST  416   41,2447  0 2517 0                TC      GETCOMP
 1040   REF  36  LAST  376   41,2450  7 4736 0                MASK    BIT14
 1041   REF 116  LAST  417   41,2451 10 000  0                CCS     A
 1042   REF  17  LAST  417   41,2452  0 2353 0                TC      GOOSPALM
 1043   REF  88  LAST  417   41,2453  0 0156 0                TC      MPAC     +2


 1044   REF  71  LAST  417   41,2454 22 002  0      DCTSTCYC  LXCH    Q                    ALARMS AND RECYCLES IF DEC ONLY BIT = 1
 1045   REF   3  LAST  417   41,2455  0 2517 0                TC      GETCOMP              ( BIT4 OF COMP CODE NUMBER). RETURNS
 1046   REF  37  LAST  417   41,2456  7 4736 0                MASK    BIT14                IF NOT.  USED BY LOAD VERBS.
 1047   REF 117  LAST  417   41,2457 10 000  0                CCS     A
 1048   REF   3  LAST  414   41,2460  0 4145 0                TC      ALMCYCLE
 1049   REF  48  LAST  417   41,2461  0 0001 0                TC      L


R1050   NOUNTEST ALARMS IF NO-LOAD BIT (BIT5 OF COMP CODE NUMBER) = 1.
R1051   IF NOT, IT RETURNS.
 1052   REF  72  LAST  417   41,2462 22 002  0      NOUNTEST  LXCH    Q
 1053   REF   4  LAST  417   41,2463  0 2517 0                TC      GETCOMP
 1054   REF 118  LAST  417   41,2464 10 000  0                CCS     A
 1055   REF  49  LAST  417   41,2465  0 0001 0                TC      L
 1056   REF  50  LAST  417   41,2466  0 0001 0                TC      L
 1057   REF  18  LAST  417   41,2467  0 2353 0                TC      GOOSPALM


 1058   REF  73  LAST  417   41,2470 22 002  0      TSTFORDP  LXCH    Q                    TEST FOR DP. IF SO, GET MINOR PART ONLY.
 1059   REF   6  LAST  413   41,2471  3 0146 1                CA      NNADTEM
 1060   REF  36  LAST  416   41,2472  6 4753 1                AD      ONE                  IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1061                        41,2473  0 0006 1                EXTEND
 1062   REF   1              41,2474  1 2506 1                BZF     CHANDSP
 1063   REF   4  LAST  409   41,2475 50 140  1                INDEX   MIXBR
 1064                        41,2476  0 2476 0                TC      +0
 1065                        41,2477  0 2501 1                TC      +2                   NORMAL
 1066   REF  51  LAST  417   41,2500  0 0001 0           TC     L                  MIXED CASE ALREADY HANDLED IN MIXNOUN
 1067   REF   1              41,2501  0 3051 0           TC     SFRUTNOR
 1068   REF   2  LAST  412   41,2502  0 2261 0           TC     DPTEST
 1069   REF  52  LAST  418   41,2503  0 0001 0           TC     L                  NO DP
 1070   REF   8  LAST  416   41,2504  24 145 1           INCR   NOUNADD            DP    E+1 INTO NOUNADD FOR MINOR PART.
 1071   REF  53  LAST  418   41,2505  0 0001 0           TC     L


 1072   REF   3  LAST  410   41,2506  3 1016 1  CHANDSP  CA     NOUNCADR
 1073   REF   6  LAST  270   41,2507  7 5004 1           MASK   LOW9
 10731                       41,2510  0 0006 1           EXTEND
 10732  REF 119  LAST  417   41,2511  5 0000 1           INDEX  A
 1074                        41,2512  00 000 1           READ   0
 1075   REF 120  LAST  418   41,2513  4 0000 0           CS     A
 1076   REF   3  LAST  416   41,2514  1 2373 0           TCF    DSPCOM1


 1077   REF   2  LAST  306   41,2515   00147 0  COMPICK  ADRES  NNTYPTEM
 1078   REF   7  LAST  417   41,2516   00146 1           ADRES  NNADTEM

 1079   REF   5  LAST  417   41,2517  50 140 1  GETCOMP  INDEX  MIXBR              NORMAL               MIXED
 1080   REF   1              41,2520  3 2514 0           CAF    COMPICK -1         ADRES NNTYPTEM       ADRES NNADTEM
 1081   REF 121  LAST  418   41,2521  50 000 1           INDEX  A
 1082                        41,2522  3 0000 1           CA     0                  C(NNTYPTEM)          C(NNADTEM)
 1083   REF   4  LAST  234   41,2523  7 4350 1           MASK   HI5                GET HI5 OF NNTYPTAB(NORM)OF NNADTAB(MIX)
 1084   REF  74  LAST  417   41,2524  0 0002 0           TC     Q


 1085   REF   5  LAST  417   41,2525  0 2517 0  DECDSP   TC     GETCOMP
 1086   REF   2  LAST  416   41,2526  0 4331 1           TC     LEFT5
 1087   REF  11  LAST  416   41,2527  7 6250 1           MASK   THREE
 1088   REF   4  LAST  412   41,2530  54 117 1           TS     DECOUNT            COMP NUMBER INTO DECOUNT
 1089   REF   1              41,2531  54 122 1  DSPDCGET TS     DECTEM             PICKS UP DATA
 1090   REF   9  LAST  418   41,2532  6 0145 1           AD     NOUNADD            DECTEM  1COMP +0, 2COMP +1, 3COMP +2
 1091   REF 122  LAST  418   41,2533  50 000 1           INDEX  A
 1092                        41,2534  4 0000 0           CS     0
 1093   REF   2  LAST  418   41,2535  50 122 0           INDEX  DECTEM
 1094   REF   2  LAST  307   41,2536  57 002 1           XCH    XREG               CANT USE BUF SINCE DMP USES IT.
 1095   REF   3  LAST  418   41,2537  10 122 1           CCS    DECTEM
 1096   REF   1              41,2540  0 2531 1           TC     DSPDCGET           MORE TO GET
 1097   REF  65  LAST  409   41,2541  3 4755 1  DSPDCPUT CAF    ZERO               DISPLAYS DATA
 1098   REF  89  LAST  417   41,2542  54 155 1           TS     MPAC      +1       DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
 1099   REF  90  LAST  418   41,2543  54 156 1           TS     MPAC      +2
 1100   REF   5  LAST  418   41,2544  50 117 0           INDEX  DECOUNT
 1101   REF   5  LAST  416   41,2545  3 4317 0           CAF    R1D1
 1102   REF  28  LAST  416   41,2546  54 776 0           TS     DSPCOUNT
 1103   REF   6  LAST  418   41,2547  50 117 0           INDEX  DECOUNT
 1104   REF   3  LAST  418   41,2550  4 1002 0           CS     XREG
 1105   REF  91  LAST  418   41,2551  54 154 0           TS     MPAC
 1106   REF   1              41,2552  0 3072 1           TC     SFCONUM            2X( SF CON NUMB ) IN A
 1107    REF   7  LAST  417    41,2553  54 123 0            TS      SFTEMP1        SWITCH BANKS TO SF CONSTANT TABLE
 1108                          41,2554  0 0006 1            EXTEND                    READING ROUTINE.
 1109    REF   1               41,2555  3 2567 1            DCA     GTSFOUTL       LOADS SFTEMP1, SFTEMP2.
 1110    REF   6  LAST  413    41,2556  52 006 0            DXCH    Z
 1111    REF   6  LAST  418    41,2557  50 140 1            INDEX   MIXBR
 1112                          41,2560  0 2560 0            TC      +0
 1113    REF   1               41,2561  0 2564 1            TC      DSPSFNOR
 1114    REF   2  LAST  412    41,2562  0 3057 0            TC      SFRUTMIX
 1115    REF   1               41,2563  0 2577 0            TC      DECDSP3

 1116    REF   2  LAST  418    41,2564  0 3051 0  DSPSFNOR  TC      SFRUTNOR
 1117    REF   2  LAST  419    41,2565  0 2577 0            TC      DECDSP3

 1118    REF  29  LAST  418      0776                       EBANK=  DSPCOUNT
 1119    REF   1               41,2566   02141 1  GTSFOUTL  2CADR   GTSFOUT
 1119    REF   1               41,2567   64101 0


 1120    REF  80  LAST  413    41,2570  0 4616 1  DSPDCEND  TC      BANKCALL       ALL SFOUT ROUTINES END HERE
 1121    REF   1               41,2571   61262 0            CADR    DSPDECWD
 1122    REF   7  LAST  418    41,2572  10 117 1            CCS     DECOUNT
 1123                          41,2573  0 2575 1            TC      +2
 1124    REF   4  LAST  416    41,2574  0 0136 0            TC      ENTEXIT
 1125    REF   8  LAST  419    41,2575  54 117 1            TS      DECOUNT
 1126    REF   1               41,2576  0 2541 0            TC      DSPDCPUT       MORE TO DISPLAY


 1127    REF 123  LAST  418    41,2577  50 000 1  DECDSP3   INDEX   A
 1128    REF   1               41,2600  3 2602 1            CAF     SFOUTABR
 1129    REF   3  LAST  410    41,2601  0 4640 1            TC      BANKJUMP

 1130    REF   1               41,2602   61452 0  SFOUTABR  CADR    PREDSPAL       ALARM IF DEC DISP WITH OCTAL ONLY NOUN
 1131    REF   1               41,2603   62570 1            CADR    DSPDCEND
 1132    REF   1               41,2604   60615 0            CADR    DEGOUTSF
 1133    REF   1               41,2605   60733 0            CADR    ARTOUTSF
 1134    REF   1               41,2606   60744 0            CADR    DP1OUTSF
 1135    REF   1               41,2607   60751 1            CADR    DP2OUTSF
 1136    REF   1               41,2610   60635 1            CADR    LRPOSOUT
 1137    REF   1               41,2611   60753 0            CADR    DP3OUTSF
 1138    REF   1               41,2612   65230 0            CADR    HMSOUT
 1139    REF   1               41,2613   65303 1            CADR    M/SOUT
 1140    REF   2  LAST  419    41,2614   60751 1            CADR    DP2OUTSF
 11401   REF   1               41,2615   60740 1            CADR    AROUT1SF
 11402   REF   1               41,2616   60766 0            CADR    2INTOUT
 11403   REF   1               41,2617   60623 0            CADR    360-CDUO
 11404   REF   1               41,2620   60645 0            CADR    RRANGOUT
 11405   REF   1               41,2621   60662 0            CADR    RRDOTOUT
 1141                          41,2622            ENDRTOUT  EQUALS
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R1142            THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
R1143    LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEND


 1144    REF   2  LAST  407   40,2615                        SETLOC BLANKCON +1

 11445   REF   2 LAST  400 TO  408:   334   334*             COUNT* $$/PIN
R1145       DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE , ADDING .18 FOR
R1146    NUMBERS IN THE NEGATIVE (AGC) RANGE.

 1147    REF  66  LAST  418   40,2615  3 4755 1  DEGOUTSF CAF    ZERO
 1148    REF  92  LAST  418   40,2616  54 156 1           TS     MPAC     +2      SET INDEX FOR FULL SCALE
 1149    REF   1              40,2617  0 2706 1           TC     FIXRANGE
 1150                         40,2620  0 2622 0           TC     +2               NO AUGMENT NEEDED (SFTEMP1 AND 2 ARE 0)
 1151    REF   1              40,2621  0 2701 0           TC     SETAUG           SET AUGMENTER ACCORDING TO C(MPAC +2)
 11511   REF   1              40,2622  0 2717 1           TC     DEGCOM

R1152    360-CDUD COMPUTES 360 - CDU ANGLE IN MPAC, STORES RESULT IN MPAC AND
R11521   GOES TO DEGOUTSF.

 11522   REF   1              40,2623  0 2625 1  360-CDUD TC     360-CDU
 11523   REF   2  LAST  419   40,2624  0 2615 1           TC     DEGOUTSF

 11524   REF  93  LAST  420   40,2625  3 0154 1  360-CDU  CA     MPAC
 11525   REF   6  LAST  383   40,2626  7 4733 0           MASK   POSMAX           IF ANGLE IS 0 OR 180 DEGREES, DO NOTHING
 11526                        40,2627  0 0006 1           EXTEND
 11527   REF   1              40,2630  1 2634 0           BZF    360-CDUE
 11528   REF  94  LAST  420   40,2631  4 0154 0           CS     MPAC             COMPUTE 360 DEGREES MINUS ANGLE
 11529   REF  37  LAST  417   40,2632  6 4753 1           AD     ONE
 115291  REF  95  LAST  420   40,2633  54 154 0           TS     MPAC
 115292  REF  75  LAST  418   40,2634  0 0002 0  360-CDUE TC     Q

R1153    LRPOSOUT DISPLAYS +0,1,2,OR 3 (WHOLE) FOR CHANNEL 33,BITS 7-6 = 11,10,
R1154    01,00 RESPECTIVELY.

 1155                         40,2635  0 0006 1  LRPOSOUT EXTEND
 1156    REF   6  LAST  279   40,2636  00 033 1           READ   CHAN33
 1157                         40,2637  0 0006 1           EXTEND
 1158    REF  20  LAST  377   40,2640  7 4742 0           MP     BIT10            BITS 7-6 TO BITS 2-1
 1159                         40,2641  4 0000 0           COM
 1160    REF  12  LAST  418   40,2642  7 6250 1           MASK   THREE
 1161    REF  96  LAST  420   40,2643  54 154 0           TS     MPAC
 1162    REF   2  LAST  419   40,2644  0 2733 1           TC     ARTOUTSF         DISPLAY AS WHOLE

R1163    RRANGOUT AND RRDOTOUT CONVERT RR RANGE AND RANGE RATE FROM SP 15 BIT
R11633   MAGNITUDE TO DP AND THEN SCALE FOR DISPLAY.

 11636   REF   1              40,2645  0 2671 0  RRANGOUT TC     RRSPTODP         CONVERT TO DP.
 11639   REF  27  LAST  325   40,2646  4 0110 0           CS     RADMODES         BIT 3 OF FLAG12 = HI SCALE
 11643   REF  20  LAST  301   40,2647  7 4751 1           MASK   BIT3
 11646  REF 124  LAST  419    40,2650  10 000 0            CCS     A
 11649  REF   1               40,2651  0 2657 1            TC      SCALELC              OATA IS IN LO SCALE.
 11653  REF  97  LAST  420    40,2652  52 155 1            DXCH    MPAC                 DATA IS IN HI SCALE, MP BY 8
 11656  REF 125  LAST  421    40,2653  20 001 1            DAS     A
 11659  REF 126  LAST  421    40,2654  20 001 1            CAS     A
 11663  REF 127  LAST  421    40,2655  20 001 1            DAS     A
 11666  REF  98  LAST  421    40,2656  52 155 1            DXCH    MPAC
 11669  REF   2  LAST  402    40,2657  0 7106 1  SCALELO   TC      DMP                  SCALE FOR DISPLAY,
 11673  REF   8  LAST  419    40,2660   00123 1            ADRES   SFTEMP1
 11676  REF   1               40,2661  0 2745 0            TC      L14/OUT              ANO GO TO ARITHDP1.

 11679  REF   2  LAST  420    40,2662  0 2671 0  RROCTOUT  TC      RRSPTOCP             CONVERT TO DP.
 11683                        40,2663  0 0006 1            EXTENO
 11686  REF   1               40,2664  4 2670 0            DCS     BIASRODT             SUBTRACT BIAS OF 17000 CCUNTS.
 11689  REF  99  LAST  421    40,2665  20 155 1            DAS     MPAC
 11693  REF   2  LAST  421    40,2666  0 2657 1            TC      SCALELD              SCALE FCR OISPLAY.
 11696                        40,2667   00001 0  BIASROOT  20EC    17000
 11696                        40,2670   01150 1

 11699  REF   7  LAST  420    40,2671  3 4733 1  RRSPTOCP  CAF     PDSMAX               CONVERT SP 15 BIT MAG TC DP.
 1171   REF 100  LAST  421    40,2672  7 0154 0            MASK    MPAC
 11713  REF 101  LAST  421    40,2673  54 155 1            TS      MPAC +1
 11716  REF 102  LAST  421    40,2674  3 0154 1            CA      MPAC
 11719                        40,2675  6 0000 1            DOUBLE
 11723  REF  19  LAST  298    40,2676  7 4753 0            MASK    BIT1
 11726  REF 103  LAST  421    40,2677  54 154 0            TS      MPAC
 11729  REF  76  LAST  420    40,2700  0 0002 0            TC      Q

 1174                         40,2701  0 0006 1  SETAUG    EXTEND                       LOADS SFTEMP1 AND SFTEMP2 WITH THE
 1175   REF 104  LAST  421    40,2702  5 0156 0            INDEX   MPAC      +2         OP AUGMENTEP CONSTANT
 1176   REF   1               40,2703  2 2730 1            OCA     DEGTAB
 1177   REF   9  LAST  421    40,2704  52 124 1            DXCH    SFTEMP1
 1178   REF  77  LAST  421    40,2705  0 0002 0            TC      Q

 1179   REF 105  LAST  421    40,2706  10 154 0  FIXRANGE  CCS     MPAC                 IF MPAC IS + RETURN TO L+1
 1180   REF  78  LAST  421    40,2707  0 0002 0            TC      Q                    IF MPAC IS - RETURN TO L+2 AFTER
 1181   REF  79  LAST  421    40,2710  0 0002 0            TC      Q                    MASKING OUT THE SIGN BIT
 1182                         40,2711  1 2712 0            TCF     +1
 1183   REF  23  LAST  409    40,2712  4 4735 0            CS      BIT15
 1184   REF 106  LAST  421    40,2713  7 0154 0            MASK    MPAC
 1185   REF 107  LAST  421    40,2714  54 154 0            TS      MPAC
 1186   REF  80  LAST  421    40,2715  50 002 0            INDEX   Q
 1187                         40,2716  0 0001 0            TC      1

 1188                         40,2717  0 0006 1  CEGCOM    EXTENO                       LOADS MULTIPLIER , OOES SHOPTMP, ANO
 1189   REF 108  LAST  421    40,2720  5 0156 0            INDEX   MPAC      +2         AODS AUGMENTER.
 1190   REF   2  LAST  421    40,2721  3 2730 1            DCA     DEGTAB
 1191   REF 109  LAST  421    40,2722  52 155 1            DXCH    MPAC                 AOJUSTED ANGLE IN A
 1192   REF   2  LAST  402    40,2723  0 7312 0            TC      SHORTMP
 1193   REF  10  LAST  421    40,2724  52 124 1            DXCH    SFTEMP1
 1194   REF 110  LAST  421    40,2725  20 155 1             DAS      MPAC
 1195   REF   1               40,2726  0 2736 1             TC       SCOUTEND


 1196   .                     40,2727   05605 1  DEGTAB     OCT      05605               HI PART OF     .18
 1197                         40,2730   03656 1             OCT      03656               LOW PART OF    .18
 1198                         40,2731   16314 0             OCT      16314               HI PART OF     .45
 1199                         40,2732   31463 1             OCT      31463               LO PART OF     .45

 1201   REF  11  LAST  421    40,2733  52 124 1  ARTOUTSF   DXCH     SFTEMP1             ASSUMES POINT AT LEFT OF DP SFCON
 1202   REF 111  LAST  422    40,2734  52 155 1             DXCH     MPAC
 1203   REF   1               40,2735  0 4415 0             TC       PRSHRTMP            IF C(A) = -0, SHORTMP FAILS TO GIVE -0.
 1204   REF  21  LAST  414    40,2736  0 4635 0  SCOUTEND   TC       POSTJUMP
 1205   REF   2  LAST  419    40,2737   62570 1             CADR     DSPOCEND

 12051  REF  12  LAST  422    40,2740  52 124 1  AROUT1SE   DXCH     SFTEMP1             ASSUMES POINT BETWEEN HI AND LO PARTS OF
 12052  REF 112  LAST  422    40,2741  52 155 1             DXCH     MPAC                DP SFCON. SHIFTS RESULTS LEFT 14, BY
 12053  REF   2  LAST  422    40,2742  0 4415 0             TC       PRSHRTMP            TAKING RESULTS FROM MPAC+1, MPAC+2.
 12054  REF   2  LAST  421    40,2743  0 2745 0             TC       L14/OUT


 1206   REF   1               40,2744  0 2757 0  OP1OUTSF   TC       OPOUT               SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
 1207   REF 113  LAST  422    40,2745  56 156 0  L14/OUT    XCH      MPAC      +2        IN SFTEMP1, SFTEMP2. THEN SCALE RESULT
 1208   REF 114  LAST  422    40,2746  56 155 0             XCH      MPAC      +1        BY B14.
 1209   REF 115  LAST  422    40,2747  54 154 0             TS       MPAC
 1210   REF   2  LAST  422    40,2750  0 2736 1             TC       SCOUTEND


 1211   REF   2  LAST  422    40,2751  0 2757 0  OP2OUTSF   TC       OPOUT               SCALES MPAC , MPAC +1 BY OP SCALE FACTOR
 1212   REF   3  LAST  422    40,2752  0 2736 1             TC       SCOUTEND


 1213   REF   3  LAST  422    40,2753  0 2757 0  OP3OUTSF   TC       OPOUT               ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1214   REF  10  LAST  412    40,2754  3 6245 1             CAF      SIX                 LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1.
 1215   REF   1               40,2755  0 3207 1             TC       TPLEFTN             SHIFT LEFT 7.
 1216   REF   4  LAST  422    40,2756  0 2736 1             TC       SCOUTEND


 12165  REF 116  LAST  422       0162            MPAC+6     =        MPAC +6             USE MPAC +6 INSTEAD OF OVFIND

 1217   REF  81  LAST  421    40,2757  56 002 0  OPOUT      XCH      Q
 1218   REF   1               40,2760  54 162 0             TS       MPAC+6
 1219   REF   1               40,2761  0 3003 1             TC       READLO              GET FRESH DATA FOR BOTH HI AND LO.
 1220   REF   2  LAST  277    40,2762  0 7262 0             TC       TPAGREE             MAKE DP DATA AGREE
 1221   REF   3  LAST  421    40,2763  0 7106 1             TC       DMP
 1222   REF  13  LAST  422    40,2764   00123 1             ADRES    SFTEMP1
 1223   REF   2  LAST  422    40,2765  0 0162 1             TC       MPAC+6
R12231  THE FOLLOWING ROUTINE DISPLAYS TWO CONTIGUOUS SP POSITIVE INTEGERS
R12232  AS TWO POSITIVE DECIMAL INTEGERS IN RXC1-RXC2 AND RX04-RX05 (RX03 IS
R12233  BLANKED). THE INTEGER IN THE LOWER NUMBERED ADDRESS IS DISPLAYED IN
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R12234  RX01-RX02.

 12235   REF   3  LAST  413   40,2766  0 2536 0  2INTOUT  TC     5BLANK            TO BLANK RX03
 122355  REF   2  LAST  404   40,2767  0 2413 0           TC     +ON               TURN ON + SIGN
 12236   REF 117  LAST  422   40,2770  3 0154 1           CA     MPAC
 12237   REF   1              40,2771  0 3342 1           TC     DSPDECVN          DISPLAY 1ST INTEGER (LIKE VERB AND NOUN)
 122371  REF  13  LAST  420   40,2772  4 6250 1           CS     THREE
 122372  REF   9  LAST  419   40,2773  50 117 0           INDEX  DECOUNT
 122373  REF   6  LAST  418   40,2774  6 4317 0           AD     R101              RX04
 122374  REF  30  LAST  419   40,2775  54 776 0           TS     DSPCOUNT
 122375  REF   2  LAST  422   40,2776  0 3003 1           TC     READLO            GET 2ND INTEGER
 122376  REF 118  LAST  423   40,2777  3 0155 0           CA     MPAC +1
 122377  REF   2  LAST  423   40,3000  0 3342 1           TC     DSPDECVN          DISPLAY 2ND INTEGER (LIKE VERB AND NOUN)
 122378  REF  22  LAST  422   40,3001  0 4635 0           TC     POSTJUMP
 122379  REF   3  LAST  422   40,3002   62572 0           CADR   DSPDECND +2


R1224   READLO PICKS UP FRESH DATA FOR BOTH HI AND LO AND LEAVES IT IN
R1225   MPAC, MPAC+1. THIS IS NEEDED FOR TIME DISPLAY. IT ZEROES MPAC+2, BUT
R1226   DOES NOT FORCE TPAGREE.

 1227    REF  82  LAST  422   40,3003  56 002 0  READLO   XCH    Q
 1228    REF   8  LAST   98   40,3004  54 144 1           TS     TEM4
 1229    REF   7  LAST  419   40,3005  50 140 1           INDEX  MIXBR
 1230                         40,3006  0 3006 1           TC     +0
 1231    REF   1              40,3007  0 3023 0           TC     ROLONDR
 1232    REF  10  LAST  423   40,3010  50 117 0           INDEX  DECOUNT
 1233    REF   3  LAST  412   40,3011  3 0150 0           CA     IDADITEM          GET IDADDTAB ENTRY FOR COMP K OF NOUN
 1234    REF   4  LAST  412   40,3012  7 4356 1           MASK   LOW11             E SUBK
 1235    REF   2  LAST  412   40,3013  0 4313 1           TC     SETEBANK          SET EB, LEAVE EADRES IN A.
 1236                         40,3014  0 0006 1  READLO1  EXTEND                   MIXED          NORMAL
 1237    REF 128  LAST  421   40,3015  5 0000 1           INDEX  A                 C(ESUBK)       C(E)
 1238                         40,3016  3 0001 0           DCA    0                 C((E SUBK)+1)        C(E+1)
 1239    REF 119  LAST  423   40,3017  52 155 1           DXCH   MPAC
 1240    REF  67  LAST  420   40,3020  3 4755 1           CAF    ZERO
 1241    REF 120  LAST  423   40,3021  54 156 1           TS     MPAC     +2
 1242    REF   9  LAST  423   40,3022  0 0144 0           TC     TEM4

 1243    REF  10  LAST  418   40,3023  3 0145 1  ROLONDR  CA     NOUNADD           E
 1244    REF   1              40,3024  0 3014 1  ENDROLO  TC     READLO1


 1245                         42,3230                     BANK   42
 124501  REF   3  LAST  306   42,2000                     SETLOC PINBALL3
 124502                       42,3230                     BANK

 12455   REF   1                                          COUNT* $$/PIN
 1246    REF  81  LAST  419   42,3230  0 4636 1  HMSOUT   TC     BANKCALL          READ FRESH DATA FOR HI AND LO INTO MPAC,
 1247    REF   3  LAST  423   42,3231   61003 0           CADR   READLO            MPAC+1.
 1248    REF   3  LAST  422   42,3232  0 7262 0           TC     TPAGREE           MAKE DP DATA AGREE
 1249   REF   1                42,3233  D 3417 0              TC      SEPSECNR         LEAVE FRACT SEC/60 IN MPAC, MPAC+1。LEAVE
A1250                                                                                  WHOLE MIN IN 8IT13 OF LCTEMOUT AND ABOVE
 1251   REF   4  LAST  422     42,3234  0 7106 1              TC      DMP              USE ONLY FRACT SEC/60 MOD 60
 1252   REF   1                42,3235   C3271 D              ADRES   SECCN2           MULT 8Y 。06
 1253   REF.  4  LAST  413     42,3236  3 4321 D              CAF     R3D1             GIVES CENTI-SEC/10EXP5 MOD 60
 1254   REF  31  LAST  423     42,3237  54 776 D              TS      OSPCCUNT
 1255   REF  82  LAST  423     42,3240  0 4616 1              TC      8ANKCALL         DISPLAY SEC MOO 60
 1256   REF   2  LAST  419     42,3241   61262 0              CADR    OSPDECWD
 1257   REF   1                42,3242  0 3435 0              TC      SEPMIN           REMOVE REST OF SECONOS
 1258   REF   1                42,3243  3 3273 1              CAF     MINCON2          LEAVE FRACT MIN/60 IN MPAC+1。 LEAVE
 1259   REF 121  LAST  423     42,3244  56 154 1              XCH     MRAC             WHOLE HOURS IN MPAC。
 1260   REF   1                42,3245  55'006 1              TS      HITEMCUT         SAVE WHOLE HOURS。
 1261   REF   2  LAST  424     42,3246  3 3274 0              CAF     MINCON2 +1
 1262   REF 122  LAST  424     42,3247  56 155 0              XCH     MPAC    +1       USE ONLY FRACT MIN/60 MOO 60
 1263   REF   3  LAST  422     42,3250  C 4415 0              TC      PRSHRTMP         IF C(A) = -0, SHORTMP FAILS TO GIVE -0。
A1264                                                                                  MULT 8Y 。0006
 1265   REF   3  LAST  413     42,3251  3 4320 1              CAF     R2C1             GIVES MIN/10EXR5 MOD 60
 1266   REF  32  LAST  424     42,3252  54 776 0              TS      OSPCOUNT
 1267   REF  83  LAST  424     42,3253  0 4616 1              TC      8ANKCALL         OISRLAY MIN MOO 60
 1268   REF   3  LAST  424     42,3254   61262 0              CADR    DSPDECWO
 1269                          42,3255  C 0006 1              EXTENO                   MINUTES, SECONOS HAVE BEEN REMOVED
 1270   REF   1                42,3256  3 3300 1              OCA     HRCCN1
 1271   REF 123  LAST  424     42,3257  52 155 1              DXCH    MRAC
 1272   REF   2  LAST  424     42,3260  3 1006 0              CA      HITEMOUT         USE WHOLE HOURS
 1273   REF   4  LAST  424     42,3261  D 4415 D              TC      PRSHRTMP         IF C(A) = -0, SHORTMP FAILS TO GIVE -0。
A1274                                                                                  MULT 8Y 。16384
 1275   REF   7  LAST  423     42,3262  3 4317 0              CAF     R101             GIVES HOURS/10EXR5
 1276   REF  33  LAST  424     42,3263  54 776 C              TS      DSPCCUNT
 1277   REF  84  LAST  424     42,3264  0 4616 1              TC      8ANKCALL         USE REGULAR OSPDECWD, WITH ROUNO OFF。
 1278   REF   4  LAST  424     42,3265   61262 0              CAOR    DSPOECWO
 1279   REF   5  LAST  419     42,3266  C 0136 0              TC      ENTEXIT

 1280                          42,3267   25660 0  SECON1      2DEC*   1。666666666 E-4 812*   2EXP12/6000
 1280                          42,3270   31742 1
 1281                          42,3271   C1727 1  SECON2      OCT     01727            。06 FOR SECCNDS DISRLAY
 1282                          42,3272   01217 1              OCT     01217
 1283                          42,3273   00011 1  MINCON2     OCT     00011            。0006 FOR MINUTES DISLPAY
 1284                          42,3274   32445 0              OCT     32445
 1285                          42,3275   02104 D  MINCON1     OCT     02104            。066。。66 UPPEO BY 2EXP-28
 1286                          42,3276   10422 1              OCT     10422
 1287                          42,3277   05174 0  HRCON1      2DEC    。16384
 1287                          42,3300   13261 0
 1288                          42,3301   C0C00 1              OCT     00000
 1289                          42,3302   00062 0  RNDCON      OCT     00062            。5 SEC


 1290   REF  85  LAST  424     42,3303  0 4616 1  M/SOUT      TC      8ANKCALL         READ FRESH DATA FOR HI AND LO INTO MPAC,
 1291   REF   4  LAST  423     42,3304   61003 0              CAOR    READLO           MPAC+1。
 1292   REF   4  LAST  423     42,3305  0 7262 0              TC      TRAGREE          MAKE OR OATA AGREE
 1293   REF 124  LAST  424     42,3306  10 154 0              CCS     MPAC             IF MAG OF (MRAC, MPAC+1) G/ 59 M 59 S,
 1294                        42,3307  0 3311 1            TC       +2             DISPLAY 59B59, WITH PROPER SIGN.
 1295   REF   1              42,3310  0 3342 1            TC       M/SNORM        MPAC = +0. L/ 59M58.5S
 1296   REF   1              42,3311  6 3377 1            AD       M/SCON1        - HI PART OF (59M58.5S) +1  FOR CCS
 1297   REF 129  LAST  423   42,3312  10 000 0            CCS      A              MAG OF MPAC - HI PART OF (59M58.5S)
 1298   REF   1              42,3313  0 3326 0            TC       M/SLIMIT       G/ 59M58.5S
 1299   REF   2  LAST  425   42,3314  0 3342 1            TC       M/SNORM        ORIGINAL MPAC = -0. L/ 59M58.5S
 1300   REF   3  LAST  425   42,3315  0 3342 1            TC       M/SNORM        L/ 59M58.5S
 1301   REF 125  LAST  424   42,3316  10 155 1            CCS      MPAC     +1    MAG OF MPAC = HI PART OF 59M58.5S
 1302                        42,3317  0 3321 1            TC       +2
 1303   REF   4  LAST  425   42,3320  0 3342 1            TC       M/SNORM        MPAC+1 = +0. L/ 59M58.5S
 1304   REF   1              42,3321  6 3400 0            AD       M/SCON2        - LO PART OF (59M58.5S) +1  FOR CCS
 1305   REF 130  LAST  425   42,3322  10 000 0            CCS      A              MAG OF MPAC+1 - LO PART OF (59M58.5S)
 1306   REF   2  LAST  425   42,3323  0 3326 0            TC       M/SLIMIT       G/ 59M58.5S
 1307   REF   5  LAST  425   42,3324  0 3342 1            TC       M/SNORM        ORIGINAL MPAC+1 = -0. L/ 59M58.5S
 1308   REF   6  LAST  425   42,3325  0 3342 1            TC       M/SNORM        L/ 59M58.5S
 1309   REF 126  LAST  425   42,3326  10 154 0  M/SLIMIT  CCS      MPAC           = 59M58.5S    LIMIT
 1310   REF   1              42,3327  3 3402 1            CAF      M/SCON3        MPAC CANNOT BE +/- 0 AT THIS POINT.
 1311   REF   1              42,3330  0 3337 0            TC       +LIMIT         FORCE MPAC, MPAC+1 TO +/- 59M59.5S
 1312   REF   2  LAST  425   42,3331  4 3402 0            CS       M/SCON3
 1313   REF 127  LAST  425   42,3332  54 154 0            TS       MPAC           WILL DISPLAY 59M59S IN DSPDECNR
 1314   REF   3  LAST  425   42,3333  4 3403 1            CS       M/SCON3  +1
 1315   REF 128  LAST  425   42,3334  54 155 1  LIMITCOM  TS       MPAC     +1
 1316   REF   1              42,3335  3 3401 1            CAF      NORMADR        SET RETURN TO M/SNORM+1.
 1317   REF   2  LAST  424   42,3336  0 3420 1            TC       SEPSECNR +1
 1318   REF 129  LAST  425   42,3337  54 154 0  +LIMIT    TS       MPAC
 1319   REF   4  LAST  425   42,3340  3 3403 0            CAF      M/SCON3  +1
 1320   REF   1              42,3341  0 3334 0            TC       LIMITCOM
 1321   REF   1              42,3342  0 3404 1  M/SNORM   TC       SEPSEC         LEAVE FRACT SEC/60 IN MPAC,MPAC+1. LEAVE
A1322                                                                             WHOLE MIN IN BIT13 OF LOTEMOUT AND ABOVE
 1323   REF   1              42,3343  3 3375 0            CAF      HISECON        USE ONLY FRACT SEC/60 MOD 60
 1324   REF   3  LAST  421   42,3344  0 7312 0            TC       SHORTMP        MULT BY .6 + 2EXP-14
 1325   REF  14  LAST  423   42,3345  4 6250 1            CS       THREE          GIVES SEC/100 MOD 60
 1326   REF  34  LAST  424   42,3346  26 776 0            ADS      DSPCOUNT       DSPCOUNT ALREADY SET TO RXD1
 1327   REF  86  LAST  424   42,3347  0 4616 1            TC       BANKCALL       DISPLAY SEC MOD 60 IN D4D5.
 1328   REF   1              42,3350   61322 0            CADR     DSPDC2NR
 1329   REF  68  LAST  423   42,3351  3 4755 1            CAF      ZERO
 1330   REF   5  LAST  407   42,3352  54 124 1            TS       CODE
 1331   REF  23  LAST  416   42,3353  4 4752 1            CS       TWO
 1332   REF  11  LAST  423   42,3354  50 117 0            INDEX    DECOUNT
 1333   REF   8  LAST  424   42,3355  6 4317 0            AD       R1D1           RXD3
 1334   REF   3  LAST  407   42,3356  54 143 0            TS       COUNT
 1335   REF  87  LAST  425   42,3357  0 4616 1            TC       BANKCALL       BLANK MIDDLE CHAR
 1336   REF   3  LAST  407   42,3360   61356 0            CADR     DSPIN
 1337   REF   2  LAST  424   42,3361  0 3435 0            TC       SEPMIN         REMOVE REST OF SECONDS
 1338   REF 130  LAST  425   42,3362  56 155 0            XCH      MPAC     +1    LEAVE FRACT MIN/60 IN MPAC+1
 1339                        42,3363  0 0006 1            EXTEND                  USE ONLY FRACT MIN/60 MOD 60
 1340   REF   1              42,3364  7 3376 1            MP       HIMINCON       MULT BY .6 + 2EXP-7
 1341   REF 131  LAST  425   42,3365  52 155 1            DXCH     MPAC           GIVES MIN/100 MOD 60
 1342   REF  12  LAST  425   42,3366  50 117 0            INDEX    DECOUNT
 1343   REF   9  LAST  425   42,3367  3 4317 0            CAF      R1D1           RXD1
 1344   REF  35  LAST  425   42,3370  54 776 0           TS     DSPCCUNT
 1345   REF  88  LAST  425   42,3371  C 4616 1           TC     BANKCALL            DISPLAY MIN MOD 60 IN D102.
 1346   REF   2  LAST  425   42,3372   61322 0           CACR   DSPDC2NR
 1347   REF  23  LAST  423   42,3373  C 4635 0           TC     POSTJUMP
 1348   REF   4  LAST  423   42,3374   62572 0           CADR   DSPDCEND +2

 1349     .                  42,3375   23147 1  HISECON  DCT    23147               .6 + 2EXP-14
 1350                        42,3376   23346 1  HIMINCCN DCT    23346               .6 + 2EXP-7

 1351                        42,3377   77753 0  M/SCON1  DCT    77753               - HI PART OF (59M58.5S) +1
 1352                        42,3400   41126 1  M/SCON2  DCT    41126               - LO PART OF (59M58.5S) +1
 1353   REF   7  LAST  425   42,3401-  C3343 0  NORMADR  ADRES  M/SNCRM +1
 1354                        42,3402   D0025 0  M/SCON3  DCT    00D25               59M 59.5S
 1355                        42,3403   37016 1           DCT    37016


 1356   REF 132  LAST  425   42,3404  10 155 1  SEPSEC   CCS    MPAC     +1         IF +, ROUND BY ADDING .5 SEC
 1357   REF   1              42,3405  1 3414 1           TCF    POSEC               IF -, ROUND BY SUBTRACTING .5 SEC
 1358   REF   2  LAST  426   42,3406  1 3414 1           TCF    POSEC               FINDS TIME IN MPAC, MPAC+1
 1359                        42,3407  1 3410 0           TCF    +1                  ROUNDS OFF BY +/- .5 SEC
 1360                        42,3410  0 D006 1           EXTENO                     LEAVES WHOLE MIN IN BIT13 OF
 1361   REF   1              42,3411  4 3302 1           DCS    RNOCON  -1          LOTEMOUT AND ABCVE.
 1362   REF 133  LAST  426   42,3412  20 155 1  SEPSEC1  OAS    MPAC                LEAVES FRACT SEC/60 IN MPAC, MPAC+1.
 1363   REF   3  LAST  425   42,3413  1 3417 1           TCF    SEPSECNR
 1364                        42,3414  C 0006 1  POSEC    EXTEND
 1365   REF   2  LAST  426   42,3415  3 3302 0           DCA    RNDCON  -1
 1366   REF   1              42,3416  1 3412 1           TCF    SEPSEC1
 1367   REF  83  LAST  423   42,3417  56 002 D  SEPSECNR XCH    Q                   THIS ENTRY AVOIDS ROUNOING BY .5 SEC
 1368   REF   1              42,3420  54 144 1           TS     SEPSCRET
 1369   REF   5  LAST  424   42,3421  C 7106 1           TC     DMP                 MULT BY 2EXP12/6000
 1370   REF   1              42,3422   03267 1           ADRES  SECON1              GIVES FRACT SEC/60 IN BIT12 OF MPAC+1
 1371                        42,3423  C 00D6 1           EXTEND                     AND BELOW.
 1372   REF 134  LAST  426   42,3424  3 0155 0           OCA    MPAC                SAVE MINUTES AND HCURS
 1373   REF   3  LAST  424   42,3425  53'0D7 D           DXCH   HITEMOUT
 1374   REF   1              42,3426  C 4404 0           TC     TPSL1
 1375   REF   2  LAST  426   42,3427  0 4404 D           TC     TPSL1               GIVES FRACT SEC/60 IN MPAC+1, MPAC+2.
 1376   REF  69  LAST  425   42,343D  3 4755 1           CAF    ZERO
 1377   REF 135  LAST  426   42,3431  56 156 0           XCH    MPAC     +2         LEAVE FRACT SEC/60 IN MPAC, MPAC+1.
 1378   REF 136  LAST  426   42,3432  56 155 0           XCH    MPAC     +1
 1379   REF 137  LAST  426   42,3433  56 154 1           XCH    MPAC
 1380   REF   2  LAST  426   42,3434  0 0144 D           TC     SEPSCRET


 1381   REF  84  LAST  426   42,3435  56 002 0  SEPMIN   XCH    Q                   FINDS WHOLE MINUTES IN BIT13
 1382   REF   1              42,3436  54 144 1           TS     SEPMNRET            OF LOTEMOUT AND ABOVE.
 1383   REF   1              42,3437  3 10D7 1           CA     LOTEMOUT            REMOVES REST OF SECONDS.
 1384                        42,3440  0 0006 1           EXTEND                     LEAVES FRACT MIN/60 IN MPAC+1
 1385   REF  21  LAST  42D   42,3441  7 4751 1           MP     BIT3                LEAVES WHOLE HCURS IN MPAC.
 1386                        42,3442  0 0006 1           EXTEND                     SR 12, THROW AWAY LP.
 1387   REF  23  LAST  295   42,3443  7 4737 1           MP     BIT13               SR 2, TAKE FROM LP. = SL 12.
 1388   REF 138  LAST  426    42,3444  22 155 0           LXCH   MPAC     +1      THIS FORCES BITS 12-1 TO 0 IF +,
A1389                                                                             FORCES BITS 12-1 TO 1 IF -.
 1390   REF   4  LAST  426    42,3445  3 1006 0           CA     HITEMOUT
 1391   REF 139  LAST  427    42,3446  54 154 0           TS     MPAC
 1392   REF   6  LAST  426    42,3447  0 7106 1           TC     DMP              MULT BY 1/15
 1393   REF   1               42,3450   03275 1           ADRES  MINCON1          GIVES FRACT MIN/60 IN MPAC+1.
 1394   REF   2  LAST  426    42,3451  0 0144 0  ENDSPMIN TC     SEPMNRET         GIVES WHOLE HOURS IN MPAC.


R1395   THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1396   WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
R1397   ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1398   OF THE REGISTER NOUNADD IS POINTING TO .  IF USED WITH NOUNS WHICH ARE
R1399   INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1400   DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.


 1401   REF   1               40,3025                     SETLOC ENDRDLD  +1

 14015  REF   3 LAST  420 TO  423:    136   470*          COUNT* $$/PIN
 1402   REF   8  LAST  423    40,3025  50 140 1  DSPDPDEC INDEX  MIXBR
 1403                         40,3026  0 3026 0           TC     +0
 1404                         40,3027  0 3031 0           TC     +2               NORMAL NOUN
 1405   REF   3  LAST  414    40,3030  0 3454 1           TC     DSPALARM
 1406                         40,3031  0 0006 1           EXTEND
 1407   REF  11  LAST  423    40,3032  5 0145 1           INDEX  NOUNADD
 1408                         40,3033  3 0001 0           DCA    0
 1409   REF 140  LAST  427    40,3034  52 155 1           DXCH   MPAC
 1410   REF  10  LAST  425    40,3035  3 4317 0           CAF    R1D1
 1411   REF  36  LAST  426    40,3036  54 776 0           TS     DSPCOUNT
 1412   REF  70  LAST  426    40,3037  3 4755 1           CAF    ZERO
 1413   REF 141  LAST  427    40,3040  54 156 1           TS     MPAC  +2
 1414   REF   5  LAST  424    40,3041  0 7262 0           TC     TPAGREE
 1415   REF   1               40,3042  0 3327 1           TC     DSP2DEC
 1416   REF   6  LAST  424    40,3043  0 0136 0  ENDDPDEC TC     ENTEXIT
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P1417   LCAD VER8S              IF ALARM CCNCITION IS CETECTED DURING EXECUTE,
R1418   CHECK FAIL LIGHT IS TURNED DN AND ENDDFJC8. IF ALARM CDNOITIDN IS
R1419   DETECTEC OURING ENTER OF OATA, CHECK FAIL IS TURNEO ON AND IT RECYCLES
R142D   TC EXECUTE  CF DRIGINAL LCAC VERB. RECYCLE CAUSEC BY  1) DECIMAL MACHINE
R1421   CAOR  2) MIXTURF OF OCTAL/DECIMAL OATA  3) CCTAL DATA INTO DECIMAL
R1422   CNLY NCUN  4) CEC CATA INTC CCT CNLY NDUN  5) CATA TOD LARGE FOR SCALE
R1423   6) FEWER THAN 3 OATA WOROS LCAOEO FCR HRS, MIN, SEC NOUN.B(2)-(6) ALARM
R1424   ANO RECYCLE DCCUR AT FINAL ENTER OF SET. (1) ALARM AND RECYCLE CCCUR AT
R1425   ENTER OF CACR.


 1426   REF   1                 41,2622                           SETLDC ENOPTCUT

 14265  REF   2 LAST  408 TO  420:   4D2   402*                   COUNT* $$/PIN
 1427   REF  24  LAST  425     41,2622  4 4752 1  ABCLOAC   CS     TWO
 1428   REF   3  LAST  416     41,2623  0 2426 0            TC     COMPTEST
 1429   REF   1                41,2624  0 2462 0            TC     NOUNTEST        TEST IF NDUN CAN BE LCACEO.
 1430   REF   1                41,2625  3 3031 D            CAF    V8SP1LO
 1431   REF   2  LAST  406     41,2626  0 2341 D            TC     UPOATVB  -1
 1432   REF   1                41,2627  D 23D5 D            TC     REQDATX
 1433   REF   1                41,2630  3 3032 D            CAF    V8SP2LD
 1434   REF   3  LAST  42B     41,2631  0 2341 0            TC     UPDATVB  -1
 1435   REF   1                41,2632  D 23D7 1            TC     REQOATY
 1436   REF   1                41,2633  3 3033 1            CAF    V8SP3LO
 1437   REF   4  LAST  42B     41,2634  0 2341 0            TC     UPOATVB -1
 1438   REF   2  LAST  4D9     41,2635  D 2311 D            TC     REQOATZ


 1439   REF  11  LAST  422     41,2636  4 6245 C  PUTXYZ    CS     SIX             TEST THAT THE 3 DATA WORDS LOADED ARE
 1440   REF   1                41,2637  0 3034 0            TC     ALLDC/OC        ALL OEC OR ALL OCT.
 1441                          41,2640  0 0D06 1            EXTENO
 1442   REF   4  LAST  413     41,2641  3 2114 1            OCA    LODNNLCC        SWITCH BANKS TC NOUN TABLE REAOING
 1443   REF   7  LAST  419     41,2642  52 006 0            OXCH   Z               ROUTINE.
 1444   REF  71  LAST  427     41,2643  3 4755 1            CAF    ZERD            X COMP
 1445   REF   1                41,2644  C 3120 1            TC     PUTCDM
 1446   REF  12  LAST  427     41,2645  50 145 1            INOEX  NDUNADD
 1447                          41,2646  54 CCC C            TS     0
 144B   REF  3B  LAST  420     41,2647  3 4753 1            CAF    ONE             Y CDMP
 1449   REF   2  LAST  42B     41,265D  C 3120 1            TC     PUTCOM
 1450   REF  13  LAST  428     41,2651  5C 145 1            INDEX   NCUNADD
 1451                          41,2652  54 001 1            TS     1
 1452   REF  25  LAST  42B     41,2653  3 4752 D            CAF    TWO             Z COMP
 1453   REF   3  LAST  428     41,2654  D 3120 1            TC     PUTCOM
 1454   REF  14  LAST  428     41,2655  50 145 1            INDEX  NOUNAOD
 1455                          41,2656  54 002 1            TS     2
 1455D1 REF   2  LAST  157     41,2657  4 4757 1            CS     SEVEN           IF NDUN 7 HAS JUST BEEN LOADED, SET
 145502 REF  1D  LAST  413     41,2660  6 1DD1 1            AD     NOUNREG          FLAG BITS AS SPECIFIED.
 145503                        41,2661  C 0CC6 1            EXTENO
 1455C4                        41,2662  1 2664 D            BZF    +2
 1455D5 REF   2  LAST  408     41,2663  0 3020 D            TC     LOADLV
 145506                         41,2664  0 0004 0           INHINT
 145508 REF   1                 41,2665  4 4763 0           CS      OCT30           IS IT A CHANNEL (30 OR UNDER)
 14551  REF   4  LAST  418      41,2666  6 1002 1           AD      XREG
 145512                         41,2667  0 0006 1           EXTEND
 145514 REF   1                 41,2670  6 2700 1           BZMF    CHANBITS        YES

 145516 REF   5  LAST  429      41,2671  3 1002 1           CA      XREG            ECADR OF ERASABLE CELL
 145518 REF   5  LAST  413      41,2672  0 4304 1           TC      SETNCADR +1     SET EBANK, NOUNADD

 14552  REF  15  LAST  428      41,2673  50 145 1           INDEX   NOUNADD
 145522                         41,2674  3 0000 1           CA      0
 145524 REF  54  LAST  418      41,2675  54 001 1           TS      L
 145526 REF  39  LAST  428      41,2676  3 4753 1           CAF     ONE
 145528 REF   6  LAST  429      41,2677  55'002 0           TS      XREG            MAKE IT LOOK LIKE A CHANNEL FOR A WHILE

 14553  REF   3  LAST  273      41,2700  6 4361 1  CHANBITS AD      OCT21
 145532                         41,2701  0 0006 1           EXTEND
 145534 REF   1                 41,2702  1 2724 0           BZF     BITSOFF2        DONT TOUCH CHAN7 (SUPERBANK)

 145536 REF   2  LAST  409      41,2703  3 1004 1           CA      ZREG
 145538                         41,2704  0 0006 1           EXTEND
 14554  REF   1                 41,2705  6 2713 0           BZMF    BITSOFF         R3 IS ZERO FOR OFF, NONZERO FOR ON

 145542 REF   1                 41,2706  3 1003 0           CA      YREG
 145544                         41,2707  0 0006 1           EXTEND
 145546 REF   7  LAST  429      41,2710  5 1002 1           INDEX   XREG
 145548                         41,2711  05 000 1           WOR     0
 14555  REF   1                 41,2712  1 2717 0           TCF     BITSOFF1

 145552 REF   2  LAST  429      41,2713  4 1003 1  BITSOFF  CS      YREG
 145553                         41,2714  0 0006 1           EXTEND
 145554 REF   8  LAST  429      41,2715  5 1002 1           INDEX   XREG
 145556                         41,2716  03 000 1           WAND    0

 145558 REF   9  LAST  429      41,2717  11'002 0  BITSOFF1 CCS     XREG            WAS IT REALLY A CHANNEL
 14556  REF 131  LAST  425      41,2720  10 000 0           CCS     A
 145562 REF   2  LAST  429      41,2721  1 2724 0           TCF     BITSOFF2        YES

 145564 REF  16  LAST  429      41,2722  50 145 1           INDEX   NOUNADD
 145566                         41,2723  22 000 1           LXCH    0

 145568                         41,2724  0 0003 1  BITSOFF2 RELINT
 1456   REF   3  LAST  428      41,2725  0 3020 0           TC      LOADLV

 14565  REF   4  LAST  283         4763            OCT30    =       BITS4&5
 1457   REF  40  LAST  429      41,2726  4 4753 0  ABLDAD   CS      ONE
 1458   REF   4  LAST  428      41,2727  0 2426 0           TC      COMPTEST
 1459   REF   2  LAST  428      41,2730  0 2462 0           TC      NOUNTEST        TEST IF NOUN CAN BE LOADED.
 1460   REF   2  LAST  428      41,2731  3 3031 0           CAF     VBSP1LD
 1461   REF   5  LAST  428      41,2732  0 2341 0           TC      UPDATVB -1
 1462   REF   2  LAST  428    41,2733  0 2305 0             TC      REQDATX
 1463   REF   2  LAST  428    41,2734  3 3032 0             CAF     VBSP2LO
 1464   REF   6  LAST  429    41,2735  0 2341 0             TC      UPDATVB -1
 1465   REF   2  LAST  428    41,2736  0 2307 1             TC      REQDATY
 1466   REF   9  LAST  410    41,2737  4 4756 0  PUTXY      CS      FIVE            TEST THAT THE 2 DATA WORDS LOADED ARE
 1467   REF   2  LAST  428    41,2740  0 3034 0             TC      ALLDC/OC        ALL DEC OR ALL OCT.
 1468                         41,2741  0 0006 1             EXTEND
 1469   REF   5  LAST  428    41,2742  3 2114 1             DCA     LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
 1470   REF   8  LAST  428    41,2743  52 006 0             DXCH    Z               ROUTINE.
 1471   REF  72  LAST  428    41,2744  3 4755 1             CAF     ZERO            X COMP
 1472   REF   4  LAST  428    41,2745  0 3120 1             TC      PUTCOM
 1473   REF  17  LAST  429    41,2746  50 145 1             INDEX   NOUNADD
 1474                         41,2747  54 000 0             TS      0
 1475   REF  41  LAST  429    41,2750  3 4753 1             CAF     ONE             Y COMP
 1476   REF   5  LAST  430    41,2751  0 3120 1             TC      PUTCOM
 1477   REF  18  LAST  430    41,2752  50 145 1             INDEX   NOUNADD
 1478                         41,2753  54 001 1             TS      1
 1479   REF   4  LAST  429    41,2754  0 3020 0             TC      LOADLV

 1481   REF   3  LAST  430    41,2755  0 2305 0  ALOAD      TC      REQDATX
 1482                         41,2756  0 0006 1             EXTEND
 1483   REF   6  LAST  430    41,2757  3 2114 1             DCA     LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
 1484   REF   9  LAST  430    41,2760  52 006 0             DXCH    Z               ROUTINE.
 1485   REF  73  LAST  430    41,2761  3 4755 1             CAF     ZERO            X COMP
 1486   REF   6  LAST  430    41,2762  0 3120 1             TC      PUTCOM
 1487   REF  19  LAST  430    41,2763  50 145 1             INDEX   NOUNADD
 1488                         41,2764  54 000 0             TS      0
 1489   REF   5  LAST  430    41,2765  0 3020 0             TC      LOADLV

 1490   REF  42  LAST  430    41,2766  4 4753 0  BLOAD      CS      ONE
 1491   REF   5  LAST  429    41,2767  0 2426 0             TC      COMPTEST
 1493   REF  24  LAST  421    41,2770  3 4735 1             CAF     BIT15           SET CLPASS FOR PASS0 ONLY
 1494   REF  10  LAST  409    41,2771  55'014 1             TS      CLPASS
 1495   REF   3  LAST  430    41,2772  0 2307 1             TC      REQDATY
 1496                         41,2773  0 0006 1             EXTEND
 1497   REF   7  LAST  430    41,2774  3 2114 1             DCA     LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
 1498   REF  10  LAST  430    41,2775  52 006 0             DXCH    Z               ROUTINE.
 1499   REF  43  LAST  430    41,2776  3 4753 1             CAF     ONE
 1500   REF   7  LAST  430    41,2777  0 3120 1             TC      PUTCOM
 1501   REF  20  LAST  430    41,3000  50 145 1             INDEX   NOUNADD
 1502                         41,3001  54 001 1             TS      1
 1503   REF   6  LAST  430    41,3002  0 3020 0             TC      LOADLV

 1504   REF  26  LAST  428    41,3003  4 4752 1  CLOAD      CS      TWO
 1505   REF   6  LAST  430    41,3004  0 2426 0             TC      COMPTEST
 1507   REF  25  LAST  430    41,3005  3 4735 1             CAF     BIT15           SET CLPASS FOR PASS0 ONLY
 1508   REF  11  LAST  430    41,3006  55'014 1             TS      CLPASS
 1509   REF   3  LAST  428    41,3007  0 2311 0             TC      REQDATZ
 1510                         41,3010  0 0006 1             EXTEND
 1511   REF   8  LAST  430    41,3011  3 2114 1             DCA     LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
 1512   REF  11  LAST  430   41,3D12  52 006 0            DXCH    Z              RDUTINE.
 1513   REF  27  LAST  430   41,3013  3 4752 D            CAF     TWD
 1514   REF   8  LAST  430   41,3014  D 312D 1            TC      PUTCDM
 1515   REF  21  LAST  430   41,3D15  5C 145 1            INOEX   NOUNAOD
 1516                        41,3016  54 DD2 1            TS      2
 1517   REF   7  LAST  43D   41,3017  0 3020 0            TC      LOAOLV

 151B   REF  74  LAST  43D   41,302D  3 4755 1  LOADLV    CAF     ZERC
 1519   REF  13  LAST  409   41,3021  54 777 1            TS      OECBRNCH
 152D   REF  75  LAST  431   41,3022  4 4755 D            CS      ZERD
 1521   REF   1              41,3023  55'C13 0            TS      LOAOSTAT
 15215  REF   5  LAST  41D   41,3024  0 4457 0            TC      RELDSP         RELEASE FOR PRIOPITY OISPLAY PROBLEM.
 1522   REF   6  LAST  414   41,3025  4 436D 1            CS      VD1            TC BLOCK NUMERICAL CHARACTERS ANO
 1523   REF  37  LAST  427   41,3026  54 776 C            TS      DSPCOUNT       CLEARS AFTEP A CONPLETEC LOAO
 1524   REF  24  LAST  426   41,3D27  0 4635 D            TC      POSTJUMP       AFTER COMPLETED LOAO, GD TO RECALTST
 1525   REF   1              41,3D3D   61612 0            CAOR    RECALTST       TO SEE IF THERE IS RECALL FROM ENOIOLE.

 1526                        41,3D31   D0025 0  VBSP1LC   DEC     21             VB21 = ALDAO
 1527                        41,3032   C0026 D  VBSP2LC   OEC     22             VB22 = BLDAO
 1528                        41,3033   00027 1  VBSP3LD   DEC     23             VB23 = CLOAD


 1529   REF  13  LAST  425   41,3034  54 117 1  ALLCC/CC  TS      DECDUNT        TESTS THAT DATA WOROS LOADED ARE EITHER
 1530   REF  14  LAST  431   41,3035  4 0777 1            CS      DECBRNCH       ALL OEC OR ALL OCT. ALARMS IF NOT.
 1531   REF   3  LAST  407   41,3036  54 021 D            TS      SR
 1532   REF   4  LAST  431   41,3037  4 D021 0            CS      SR
 1533   REF   5  LAST  431   41,304D  4 CC21 0            CS      SR             SHIFTEO RIGHT 2
 1534   REF 132  LAST  429   41,3041  10 D00 0            CCS     A              DEC COMP BITS IN LOW 3
 1535                        41,3042  1 3044 0            TCF     +2             SOME ONES IN LOW 3
 1536   REF  B5  LAST  426   41,3043  0 0002 0            TC      Q              ALL ZERDS. ALL OCTAL.  CK
 1537   REF  14  LAST  431   41,3044  6 0117 0            AO      OECOUNT        DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
 1538                        41,3D45  C 0006 1            EXTENO                 (BUT IT HAS BEEN OECREMENTEC BY CCS)
 1539                        41,3046  1 305D 0            BZF     +2             MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP.
 1540   REF   4  LAST  417   41,3047  C 4145 0            TC      ALMCYCLE       ALARM AND RECYCLE.
 1541   REF  86  LAST  431   41,3050  C 0C02 0  GOQ       TC      Q              ALL REQUIREC ARE OEC, CK


 1542   REF  87  LAST  431   41,3D51  56 D02 0  SFRUTNOR  XCH     Q              GETS SF RDUTINE NUMBER FOR NORMAL CASE
 1543   REF   1              41,3052  54 114 1            TS      EXITEM         CANT USE L FOR RETURN. TSTFORDP USES L.
 1544   REF   1              41,3053  3 4347 0            CAF     MIO5
 1545   REF   3  LAST  41B   41,3054  7 0147 1            MASK    NNTYPTEM
 1546   REF   1              41,3C55  C 4322 0            TC      RIGHT5
 1547   REF   2  LAST  431   41,3056  0 0114 0            TC      EXITEM         SF RDUTINE NUMBER IN A

 154B   REF  8B  LAST  431   41,3C57  56 C02 0  SFRUTMIX  XCH     Q              GETS SF RDUTINE NUMBER FOR MIXEO CASE
 1549   REF   3  LAST  431   41,3060  54 114 1            TS      FXITEM
 1550   REF  15  LAST  431   41,3061  50 117 0            INDEX   DECDUNT
 1551   REF   1              41,3062  3 3111 0            CAF     OISPLACE       PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1552   REF  55  LAST  429   41,3063  54 001 1            TS      L
 1553   REF  16  LAST  431   41,3D64  5D 117 0            INDEX   DECDUNT
 1554   REF   2  LAST  401    41,3065  3 4346 1            CAF     LOW5            LOW5, MID5, OR HI5 IN A
 1555   REF   2  LAST  306    41,3066  7 0153 1            MASK    RUTMXTEM        GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
 1556   REF  56  LAST  431    41,3067  50 001 0            INDEX   L
 1557                         41,3070  0 0000 1            TC      0
R1558   DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1559   REF   4  LAST  431    41,3071  0 0114 0  SFRET1    TC      EXITEM          SF ROUTINE NUMBER IN A

 1560   REF  89  LAST  431    41,3072  56 002 0  SFCONUM   XCH     Q               GETS 2X( SF CONSTANT NUMBER)
 1561   REF   5  LAST  432    41,3073  54 114 1            TS      EXITEM
 1562   REF   9  LAST  427    41,3074  50 140 1            INDEX   MIXBR
 1563                         41,3075  0 3075 0            TC      +0
 1564   REF   1               41,3076  0 3114 0            TC      CONUMNOR        NORMAL NOUN
 1565   REF  17  LAST  431    41,3077  50 117 0            INDEX   DECOUNT         MIXED NOUN
 1566   REF   2  LAST  431    41,3100  3 3111 0            CAF     DISPLACE
 1567   REF  57  LAST  432    41,3101  54 001 1            TS      L               PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1568   REF  18  LAST  432    41,3102  50 117 0            INDEX   DECOUNT
 1569   REF   3  LAST  432    41,3103  3 4346 1            CAF     LOW5
 1570   REF   4  LAST  431    41,3104  7 0147 1            MASK    NNTYPTEM
 1571   REF  58  LAST  432    41,3105  50 001 0            INDEX   L
 1572                         41,3106  0 0000 1            TC      0
R1573   DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1574                         41,3107  6 0000 1  SFRET     DOUBLE                  2X(SF CONSTANT NUMBER ) IN A
 1575   REF   6  LAST  432    41,3110  0 0114 0            TC      EXITEM

 1576   REF   1               41,3111  0 3050 1  DISPLACE  TC      GOQ
 1577   REF   2  LAST  431    41,3112  0 4322 0            TC      RIGHT5
 1578   REF   3  LAST  418    41,3113  0 4331 1            TC      LEFT5

 1579   REF   4  LAST  432    41,3114  3 4346 1  CONUMNOR  CAF     LOW5            NORMAL NOUN ALWAYS GETS LOW 5 OF
 1580   REF   5  LAST  432    41,3115  7 0147 1            MASK    NNTYPTEM        NNTYPTAB FOR SF CONUM.
 1581                         41,3116  6 0000 1            DOUBLE
 1582   REF   7  LAST  432    41,3117  0 0114 0            TC      EXITEM          2X( SF CONSTANT NUMBER) IN A


 1583   REF  19  LAST  432    41,3120  54 117 1  PUTCOM    TS      DECOUNT
 1584   REF  90  LAST  432    41,3121  56 002 0            XCH     Q
 1585   REF   1               41,3122  54 115 0            TS      DECRET
 1586   REF  76  LAST  431    41,3123  3 4755 1            CAF     ZERO
 1587   REF   3  LAST  422    41,3124  54 162 0            TS      MPAC+6
 1588   REF  20  LAST  432    41,3125  50 117 0            INDEX   DECOUNT
 1589   REF   3  LAST  407    41,3126  57'005 0            XCH     XREGLP
 1590   REF 142  LAST  427    41,3127  54 155 1            TS      MPAC   +1
 1591   REF  21  LAST  432    41,3130  50 117 0            INDEX   DECOUNT
 1592   REF  10  LAST  429    41,3131  57'002 1            XCH     XREG
 1593   REF 143  LAST  432    41,3132  54 154 0            TS      MPAC
 1594   REF  10  LAST  432    41,3133  50 140 1            INDEX   MIXBR
 1595                         41,3134  0 3134 1            TC      +0
 1596   REF   1               41,3135  0 3162 1            TC      PUTNORM         NORMAL NOUN
R1597   IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
 1598   REF  22  LAST  432    41,3136  50 117 0            INDEX   DECOUNT         GET IDADDTAB ENTRY FOR COMPONENT K
 1599  REF   4  LAST  423   41,3137  3 0150 0           CA      IDADITEM            OF NOUN.
 1600  REF   5  LAST  423   41,3140  7 4356 1           MASK    LOW11            (ECADR)SUBK FOR CURRENT COMP OF NOUN
 1601  REF   6  LAST  429   41,3141  0 4303 0           TC      SETNCADR         ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 1602                       41,3142  0 0006 1           EXTEND                   C(NOUNADD) IN A UPON RETURN
 1603  REF  23  LAST  432   41,3143  60 117 0           SU      DECOUNT          PLACE (ESUBK)-K INTO NOUNADD
 1604  REF  22  LAST  431   41,3144  54 145 0           TS      NOUNADD
 1605  REF  15  LAST  431   41,3145  10 777 1           CCS     DECBRNCH
 1606  REF   1              41,3146  0 3217 0           TC      PUTDECSF         +  DEC
 1607  REF   1              41,3147  0 2454 0           TC      DCTSTCYC         +0 OCTAL
 1608  REF   3  LAST  419   41,3150  0 3057 0           TC      SFRUTMIX         TEST IF DEC ONLY BIT = 1. IF SO,
 1609  REF   3  LAST  418   41,3151  0 2261 0           TC      DPTEST           ALARM AND RECYCLE. IF NOT, CONTINUE.
 1610  REF   1              41,3152  0 3200 0           TC      PUTCOM2          NO DP
A1611                                                                            TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1612                                                                            +0 INTO MAJOR PART. SET NOUNADD FOR
A1613                                                                            LOADING OCTAL WORD INTO MINOR PART.
 1614  REF  23  LAST  433   41,3153  24 145 1  PUTDPCOM INCR    NOUNADD          DP  (ESUBK)-K+1  OR  E+1
 1615  REF  24  LAST  433   41,3154  3 0145 1           CA      NOUNADD          NOUNADD NOW SET FOR MINOR PART
 1616  REF  24  LAST  433   41,3155  26 117 1           ADS     DECOUNT          (ESUBK)+1  OR  E+1  INTO DECOUNT
 1617  REF  77  LAST  432   41,3156  3 4755 1           CAF     ZERO             NOUNADD SET FOR MINOR PART
 1618  REF  25  LAST  433   41,3157  50 117 0           INDEX   DECOUNT
 1619                       41,3160  53 777 0           TS      0        -1      ZERO MAJOR PART(ESUBK OR E)
 1620  REF   2  LAST  433   41,3161  0 3200 0           TC      PUTCOM2

 1621  REF   2  LAST  409   41,3162  0 4311 0  PUTNORM  TC      SETNADD          ECADR FROM NOUNCADR. SETS EB, NOUNADD
 1622  REF  16  LAST  433   41,3163  10 777 1           CCS     DECBRNCH
 1623  REF   2  LAST  433   41,3164  0 3217 0           TC      PUTDECSF         +  DEC
 1624  REF   2  LAST  433   41,3165  0 2454 0           TC      DCTSTCYC         +0 OCTAL
 1625  REF   3  LAST  419   41,3166  0 3051 0           TC      SFRUTNOR         TEST IF DEC ONLY BIT = 1. IF SO,
 1626  REF   4  LAST  433   41,3167  0 2261 0           TC      DPTEST           ALARM AND RECYCLE. IF NOT, CONTINUE.
 1627  REF   3  LAST  433   41,3170  0 3174 0           TC      PUTCOM2 -4       NO DP
 1628  REF  78  LAST  433   41,3171  3 4755 1           CAF     ZERO             DP
 1629  REF  26  LAST  433   41,3172  54 117 1           TS      DECOUNT
 1630  REF   1              41,3173  0 3153 0           TC      PUTDPCOM

 1631  REF   8  LAST  418   41,3174  3 0146 1           CA      NNADTEM
 1632  REF  44  LAST  430   41,3175  6 4753 1           AD      ONE              IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1633                       41,3176  0 0006 1           EXTEND
 1634  REF   1              41,3177  1 3204 0           BZF     CHANLOAD
 1635  REF 144  LAST  432   41,3200  56 154 1  PUTCOM2  XCH     MPAC
 1636  REF   2  LAST  432   41,3201  0 0115 1           TC      DECRET

 1637  REF  38  LAST  431     0776                      EBANK=  DSPCOUNT
 1638  REF   1              41,3202   02147 1  GTSFINLC 2CADR   GTSFIN
 1638  REF   1              41,3203   64101 0


 1639  REF   3  LAST  428   41,3204  4 4757 1  CHANLOAD CS      SEVEN            CONT LOAD CHAN 7. (IT = SUPERBANK).
16391  REF   4  LAST  418   41,3205  6 1016 1           AD      NOUNCADR
16392                       41,3206  0 0006 1           EXTEND
16393  REF   8  LAST  431   41,3207  1 3020 1           BZF     LOADLV
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 16394  REF   5  LAST  433    41,3210  3 1016 1             CA       NOUNCADR
 1640   REF   7  LAST  418    41,3211  7 5004 1             MASK     LOW9
 1641   REF 145  LAST  433    41,3212  56 154 1             XCH      MPAC
 16411                        41,3213  0 0006 1             EXTEND
 16412  REF 146  LAST  434    41,3214  5 0154 1             INDEX    MPAC
 1642                         41,3215  01 000 0             WRITE    0
 1643   REF   9  LAST  433    41,3216  0 3020 0             TC       LOADLV


R1644   PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

 1645   REF   2  LAST  418    41,3217  0 3072 1  PUTDECSF   TC       SFCONUM            2X(SF CON NUMB) IN A
 1646   REF  14  LAST  422    41,3220  54 123 0             TS       SFTEMP1
 1647                         41,3221  0 0006 1             EXTEND                      SWITCH BANKS TO SF CONSTANT TABLE
 1648   REF   1               41,3222  3 3203 0             DCA      GTSFINDC           READING ROUTINE.
 1649   REF  12  LAST  431    41,3223  52 006 0             DXCH     Z                  LOADS SFTEMP1, SFTEMP2.
 1650   REF  11  LAST  432    41,3224  50 140 1             INDEX    MIXBR
 1651                         41,3225  0 3225 1             TC       +0
 1652   REF   1               41,3226  0 3231 1             TC       PUTSFNOR
 1653   REF   4  LAST  433    41,3227  0 3057 0             TC       SFRUTMIX
 1654   REF   1               41,3230  0 3232 1             TC       PUTDCSF2
 1655   REF   4  LAST  433    41,3231  0 3051 0  PUTSFNOR   TC       SFRUTNOR

 1656   REF 133  LAST  431    41,3232  50 000 1  PUTDCSF2   INDEX    A
 1657   REF   1               41,3233  3 3235 0             CAF      SFINTABR
 1658   REF   4  LAST  419    41,3234  0 4640 1             TC       BANKJUMP           SWITCH BANKS FOR EXPANSHION ROOM
 1659   REF   1               41,3235    62352 1  SFINTABR  CADR     GOALMCYC           ALARM AND RECYCLE IF DEC LOAD
A1660                                                                                   WITH OCTAL ONLY NOUN.
 1661   REF   1               41,3236    61142 1            CADR     BINROUND
 1662   REF   1               41,3237    61044 0            CADR     DEGINSF
 1663   REF   1               41,3240    61132 0            CADR     ARTHINSF
 1664   REF   1               41,3241    61150 1            CADR     DPINSF
 1665   REF   1               41,3242    61175 0            CADR     DPINSF2
 1666   REF   4  LAST  427    41,3243    61454 0            CADR     DSPALARM           LRPOSOUT CANT BE LOADED.
 1667   REF   2  LAST  434    41,3244    61150 1            CADR     DPINSF             SAME AS ARITHDP1
 1668   REF   1               41,3245    65452 1            CADR     HMSIN
 1669   REF   5  LAST  434    41,3246    61454 0            CADR     DSPALARM           MIN/SEC CANT BE LOADED.
 1671   REF   1               41,3247    61202 0            CADR     DPINSF4
 16711  REF   1               41,3250    61145 0            CADR     ARTIN1SF
 16712  REF   6  LAST  434    41,3251    61454 0            CADR     DSPALARM           2INTOUT CANT BE LOADED.
 16714  REF   2  LAST  434    41,3252    61044 0            CADR     DEGINSF            TESTS AT END FOR 360-CDU
 16715  REF   7  LAST  434    41,3253    61454 0            CADR     DSPALARM           RRANGOUT CANT BE LOADED.
 16716  REF   8  LAST  434    41,3254    61454 0            CADR     DSPALARM           RROOTOUT CANT BE LOADED.
 1672                         41,3255            ENDRUTIN   EQUALS


R1673   SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R1674   ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A. END WITH TC DECRET
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 1675    REF   1                   40,3044                      SETLOC ENDOPDEC +1

 16755   REF   4 LAST  427 TO  428:     15   485*               COUNT* $$/PIN
R1676    DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

 1677    REF   7  LAST  427    40,3044  0 7106 1  DEGINSF  TC      DMP             SF ROUTINE FOR DEC DEGREES
 1678    REF   1               40,3045   03130 0           ADRES   DEGCONI         MULT BY 5.5  5(10)X2EXP-3
 1679    REF 147  LAST  434    40,3046  10 155 1           CCS     MPAC     +1     THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
 1680    REF  19  LAST  405    40,3047  3 4741 1           CAF     BIT11           LEFT 3, AND CAUSES 360.00 TO OF/UF
 1681                          40,3050  0 3052 0           TC      +2              WHEN SHIFTED LEFT AND ALARM.
 1682    REF  20  LAST  435    40,3051  4 4741 0           CS      BIT11
 1683    REF 148  LAST  435    40,3052  6 0155 0           AD      MPAC     +1
 1684    REF   1               40,3053  0 3221 0           TC      2ROUND   +2
 1685    REF   3  LAST  426    40,3054  0 4404 0           TC      TPSL1           LEFT 1
 1686    REF   4  LAST  435    40,3055  0 4404 0  DEGINSF2 TC      TPSL1           LEFT 2
 1687    REF   1               40,3056  0 3230 0           TC      TESTOFUF
 1688    REF   5  LAST  435    40,3057  0 4404 0           TC      TPSL1           RETURNS IF NO OF/UF (LEFT3)
 1689    REF 149  LAST  435    40,3060  10 154 0           CCS     MPAC
 1690    REF   1               40,3061  0 3065 1           TC      SIGNFIX         IF+, GO TO SIGNFIX
 1691    REF   2  LAST  435    40,3062  0 3065 1           TC      SIGNFIX         IF +0, GO TO SIGNFIX
 1692                          40,3063  4 0000 0           COM                     IF - , USE -MAGNITUDE +1
 1693    REF 150  LAST  435    40,3064  54 154 0           TS      MPAC            IF -0, USE +0
 1694    REF   4  LAST  432    40,3065  10 162 0  SIGNFIX  CCS     MPAC+6
 1695    REF   1               40,3066  0 3124 0           TC      SGNTO1          IF OVERFLOW
 1696    REF   1               40,3067  0 3077 1           TC      ENDSCALE        NO OVERFLOW/UNDERFLOW
 1697    REF 151  LAST  435    40,3070  10 154 0           CCS     MPAC            IF UF FORCE SIGN TO 0 EXCEPT -180
 1698    REF   5  LAST  417    40,3071  0 5675 0           TC      CCSHOLE
 1699    REF   1               40,3072  0 3122 0           TC      NEG180
 1700                          40,3073  0 3074 1           TC      +1
 1701    REF 152  LAST  435    40,3074  56 154 1           XCH     MPAC
 1702    REF   8  LAST  421    40,3075  7 4733 0           MASK    POSMAX
 1703    REF 153  LAST  435    40,3076  54 154 0           TS      MPAC
 1704    REF  12  LAST  434    40,3077  50 140 1  ENDSCALE INDEX   MIXBR           IF ROUTINE NO. IS NOT CDU DEGREES,
 170405                        40,3100  0 3100 0           TC      +0               THEN THIS IS 360 - CDU DEGREES
 17041                         40,3101  0 3104 1           TC      +3               AND ANGLE IN MPAC MUST BE REPLACED
 17042   REF   1               40,3102  0 3114 0           TC      SFMIXCAL         BY 360 DEGREES MINUS ITSELF.
 17043                         40,3103  0 3105 0  MIXBACK  TC      +2
 17044   REF   1               40,3104  0 3117 0           TC      SFNORCAL
 1705    REF 134  LAST  434    40,3105  4 0000 0  NORBACK  CS      A
 17051   REF  24  LAST  285    40,3106  6 4752 0           AD      BIT2
 17052                         40,3107  0 0006 1           EXTEND
 17053                         40,3110  1 3112 1           BZF     +2
 17054   REF   2  LAST  420    40,3111  0 2625 1           TC      360-CDU
 17055   REF  25  LAST  431    40,3112  0 4635 0  ENDSCAL1 TC      POSTJUMP
 17056   REF   4  LAST  433    40,3113   63200 0           CADR    PUTCOM2

 17057   REF  89  LAST  426    40,3114  0 4616 1  SFMIXCAL TC      BANKCALL
 17058   REF   5  LAST  434    40,3115   63057 0           CADR    SFRUTMIX
 17059   REF   1               40,3116  0 3103 0           TC      MIXBACK
 170591 REF  90  LAST  435   40,3117  0 4616 1  SFNORCAL TC     BANKCALL
 170592 REF   5  LAST  434   40,3120   63051 0           CADR   SFPUTNOR
 170593 REF   1              40,3121  0 3105 0           TC     NORBACK

 1706   REF   9  LAST  435   40,3122  4 4733 0  NEG180   CS     POSMAX
 1707   REF   2  LAST  435   40,3123  0 3076 0           TC     ENDSCALE  -1

 1708   REF 154  LAST  435   40,3124  4 0154 0  SGNTO1   CS     MPAC              IF OF FORCE SIGN TO 1
 1709   REF  10  LAST  436   40,3125  7 4733 0           MASK   POSMAX
 1710   REF 135  LAST  435   40,3126  4 0000 0           CS     A
 1711   REF   3  LAST  436   40,3127  0 3076 0           TC     ENDSCALE  -1

 1712                        40,3130   26161 0  DEGCON1  2DEC   5.555555555 B-3
 1712                        40,3131   30707 1

 1715   REF   8  LAST  435   40,3132  0 7106 1  ARTHINSF TC     DMP               SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
 1716   REF  15  LAST  434   40,3133   00123 1           ADRES  SFTEMP1           ASSUMES POINT BETWEEN HI AND LO PARTS
 1717   REF 155  LAST  436   40,3134  56 156 0           XCH    MPAC      +2      OF SFCON. SHIFTS RESULTS LEFT BY 14.
 1718   REF 156  LAST  436   40,3135  56 155 0           XCH    MPAC      +1      (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
 1719   REF 157  LAST  436   40,3136  56 154 1           XCH    MPAC
 1720                        40,3137  0 0006 1           EXTEND
 1721   REF   2  LAST  434   40,3140  1 3142 1           BZF    BINROUND
 1722   REF   5  LAST  431   40,3141  0 4145 0           TC     ALMCYCLE          TOO LARGE A LOAD. ALARM AND RECYCLE.
 1723   REF   2  LAST  435   40,3142  0 3217 0  BINROUND TC     2ROUND
 1724   REF   2  LAST  435   40,3143  0 3230 0           TC     TESTOFUF
 1725   REF   1              40,3144  0 3112 0           TC     ENDSCAL1          RETURNS IF NO OF/UF

 17251  REF   9  LAST  436   40,3145  0 7106 1  ARTINISF TC     DMP               SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
 17252  REF  16  LAST  436   40,3146   00123 1           ADRES  SFTEMP1           ROUNDS MPAC+1 INTO MPAC.
 17253  REF   3  LAST  436   40,3147  0 3142 0           TC     BINROUND


 1739   REF  10  LAST  436   40,3150  0 7106 1  DPINSF   TC     DMP               SCALES MPAC, MPAC +1 BY SFTEMP1,
 1740   REF  17  LAST  436   40,3151   00123 1           ADRES  SFTEMP1           SFTEMP2.  STORES LOW PART OF RESULT
 1741   REF 158  LAST  436   40,3152  56 156 0           XCH    MPAC      +2      IN (E SUBK) +1 OR E+1
 1742                        40,3153  6 0000 1           DOUBLE
 1743   REF 159  LAST  436   40,3154  54 156 1           TS     MPAC      +2
 1744   REF  79  LAST  433   40,3155  3 4755 1           CAF    ZERO
 1745   REF 160  LAST  436   40,3156  6 0155 0           AD     MPAC      +1
 1746   REF   3  LAST  436   40,3157  0 3221 0           TC     2ROUND    +2
 1747   REF   3  LAST  436   40,3160  0 3230 0           TC     TESTOFUF
 1748   REF  13  LAST  435   40,3161  50 140 1           INDEX  MIXBR             RETURNS IF NO OF/UF
 1749                        40,3162  0 3162 1           TC     +0
 1750   REF   1              40,3163  0 3173 1           TC     DPINORM
 1751   REF  27  LAST  433   40,3164  3 0117 0           CA     DECOUNT           MIXEDNOUN
 1752   REF  25  LAST  433   40,3165  6 0145 1  DPINCOM  AD     NOUNADD             MIXED                 NORMAL
 1753   REF  91  LAST  432   40,3166  54 002 1           TS     Q                  E SUBK             E
 1754   REF 161  LAST  436   40,3167  56 155 0           XCH    MPAC      +1
 1755   REF  92  LAST  436   40,3170  50 002 0           INDEX  Q
 1756                        40,3171  54 001 1           TS     L                 PLACE LOW PART IN
 1757   REF    2  LAST  436    40,3172  0 3112 0              TC      ENDSCAL1            (E SUBK) +1    MIXED

 1758   REF   80  LAST  436    40,3173  3 4755 1  DPINORM     CAF     ZERO                E +1           NORMAL
 1759   REF    1               40,3174  0 3165 0              TC      DPINCOM


 1760   REF   11  LAST  436    40,3175  0 7106 1  DPINSF2     TC      DMP                 ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1761   REF   18  LAST  436    40,3176   00123 1              ADRES   SFTEMP1             PART OF SF CONST. DPINSF2 SHIFTS RESULTS
 1762   REF   12  LAST  428    40,3177  3 6245 1              CAF     SIX                 LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1
 1763   REF    2  LAST  422    40,3200  0 3207 1              TC      TPLEFTN             SHIFT LEFT 7.
 1764   REF    3  LAST  434    40,3201  0 3152 1              TC      DPINSF   +2


 1765   REF   12  LAST  437    40,3202  0 7106 1  DPINSF4     TC      DMP                 ASSUMES POINT BETWEEN BITS 11-12 OF HIGH
 1766   REF   19  LAST  437    40,3203   00123 1              ADRES   SFTEMP1             PART OF SF CONST. DPINSF2 SHIFTS RESULTS
 1767   REF   28  LAST  431    40,3204  3 4752 0              CAF     TWO                 LEFT BY 3, ROUNDS MPAC+2 INTO MPAC+1.
 1768   REF    3  LAST  437    40,3205  0 3207 1              TC      TPLEFTN             SHIFT LEFT 3.
 1769   REF    4  LAST  437    40,3206  0 3152 1              TC      DPINSF   +2


 1770   REF   93  LAST  436    40,3207  56 002 0  TPLEFTN     XCH     Q                   SHIFTS MPAC, +1, +2 LEFT N. SETS OVFIND
 1771   REF    1               40,3210  54 124 1              TS      SFTEMP2             TO +1 FOR OF, -1 FOR UF.
 1772   REF   94  LAST  437    40,3211  56 002 0              XCH     Q                   CALL WITH N-1 IN A.
 1773   REF   20  LAST  437    40,3212  54 123 0  LEFTNCOM    TS      SFTEMP1                 LOOP TIME .37 MSEC.
 1774   REF    6  LAST  435    40,3213  0 4404 0              TC      TPSL1
 1775   REF   21  LAST  437    40,3214  10 123 0              CCS     SFTEMP1
 1776   REF    1               40,3215  0 3212 0              TC      LEFTNCOM
 1777   REF    2  LAST  437    40,3216  0 0124 0              TC      SFTEMP2


 1778   REF  162  LAST  436    40,3217  56 155 0  2ROUND      XCH     MPAC      +1
 1779                          40,3220  6 0000 1              DOUBLE
 1780   REF  163  LAST  437    40,3221  54 155 1              TS      MPAC      +1
 1781   REF   95  LAST  437    40,3222  0 0002 0              TC      Q                   IF MPAC+1 DOES NOT OF/UF
 1782   REF  164  LAST  437    40,3223  6 0154 1              AD      MPAC
 1783   REF  165  LAST  437    40,3224  54 154 0              TS      MPAC
 1784   REF   96  LAST  437    40,3225  0 0002 0              TC      Q                   IF MPAC DOES NOT OF/UF
 1785   REF    5  LAST  435    40,3226  54 162 0              TS      MPAC+6
 1786   REF   97  LAST  437    40,3227  0 0002 0  2RNDEND     TC      Q


 1787   REF    6  LAST  437    40,3230  10 162 0  TESTOFUF    CCS     MPAC+6              RETURNS IF NO OF/UF
 1788   REF    6  LAST  436    40,3231  0 4145 0              TC      ALMCYCLE            OF    ALARM AND RECYCLE.
 1789   REF   98  LAST  437    40,3232  0 0002 0              TC      Q
 1790   REF    7  LAST  437    40,3233  0 4145 0              TC      ALMCYCLE            UF    ALARM AND RECYCLE.


 1791   REF    1               42,3452                        SETLOC  ENDSPMIN +1

 17915  REF    2 LAST  423 TC  427:    146    146*            COUNT*  $$/PIN
 1792  REF   1              42,3452  0 3573 0  HMSIN    TC      ALL3DEC          IF ALL 3 WORDS WERF NOT LOAOEO, ALARM.
 1793  REF  13  LAST  437   42,3453  0 7106 1           TC      OMP              XREG, XREGLP (=HOURS) WERE ALREADY PUT
 1794  REF   1              42,3454   03534 0           ADRES   WHOLECON         INTO MPAC, MPAC+1.
 1795  REF   I              42,3455  0 3543 0           TG      RNO/TST          ROUND OFF TC WHOLF HRS IN MPAC+1.
 1796  REF  81  LAST  437   42,3456  3 4755 1           CAF     ZERD             ALARM IF MPAC NON ZERO (G/ 16383 ).
 1797  REF 166  LAST  437   42,3457  54 156 1           TS      MPAC     +2
 1798  REF   1              42,3460  3 3536 1           CAF     HRCON
 1799  REF 167  LAST  438   42,3461  54 154 0           TS      MPAC
 1800  REF   2  LAST  438   42,3462  3 3537 0           CAF     HRCON    +1
 1801  REF 168  LAST  438   42,3463  56 155 0           XCH     MPAC     +I
 1802  REF   4  LAST  425   42,3464  0 7312 0           TC      SHORTMP
 1803  REF   1              42,3465  0 3554 0           TC      MPACTST          ALARM IF MPAC NCN ZERO (G/ 745)
 1804  REF 169  LAST  438   42,3466  52 156 1           OXCH    MPAC     +1      STOPE HOURS CONTRI8UTION
 1805  REF   1              42,3467  52 124 1           DXCH    HITEMIN
 1806  REF   3  LAST  429   42,3470  3 1003 0           CA      YREG             PUT YREG, YREGLP INTO MPAC, +1.
 1807  REF   2  LAST  101   42,3471  23'006 0           LXCH    YREGLP
 1808  REF 170  LAST  438   42,3472  52 155 1           DXCH    MPAC
 1809  REF  14  LAST  438   42,3473  0 7106 1           TC      DMP
 1810  REF   2  LAST  438   42,3474   03534 0           ADRES   WHOLECON
 1811  REF   2  LAST  438   42,3475  0 3543 0           TC      RND/TST          ROUND OFF TC WHOLE MIN IN MPAC+1
 1812  REF   1              42,3476  4 3541 0           CS      59MIN            ALARM IF MPAC NON ZERO (G/16383)
 1813  REF   1              42,3477  0 3561 0           TC      SIZETST          ALARM IF MPAC+1 G/ 59MIN
 1814  REF 171  LAST  438   42,3500  56 155 0           XCH     MPAC     +1
 1815                       42,3501  0 0006 1           EXTEND
 1816  REF   1              42,3502  7 3540 1           MP      MINCON           LEAVES MINUTES CONTRIBUTION IN A,L
 1817  REF   2  LAST  438   42,3503  20 124 1           DAS     HITEMIN          ADO IN MINUTES CONTRIBUTION
 1818                       42,3504  0 0006 1           EXTEND                   IF THIS DAS OVERFLOWS, G/ 745HR,39MIN
 1819                       42,3505  1 3507 1           8ZF     +2
 1820  REF   8  LAST  437   42,3506  0 4145 0           TC      ALMCYCLE
 1821  REF   3  LAST  429   42,3507  3 1004 1           CA      ZREG             PUT ZREG, ZREGLP INTO MPAC, +1.
 1822  REF   2  LAST  101   42,3510  23'007 1           LXCH    ZREGLP
 1823  REF 172  LAST  438   42,3511  52 155 1           DXCH    MPAC
 1824  REF  15  LAST  438   42,3512  0 7106 1           TC      DMP
 1825  REF   3  LAST  438   42,3513   03534 0           ADRES   WHOLECON
 1826  REF   3  LAST  438   42,3514  0 3543 0           TC      RNO/TST          ROUND OFF TO WHOLE CENTI-SEC IN MPAC+1
 1827  REF   1              42,3515  4 3542 0           CS      59.99SEC         ALARM IF MPAC NCN ZERC (G/163.83 SEC)
 1828  REF   2  LAST  438   42,3516  0 3561 0           TC      SIZETST          ALARM IF MPAC+1 G/59.99 SEC
 1829  REF   3  LAST  438   42,3517  52 124 1           OXCH    HITEMIN          ADD IN SECONOS CONTRIBUTION
 1830  REF 173  LAST  438   42,3520  20 155 1           OAS     MPAC             IF THIS DAS OVERFLCWS,
 1831                       42,3521  0 0006 1           EXTENO                   G/ 745 HR, 39 MIN, 14.55 SEC.
 1832                       42,3522  1 3524 0           BZF     +2
 1833  REF   9  LAST  438   42,3523  0 4145 0           TC      ALMCYCLE         ALARM ANO RECYCLE
 1834  REF  82  LAST  438   42,3524  3 4755 1           GAF     ZERC
 1835  REF 174  LAST  438   42,3525  54 156 1           TS      MPAC     +2
 1836  REF   6  LAST  427   42,3526  0 7262 0           TC      TPAGREE
 1837  REF 175  LAST  438   42,3527  52 155 1           OXCH    MPAC
 1838  REF  26  LAST  436   42,3530  50 145 1           INDEX   NOUNADO
 1839                       42,3531  52 001 1           DXCH    0
 1840  REF  26  LAST  435   42,3532  0 4635 0           TC      POSTJUMP
 1841  REF  10  LAST  434   42,3533   63020 0           CACR    LOADLV
 1842                        42,3534   00006 1  WHOLECON OCT      00006             (10EXP5/2EXP14)2EXP14
 1843                        42,3535   03240 1           OCT      03240
 1844                        42,3536   00025 0  HRCCN    OCT      00025             1 HOUR IN CENTI-SEC
 1845                        42,3537   37100 1           OCT      37100
 1846                        42,3540   13560 0  MINCON   OCT      13560             1 MINUTE IN CENTI-SEC
 1847                        42,3541   00073 0  59MIN    OCT      00073             59 AS WHOLE
 1848                        42,3542   13557 1  59.99SEC OCT      13557             5999 CENTI-SEC


 1849  REF 176  LAST  438    42,3543  56 156 0  RND/TST  XCH      MPAC     +2       ROUNDS MPAC+2 INTO MPAC+1
 1850                        42,3544  6 0000 1           DOUBLE                     ALARMS IF MPAC NOT 0
 1851  REF 177  LAST  439    42,3545  54 156 1           TS       MPAC     +2
 1852  REF  83  LAST  438    42,3546  3 4755 1           CAF      ZERO
 1853  REF 178  LAST  439    42,3547  6 0155 0           AD       MPAC     +1
 1854  REF 179  LAST  439    42,3550  54 155 1           TS       MPAC     +1
 1855  REF  84  LAST  439    42,3551  3 4755 1           CAF      ZERO
 1856  REF 180  LAST  439    42,3552  6 0154 1           AD       MPAC                  CANT OVFLOW
 1857  REF 181  LAST  439    42,3553  56 154 1           XCH      MPAC
 1858  REF 182  LAST  439    42,3554  10 154 0  MPACTST  CCS      MPAC                  ALARM IF MPAC NON ZERO
 1859  REF  10  LAST  438    42,3555  0 4145 0           TC       ALMCYCLE              ALARM AND RECYCLE.
 1860  REF  99  LAST  437    42,3556  0 0002 0           TC       Q
 1861  REF  11  LAST  439    42,3557  0 4145 0           TC       ALMCYCLE              ALARM AND RECYCLE.
 1862  REF 100  LAST  439    42,3560  0 0002 0           TC       Q

 1863  REF 183  LAST  439    42,3561  54 156 1  SIZETST  TS       MPAC     +2       CALLED WITH - CON IN A
 1864  REF 184  LAST  439    42,3562  10 155 1           CCS      MPAC     +1       GET MAG OF MPAC+1
 1865  REF  45  LAST  433    42,3563  6 4753 1           AD       ONE
 1866                        42,3564  1 3566 0           TCF      +2
 1867  REF  46  LAST  439    42,3565  6 4753 1           AD       ONE
 1868  REF 185  LAST  439    42,3566  6 0156 0           AD       MPAC     +2
 1869                        42,3567  0 0006 1           EXTEND                     MAG OF MPAC+1 - CON
 1870                        42,3570  6 3572 1           BZMF     +2
 1871  REF  12  LAST  439    42,3571  0 4145 0           TC       ALMCYCLE              MAG OF MPAC+1 G/ CON. ALARM AND RECYCLE.
 1872  REF 101  LAST  439    42,3572  0 0002 0           TC       Q                     MAG OF MPAC+1 L/= CON


R1873  ALL3DEC TESTS THAT ALL 3 WORDS ARE LOADED IN DEC (FOR HMSIN).
R1874  ALARM IF NOT.( TEST THAT BITS 3,4,5 OF DECBRNCH ARE ALL = 1)
 1875  REF   1                42,3573  4 3600 0  ALL3DEC  CS       OCT34BAR              GET BITS 3,4,5 IN A
 1876  REF  17  LAST  433    42,3574  7 0777 1           MASK     DECBRNCH              GET BITS 3,4,5 OF DECBRNCH IN A
 1877  REF   2  LAST  439    42,3575  6 3600 1           AD       OCT34BAR              BITS 3,4,5 OF DECBRNCH MUST ALL = 1
 1878  REF 136  LAST  436    42,3576  10 000 0           CCS      A
 1879  REF   1                42,3577  0 3603 1           TC       FORCEV25
 1880                        42,3600   77743 1  OCT34BAR OCT      77743
 1881  REF   2  LAST  439    42,3601  0 3603 1           TC       FORCEV25
 1882  REF 102  LAST  439    42,3602  0 0002 0           TC       Q


 18825 REF   2  LAST  211    42,3603  4 6010 1  FORCEV25 CS       OCT31                 FORCE VERB 25 TO BE EXECUTED BY RECYCLE
 18826 REF   2  LAST  409    42,3604  55'040 0           TS       VERBSAVE               IN CASE OPERATOR EXECUTED A LOWER LOAD
 18827  REF   13  LAST  439    42,3605  0 4145 0                TC     ALMCYCLE           VERB.  ALARM AND RECYCLE
 1883                          42,3606               ENDHMSS   EQUALS
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P1884    MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1885    VERB PROCEED WITHOUT DATA, VERB RESEQUENCE,
R1886    ANOTHER MONITOR, OR ANY NVSUB CALL THAT PASSES THE DSPLOCK (PROVIDED
R18861   THAT THE OPERATOR HAS SOMEHOW ALLOWED THE ENDING OF A MONITOR WHICH
R18862   HE HAS INITIATED THROUGH THE KEYBOARD).

R1887    MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1888    EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1889    MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1890    NOUNCADR IN MONSAVE1, IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1891    MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT). BIT 14 OF MONSAVE1
R18911   INDICATES THE CURRENT MONITOR WAS EXTERNALLY INITIATED (EXTERNAL
R18912   MONITOR BIT). IT IS TURNED OFF BY RELDSP AND KILMONON.

R1892    MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1893    IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1894    IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1895    NVSUB (IF EXTERNAL MONITOR BIT IS OFF), V33=PROCEED WITHOUT DATA,
R1896    V32=RESEQUENCE, AND V34=TERMINATE TURN KILL MONITOR BIT ON.

R1897    IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1898    AND MONSAVE1 (TURNING OFF KILLER BIT AND EXTERNAL MONITOR BIT).

R1899    MONITOR DOSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
 1900    REF   1                 41,3255                          SETLOC ENDRUTIN

 19005   REF   3 LAST  428 TO  435:   283   685*                  COUNT* $$/PIN
 1901    REF   1                 41,3255   4 3264 0  MONITOR   CS     BIT15/14
 1902    REF   6  LAST  434      41,3256   7 1016 0            MASK   NOUNCADR
 1903    REF 186  LAST  439      41,3257  54 155 1  MONIT1     TS     MPAC     +1       TEMP STORAGE
 19031   REF   7  LAST  427      41,3260   4 0136 1            CS     ENTEXIT
 19032   REF   4  LAST  409      41,3261   6 4217 1            AD     ENDINST
 19033   REF 137  LAST  439      41,3262  10 000 0            CCS    A
 19034   REF   1                 41,3263   0 3272 0            TC     MONIT2
 19035                           41,3264    60000 1  BIT15/14 OCT    60000
 19036   REF   2  LAST  441      41,3265   0 3272 0            TC     MONIT2
 19037   REF  38  LAST  417      41,3266   3 4736 1            CAF    BIT14             EXTERNALLY INITIATED MONITOR,
 19038   REF 187  LAST  441      41,3267  26 155 1            ADS    MPAC +1           SET BIT 14 FOR MONSAVE1.
 190381  REF  85  LAST  439      41,3270   3 4755 1            CAF    ZERO
 190382  REF   1                 41,3271  55 021 1            TS     MONSAVE2          ZERO NVMONOPT OPTIONS
 1904    REF   3  LAST  234      41,3272   3 6077 1  MONIT2    CAF    LOW7
 1905    REF  17  LAST  416      41,3273   7 1000 1            MASK   VERBREG
 1906    REF   4  LAST  432      41,3274   0 4331 1            TC     LEFT5
 1907    REF   5  LAST  402      41,3275  54 022 0            TS     CYL
 1908    REF   6  LAST  441      41,3276   4 0022 0            CS     CYL
 1909    REF   7  LAST  441      41,3277  56 022 1            XCH    CYL
 1910    REF  11  LAST  428      41,3300   6 1001 1            AD     NOUNREG
 1911    REF 188  LAST  441      41,3301  54 154 0            TS     MPAC              TEMP STORAGE
 1912    REF  86  LAST  441      41,3302   3 4755 1            CAF    ZERO
 1913   REF   3  LAST  400   41,3303  55'011 1             TS      DSPLOCK         +0 INTO DSPLOCK SO MONITOR CAN RUN.
 1914   REF   4  LAST  409   41,3304  11'041 1             CCS     CADRSTOR        TURN OFF KR LITE IF CADRSTOR AND DSPLIST
 1915                        41,3305  0 3307 0             TC      +2              ARE BOTH EMPTY. (LITE COMES ON IF NEW
 1916   REF   1              41,3306  0 4502 1             TC      RELDSP1         MONITOR IS KEYED IN OVER OLD MONITOR.)
 1917                        41,3307  0 0004 0             INHINT
 1918   REF   2  LAST  224   41,3310  11'017 1             CCS     MONSAVE
 1919                        41,3311  0 3316 0             TC      +5              IF MONSAVE WAS +, NO REQUEST
 1920   REF  47  LAST  439   41,3312  3 4753 1             CAF     ONE             IF MONSAVE WAS +0, REQUEST MONREQ
 1921   REF  15  LAST  369   41,3313  0 5203 0             TC      WAITLIST
 1922   REF  39  LAST  433      0776                       EBANK=  DSPCOUNT
 1923   REF   1              41,3314   03322 1             2CADR   MONREQ
 1923   REF   1              41,3315   62101 0
 1924   REF 189  LAST  441   41,3316  52 155 1             DXCH    MPAC            PLACE MONITOR VERB AND NOUN INTO MONSAVE
 1925   REF   3  LAST  442   41,3317  53'020 0             DXCH    MONSAVE         ZERO THE KILL MONITOR BIT
 1926                        41,3320  0 0003 1             RELINT                  SET UP EXTERNAL MONITOR BIT
 1927   REF   4  LAST  408   41,3321  0 0136 0             TC      ENTRET


 1928   REF   1              41,3322  0 4400 1  MONREQ     TC      LODSAMPT        CALLED BY WAITLIST
 1929   REF   2  LAST  224   41,3323  11'020 0             CCS     MONSAVE1        TIME IS SNATCHED IN RUPT FOR NOUN 65
 1930                        41,3324  0 3330 1             TC      +4              IF KILLER BIT = 0, ENTER REQUESTS
 1931                        41,3325  0 3330 1             TC      +3              IF KILLER BIT = 0, ENTER REQUESTS
 1932   REF   1              41,3326  0 3341 1             TC      KILLMON         IF KILLER BIT = 1, NO REQUESTS
 1933   REF   2  LAST  442   41,3327  0 3341 1             TC      KILLMON         IF KILLER BIT = 1, NO REQUESTS
 1934   REF   1              41,3330  3 3345 0             CAF     MONDEL
 1935   REF  16  LAST  442   41,3331  0 5203 0             TC      WAITLIST        ENTER WAITLIST REQUEST FOR MONREQ
 1936   REF  40  LAST  442      0776                       EBANK=  DSPCOUNT
 1937   REF   2  LAST  442   41,3332   03322 1             2CADR   MONREQ
 1937                        41,3333   62101 0
 1938   REF   2  LAST  160   41,3334  3 4355 0             CAF     CHRPRIO
 1939   REF   5  LAST  330   41,3335  0 5072 1             TC      NOVAC           ENTER EXEC REQUEST FOR MONDO
 1940   REF  41  LAST  442      0776                       EBANK=  DSPCOUNT
 1941   REF   1              41,3336   03346 0             2CADR   MONDO
 1941   REF   1              41,3337   62101 0
 1942   REF  11  LAST  386   41,3340  0 5261 1             TC      TASKOVER

 1943   REF  87  LAST  441   41,3341  3 4755 1  KILLMON    CAF     ZERO            ZERO MONSAVE AND TURN KILLER BIT OFF
 1944   REF   4  LAST  442   41,3342  55'017 1             TS      MONSAVE
 1945   REF   3  LAST  442   41,3343  55'020 0             TS      MONSAVE1        TURN OFF KILL MONITOR BIT.
 1946   REF  12  LAST  442   41,3344  0 5261 1             TC      TASKOVER        TURN OFF EXTERNAL MONITOR BIT.
 1947                        41,3345   00144 0  MONDEL     OCT     144             FOR 1 SEC MONITOR INTERVALS


 1948   REF   4  LAST  442   41,3346  11'020 0  MONDO      CCS     MONSAVE1        CALLED BY EXEC
 1949                        41,3347  0 3353 1             TC      +4              IF KILLER BIT = 0, CONTINUE
 1950                        41,3350  0 3353 1             TC      +3              IF KILLER BIT = 0, CONTINUE
 1951   REF  48  LAST  406   41,3351  0 5155 0             TC      ENDOFJOB        IN CASE TERMINATE CAME SINCE LAST MONREQ
 1952   REF  49  LAST  442   41,3352  0 5155 0             TC      ENDOFJOB        IN CASE TERMINATE CAME SINCE LAST MONREQ
 1953   REF   4  LAST  442   41,3353  11'011 1             CCS     DSPLOCK
 1954   REF   1              41,3354  0 3376 0             TC      MONBUSY         NVSUB IS BUSY
 1955    REF    4  LAST  441    41,3355  3 6077 1               CAF     LOW7
 1956    REF    5  LAST  442    41,3356  7 1017 1               MASK    MONSAVE
 1958    REF    1               41,3357  0 2321 0               TC      UPDATNN -1      PLACE NOUN INTO NOUNREG AND DISPLAY IT
 1960    REF    1               41,3360  3 4144 1               CAF     MID7
 1961    REF    6  LAST  443    41,3361  7 1017 1               MASK    MONSAVE         CHANGE MONITOR VERB TO DISPLAY VERB
 1962    REF    1               41,3362  6 3374 1               AD      MONREF          -DEC10, STARTING IN BIT8
 1963    REF    1               41,3363  54 023 1               TS      EDOP            RIGHT 7
 1964    REF    2  LAST  443    41,3364  3 0023 0               CA      EDOP
 1965    REF   18  LAST  441    41,3365  55'000 1               TS      VERBREG
 1966    REF    1               41,3366  3 3375 0               CAF     MONBACK         SET RETURN TO PASTEVB AFTER DATA DISPLAY
 1967    REF    5  LAST  442    41,3367  54 136 1               TS      ENTRET
 1968    REF    2  LAST  441    41,3370  4 3264 0               CS      BIT15/14
 1969    REF    5  LAST  442    41,3371  7 1020 0               MASK    MONSAVE1        PUT ECADR INTO MPAC +2. INTMCTBS WILL
 1970    REF  190  LAST  442    41,3372  54 156 1               TS      MPAC     +2     DISPLAY IT AND SET NOUNCADR, NOUNADD,
 1971    REF    1               41,3373  0 2046 1    ENDMONDO   TC      TESTNN          EBANK.

 1972                              4124                         BLOCK   2

 197201 REF     1                  4000                         SETLOC  FFTAG8
 197202                            4124                         BANK

 19725   REF    1                                               COUNT*  $$/PIN
 1973    REF    2  LAST  443       4124  3 4144 1    PASTEVB    CAF     MID7
 1974    REF    2  LAST  441       4125  7 1021 1               MASK    MONSAVE2        NVMONOPT PASTE OPTION
 1975                              4126  0 0006 1               EXTEND
 1976                              4127  1 4131 1               BZF     +2
 1977    REF    1                  4130  0 4132 0               TC      PASTEOPT        PASTE PLEASE VERB FOR NVMONOPT
 1978    REF    7  LAST  443       4131  3 1017 0               CA      MONSAVE         PASTE MONITOR VERB - PASTE OPTION IS 0
 19782   REF    3  LAST  443       4132  54 023 1    PASTEOPT   TS      EDOP            RIGHT 7
 19783   REF    4  LAST  443       4133  3 0023 0               CA      EDOP            PLACE MONITOR VERB OR PLEASE VERB INTO
 197832 REF    91  LAST  436       4134  0 4616 1               TC      BANKCALL         VERBREG AND DISPLAY IT.
 197833 REF     7  LAST  430       4135   62341 0               CADR    UPDATVB -1
 197835 REF    88  LAST  442       4136  3 4755 1               CAF     ZERO            ZERO REQRET SO THAT PASTED VERBS CAN
 197838 REF    10  LAST  413       4137  55'012 1               TS      REQRET           BE EXECUTED BY OPERATOR.
 19784   REF    3  LAST  443       4140  3 1021 0               CA      MONSAVE2
 19785   REF    1                  4141  0 4255 1               TC      BLANKSUB        PROCESS NVMONOPT BLANK OPTION IF ANY
 19786                             4142  0 4143 0               TC      +1
 19787   REF   50  LAST  442       4143  0 5155 0    ENDPASTE   TC      ENDOFJOB

 1979                              4144   37600 0    MID7       OCT     37600


 1980    REF    1               41,3374                         SETLOC  ENDMONDO +1
 19805   REF    4 LAST  441 TO  443:       79   764*            COUNT*  $$/PIN
 1981                           41,3374   75377 0    MONREF     OCT     75377           -DEC10, STARTING IN BIT8
 1982    REF    1               41,3375   04124 1    MONBACK    ADRES   PASTEVB

 1983    REF    2  LAST  440    41,3376  0 4374 0    MONBUSY    TC      RELDSPON        TURN KEY RELEASE LIGHT
 1984    REF   51  LAST  443    41,3377  0 5155 0               TC      ENDOFJOB
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R1985   DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
R1986   IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
R1987   DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

R19871  FOR BANKS L/E 27, THIS IS ENOUGH.

R19872  FOR BANKS G/E 30, THE THIRD COMPONENT OF NOUN 26 (PRIO, ADRES, BBCON)
R19873  MUST BE PRELOADED WITH THE DESIRED SUPERBANK BITS (BITS 5,6,7).
R19874           V23N26 SHOULD BE USED.

R19875  SUMMARY
R19876  FOR BANKS L/E 27,                             V27N01E(FCADR)E
R19877  FOR BANKS G/E 30,     V23N26E(SUPERBITS)E     V27N01E(FCADR)E

 1988   REF  11  LAST  427   41,3400  3 4317 0  DSPFMEM  CAF    R1D1          IF F/F, DATACALL USES BANK 02 OR 03.
 1989   REF  42  LAST  442   41,3401  54 776 0           TS     DSPCOUNT
 19891  REF  17  LAST  376   41,3402  3 1046 1           CA     DSPTEM1 +2    SUPERBANK BITS WERE PRELOADED INTO
 19892  REF  59  LAST  432   41,3403  54 001 1           TS     L             3RD COMPONENT OF NOUN 26.
 1990   REF   7  LAST  441   41,3404  3 1016 1           CA     NOUNCADR      ORIGINAL FCADR LOADED STILL IN NOUNCADR.
 1991   REF   1              41,3405  0 4651 1           TC     SUPDACAL      CALL WITH FCADR IN A, SUPERBITS IN L.
 1992   REF   3  LAST  416   41,3406  0 3410 1           TC     DSPOCTWO
 1993   REF  52  LAST  443   41,3407  0 5155 0  ENDSPF   TC     ENDOFJOB
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P1994    WORD DISPLAY ROUTINES

 1995    REF   4  LAST  436   40,3234                         SETLOC  TESTOFUF +4
 19955   REF   5 LAST  435 TO  437:    120    605*            COUNT*  $$/PIN
 1996    REF 103  LAST  439   40,3234  56 002 0  DSPSIGN      XCH     Q
 1997    REF   1              40,3235  54 144 1               TS      DSPWDRET
 1998    REF 191  LAST  443   40,3236  10 154 0               CCS     MPAC
 1999                         40,3237  0 3247 0               TC      +8D
 2000                         40,3240  0 3247 0               TC      +7
 2001    REF  48  LAST  442   40,3241  6 4753 1               AD      ONE
 2002    REF 192  LAST  445   40,3242  54 154 0               TS      MPAC
 2003    REF   2  LAST  404   40,3243  0 2433 1               TC      -ON
 2004    REF 193  LAST  445   40,3244  4 0155 1               CS      MPAC  +1
 2005    REF 194  LAST  445   40,3245  54 155 1               TS      MPAC     +1
 2006    REF   2  LAST  445   40,3246  0 0144 0               TC      DSPWDRET
 2007    REF   3  LAST  423   40,3247  0 2413 0               TC      +ON
 2008    REF   3  LAST  445   40,3250  0 0144 0               TC      DSPWDRET

 2009                         40,3251  0 0006 1  DSPRND       EXTEND                           ROUND BY 5 EXP-6
 2010    REF   1              40,3252  3 3315 0               DCA     DECROUND -1
 2011    REF 195  LAST  445   40,3253  20 155 1               DAS     MPAC
 2012                         40,3254  0 0006 1               EXTEND
 2013                         40,3255  1 3261 0               BZF     +4
 2014                         40,3256  0 0006 1               EXTEND
 2015    REF   1              40,3257  3 4733 1               DCA     DPDSMAX
 2016    REF 196  LAST  445   40,3260  52 155 1               DXCH    MPAC
 2017    REF 104  LAST  445   40,3261  0 0002 0               TC      Q

R2018    DSPDECWD CONVERTS C( MPAC, MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
R2019    STARTING IN LOC SPECIFIED IN DSPCOUNT. IT ROUNDS BY 5 EXP-6.

 2020    REF 105  LAST  445   40,3262  56 002 0  DSPDECWD XCH     Q
 2021    REF   1              40,3263  54 115 0               TS      WDRET
 2022    REF   1              40,3264  0 3234 1               TC      DSPSIGN
 2023    REF   1              40,3265  0 3251 1               TC      DSPRND
 2024    REF   7  LAST  335   40,3266  3 4751 0               CAF     FOUR
 2025    REF   1              40,3267  54 137 0  DSPDCWD1     TS      WDCNT
 2026    REF   1              40,3270  3 4363 0               CAF     BINCON
 2027    REF   5  LAST  438   40,3271  0 7312 0               TC      SHORTMP
 2028    REF 197  LAST  445   40,3272  50 154 1  TRACE1       INDEX   MPAC
 2029    REF   3  LAST  401   40,3273  3 4066 0               CAF     RELTAB
 2030    REF   5  LAST  432   40,3274  7 4346 0               MASK    LOW5
 2031    REF   6  LAST  425   40,3275  54 124 1               TS      CODE
 2032    REF  89  LAST  443   40,3276  3 4755 1               CAF     ZERO
 2033    REF 198  LAST  445   40,3277  56 156 0               XCH     MPAC     +2
 2034    REF 199  LAST  445   40,3300  56 155 0               XCH     MPAC     +1
 2035    REF 200  LAST  445   40,3301  54 154 0               TS      MPAC
 2036    REF  43  LAST  444   40,3302  56 776 1               XCH     DSPCOUNT
 2037    REF   4  LAST  425   40,3303  54 143 0  TRACE1S      TS      COUNT
 2038    REF 138  LAST  441   40,3304  10 000 0               CCS     A                        DECREMENT DSPCOUNT EXCEPT AT +0
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  2039    REF  44  LAST  445    40,3305   54 776 0             TS      DSPCOUNT
  2040    REF   4  LAST  425    40,3306   0 3356 1             TC      DSPIN
  2041    REF   2  LAST  445    40,3307   10 137 0             CCS     WDCNT
  2042    REF   1               40,3310   0 3267 1             TC      DSPDCWD1
  2043    REF   7  LAST  431    40,3311   4 4360 1             CS      V01
  2044    REF  45  LAST  446    40,3312   54 776 0             TS      DSPCOUNT
  2045    REF   2  LAST  445    40,3313   0 0115 1             TC      WDRET

  2046                          40,3314    00000 1             OCT     00000
  2047                          40,3315    02476 0  DECROUND   OCT     02476

 R2048    DSPDECNR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 5 CHAR DECIMAL
 R2049    STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

  2050    REF 106  LAST  445    40,3316   56 002 0  DSPDECNR  XCH     Q
  2051    REF   3  LAST  446    40,3317   54 115 0             TS      WDRET
  2052    REF   2  LAST  445    40,3320   0 3234 1             TC      DSPSIGN
  2053    REF   2  LAST  446    40,3321   0 3266 0             TC      DSPDCWD1 -1

 R2054    DSPDC2NR CONVERTS C( MPAC,MPAC+1) INTO A SIGN AND 2 CHAR DECIMAL
 R2055    STARTING IN LOC SPECIFIED IN DSPCOUNT. IT DOES NOT ROUND

  2056    REF 107  LAST  446    40,3322   56 002 0  DSPDC2NR  XCH     Q
  2057    REF   4  LAST  446    40,3323   54 115 0             TS      WDRET
  2058    REF   3  LAST  446    40,3324   0 3234 1             TC      DSPSIGN
  2059    REF  49  LAST  445    40,3325   3 4753 1             CAF     ONE
  2060    REF   3  LAST  446    40,3326   0 3267 1             TC      DSPDCWD1


 R2061    DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
 R2062    STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

  2063    REF 108  LAST  446    40,3327   56 002 0  DSP2DEC   XCH     Q
  2064    REF   5  LAST  446    40,3330   54 115 0             TS      WDRET
  2065    REF  90  LAST  445    40,3331   3 4755 1             CAF     ZERO
  2066    REF   7  LAST  445    40,3332   54 124 1             TS      CODE
  2067    REF  15  LAST  425    40,3333   3 6250 0             CAF     THREE
  2068    REF   3  LAST  405    40,3334   0 3440 1             TC      11DSPIN         -R2 OFF
  2069    REF   8  LAST  445    40,3335   3 4751 0             CAF     FOUR
  2070    REF   4  LAST  446    40,3336   0 3440 1             TC      11DSPIN         +R2 OFF
  2071    REF   4  LAST  446    40,3337   0 3234 1             TC      DSPSIGN
  2072    REF   4  LAST  424    40,3340   3 4320 1             CAF     R2D1
  2073    REF   4  LAST  446    40,3341   0 3267 1  END2DEC   TC      DSPDCWD1

 R2074    DSPDECVN DISPLAYS C(A) UPON ENTRY AS A 2 CHAR DECIMAL BEGINNING IN THE
 R2075    DSP LOC SPECIFIED IN DSPCOUNT.
 R2076    C(A) SHOULD BE IN FORM N X 2EXP-14. THIS IS SCALED TO FORM N/100 BEFORE
 R2077    DISPLAY CONVERSION.
 2078                            40,3342  0 0006 1  DSPDECVN EXTEND
 2079    REF   1                 40,3343  7 3352 1           MP       VNDSPCON           MULT BY .01
 2080    REF 201  LAST  445      40,3344  22 154 1           LXCH     MPAC               TAKE RESULTS FROM L.(MULT BY 2EXP14).
 2081    REF  91  LAST  446      40,3345  3 4755 1           CAF      ZERO
 2082    REF 202  LAST  447      40,3346  54 155 1           TS       MPAC     +1
 2083    REF 109  LAST  446      40,3347  56 002 0           XCH      Q
 2084    REF   6  LAST  446      40,3350  54 115 0           TS       WDRET
 2085    REF   3  LAST  426      40,3351  0 3325 0           TC       DSPOC2NR +3        NO SIGN, NO ROUND, 2 CHAR

 2086                            40,3352   00244 0  VNDSPCON OCT      00244              .01 ROUNDED UP


 2087    REF   3  LAST  423      40,3353  0 3342 1  GOVNUPDT TC       DSPDECVN           THIS IS NOT FOR GENERAL USE. REALLY PART
 2088    REF  27  LAST  438      40,3354  0 4635 0           TC       POSTJUMP           OF UPDATVB.
 2089    REF   2  LAST  413      40,3355   62351 1           CADR     UPDAT1   +2

 2090                            40,3356            ENDDECVN EQUALS


 2091    REF   1                 41,3410                     SETLOC   ENDSPF   +1
 20915   REF   5 LAST  443 TO  445:     12    776*           COUNT*   $$/PIN
R2092    DSPOCTWO DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R2093    CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.

 2094    REF   8  LAST  441      41,3410  54 022 0  DSPOCTWO TS       CYL
 2095    REF 110  LAST  447      41,3411  56 002 0           XCH      Q
 2096    REF   7  LAST  447      41,3412  54 115 0           TS       WDRET              MUST USE SAME RETURN AS DSP2BIT.
 2097    REF  39  LAST  441      41,3413  3 4736 1           CAF      BIT14              TO BLANK SIGNS
 2098    REF  46  LAST  446      41,3414  26 776 0           ADS      DSPCOUNT
 2099    REF   9  LAST  446      41,3415  3 4751 0           CAF      FOUR
 2100    REF   3  LAST  446      41,3416  54 137 0  WDAGAIN  TS       WDCNT
 2101    REF   9  LAST  447      41,3417  4 0022 0           CS       CYL
 2102    REF  10  LAST  447      41,3420  4 0022 0           CS       CYL
 2103    REF  11  LAST  447      41,3421  4 0022 0           CS       CYL
 2104    REF 139  LAST  445      41,3422  4 0000 0           CS       A
 2105    REF   1                 41,3423  7 4757 1           MASK     DSPMSK
 2106    REF 140  LAST  447      41,3424  50 000 1           INDEX    A
 2107    REF   4  LAST  445      41,3425  3 4066 0           CAF      RELTAB
 2108    REF   6  LAST  445      41,3426  7 4346 0           MASK     LOW5
 2109    REF   8  LAST  446      41,3427  54 124 1           TS       CODE
 2110    REF  47  LAST  447      41,3430  56 776 1           XCH      DSPCOUNT
 2111    REF   5  LAST  445      41,3431  54 143 0           TS       COUNT
 2112    REF 141  LAST  447      41,3432  10 000 0           CCS      A                  DECREMENT DSPCOUNT EXCEPT AT +0
 2113    REF  48  LAST  447      41,3433  54 776 0           TS       DSPCOUNT
 2114    REF  28  LAST  447      41,3434  0 4635 0           TC       POSTJUMP
 2115    REF   1                 41,3435   61446 0           CADR     DSPOCTIN
 2116    REF   4  LAST  447      41,3436  10 137 0  OCTBACK  CCS      WDCNT
 2117    REF   1                 41,3437  0 3416 1           TC       WDAGAIN            +
 2118    REF   8  LAST  446      41,3440  4 4360 1  DSPLV    CS       VD1                TO BLOCK NUMERICAL CHARACTERS, CLEARS,
 2119    REF  49  LAST  447      41,3441  54 776 0           TS       DSPCOUNT           AND SIGNS AFTER A COMPLETED DISPLAY.
 2120   REF    8  LAST  447    41,3442  0 0115 1                TC      WORET

 2121   REF    4  LAST  433       4757             DSPMSK       =       SEVEN


R2135   FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE. BOTH
R2136   ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
R2137   FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
R2138   DSPTAB ENTRY INTO DSREL.

 2139   REF    1               40,3356                          SETLOC  ENDECVN

 21395  REF    6 LAST  445 TO  447:      82    687*             COUNT*  $$/PIN
 2140   REF  111  LAST  447    40,3356  56 002 0  DSPIN         XCH     Q                    CANT USE L FOR RETURN, SINCE MANY OF THE
 2141   REF    1               40,3357  54 114 1                TS      DSEXIT               ROUTINES CALLING DSPIN USE L AS RETURN.
 2142   REF    7  LAST  447    40,3360  3 4346 1                CAF     LOW5
 2143   REF    6  LAST  447    40,3361  7 0143 0                MASK    COUNT
 2144   REF    6  LAST  431    40,3362  54 021 0                TS      SR
 2145   REF    7  LAST  448    40,3363  56 021 1                XCH     SR
 2146   REF    1               40,3364  54 141 1                TS      DSREL
 2147   REF   20  LAST  421    40,3365  3 4753 1                CAF     BIT1
 2148   REF    7  LAST  448    40,3366  7 0143 0                MASK    COUNT
 2149   REF  142  LAST  447    40,3367  10 000 0                CCS     A
 2150                          40,3370  0 3372 1                TC      +2                   LEFT IF COUNT IS ODD
 2151   REF    1               40,3371  0 3402 1                TC      DSPIN1  -1           RIGHT IF COUNT IS EVEN
 2152   REF    9  LAST  447    40,3372  56 124 0                XCH     CODE
 2153   REF    1               40,3373  0 4340 1                TC      SLEFT5               DOES NOT USE CYL
 2154   REF   10  LAST  448    40,3374  54 124 1                TS      CODE
 2155   REF   40  LAST  447    40,3375  3 4736 1                CAF     BIT14
 2156   REF    8  LAST  448    40,3376  7 0143 0                MASK    COUNT
 2157   REF  143  LAST  448    40,3377  10 000 0                CCS     A
 2158   REF   29  LAST  437    40,3400  3 4752 0                CAF     TWO                  BIT14 = 1, BLANK SIGN
 2159   REF   50  LAST  446    40,3401  6 4753 1                AD      ONE                  BIT14 = 0, LEAVE SIGN ALONE
 2160   REF    9  LAST  448    40,3402  54 143 0                TS      COUNT                +0 INTO COUNT FOR RIGHT
A2161                                                                                        +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
A2162                                                                                        +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
 2163                          40,3403  0 0004 0  DSPIN1        INHINT
 2164   REF    2  LAST  448    40,3404  50 141 0                INDEX   DSREL
 2165   REF   24  LAST  407    40,3405  11'022 1                CCS     DSPTAB
 2166                          40,3406  0 3410 1                TC      +2                   IF +
 2167   REF    6  LAST  435    40,3407  0 5675 0                TC      CCSHOLE
 2168   REF   51  LAST  448    40,3410  6 4753 1                AD      ONE                  IF-
 2169   REF    1               40,3411  54 142 1                TS      DSMAG
 2170   REF   10  LAST  448    40,3412  50 143 1                INDEX   COUNT
 2171   REF    1               40,3413  7 3434 0                MASK    DSMSK
 2172                          40,3414  0 0006 1                EXTEND
 2173   REF   11  LAST  448    40,3415  60 124 0                SU      CODE
 2174                          40,3416  0 0006 1                EXTEND
 2175   REF    1               40,3417  1 3432 0                BZF     DSLV                 SAME
 2176   REF   11  LAST  448    40,3420  50 143 1  DFRNT         INDEX   COUNT
 2177   REF   2  LAST  448    40,3421  4 3434 0            CS      DSMSK          MASK WITH 77740,76037,75777, OR 74037
 2178   REF   2  LAST  448    40,3422  7 0142 1            MASK    DSMAG
 2179   REF  12  LAST  448    40,3423  6 0124 0            AD      CODE
 2180   REF 144  LAST  448    40,3424  4 0000 0            CS      A
 2181   REF   3  LAST  448    40,3425  50 141 0            INDEX   DSREL
 2182   REF  25  LAST  448    40,3426  57'022 0            XCH     DSPTAB
 2183                         40,3427  0 0006 1            EXTEND
 2184   REF   2  LAST  448    40,3430  6 3432 1            BZMF    DSLV           DSPTAB ENTRY WAS -
 2185   REF   7  LAST  407    40,3431  25'015 1            INCR    NOUT           DSPTAB ENTRY WAS +
 2186                         40,3432  0 0003 1  DSLV      RELINT
 2187   REF   2  LAST  448    40,3433  0 0114 0            TC      DSEXIT

 2188                         40,3434   00037 0  DSMSK     OCT     37
 2189                         40,3435   01740 0            OCT     1740
 2190                         40,3436   02000 0            OCT     2000
 2191                         40,3437   03740 1            OCT     3740


R2192   FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
R2193   BIT11 OF CODE.

 2194   REF   4  LAST  449    40,3440  54 141 1  11DSPIN   TS      DSREL
 2195   REF  30  LAST  448    40,3441  3 4752 0            CAF     TWO
 2196   REF  12  LAST  448    40,3442  54 143 0            TS      COUNT
 2197   REF 112  LAST  448    40,3443  56 002 0            XCH     Q              MUST USE SAME RETURN AS DSPIN
 2198   REF   3  LAST  449    40,3444  54 114 1            TS      DSEXIT
 2199   REF   2  LAST  448    40,3445  0 3403 0            TC      DSPIN1


 2200   REF   5  LAST  446    40,3446  0 3356 1  DSPOCTIN  TC      DSPIN          SO DSPOCTWD DOESNT USE SWCALL
 2201                         40,3447  3 3451 1            CAF     +2
 2202   REF   5  LAST  434    40,3450  0 4640 1            TC      BANKJUMP
 2203   REF   1               40,3451   63436 0  ENDSPOCT  CADR    OCTBACK


R2204   DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R2205   ABORT WITH 01501.
R2206   DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R2207   DO TC ENTRET.

 22075  REF   9  LAST  447    40,3452  4 4360 1  PREDSPAL  CS      VD1
 22076  REF  50  LAST  447    40,3453  54 776 0            TS      DSPCOUNT
 2208   REF   1               40,3454  4 3475 0  DSPALARM  CS      NVSBENDL
 2209   REF   8  LAST  441    40,3455  6 0136 0            AD      ENTEXIT
 2210                         40,3456  0 0006 1            EXTEND
 2211   REF  16  LAST  401    40,3457  1 3472 1            BZF     CHARALRM +2
 22111  REF   1               40,3460  4 3474 1            CS      MONADR         IF THIS IS A MONITOR, KILL IT
 22112  REF   9  LAST  449    40,3461  6 0136 0            AD      ENTEXIT
 22113                        40,3462  0 0006 1            EXTEND
 22114                        40,3463  1 3465 1            BZF     +2
 22115  REF  17  LAST  449   40,3464  0 3470 1            TC      CHARALRM
 22116  REF   1              40,3465  0 4204 0            TC      KILMONON
 22117  REF   3  LAST  265   40,3466  0 4364 1            TC      FALTON
 22118  REF   2  LAST  443   40,3467  0 4124 1            TC      PASTEVB           PUT MONITOR VERB BACK IN VERBREG
 2212   REF   4  LAST  450   40,3470  0 4364 1  CHARALRM  TC      FALTON            NOT NVSUB INITIATED. TURN ON OPR ERROR
 2213   REF  53  LAST  444   40,3471  0 5155 0            TC      ENDOFJOB
 2214   REF   2  LAST  245   40,3472  0 5642 1            TC      P00DOO
 2217                        40,3473   21501 0            OCT     21501
 22171  REF   3  LAST  450   40,3474   04124 1  MONADR    GENADR  PASTEVB
 2218   REF   1              40,3475  0 4202 0  NVSBENDL  TC      NVSUBEND


R2219   ALMCYCLE TURNS ON CHECK FAIL LIGHT, REDISPLAYS THE ORIGINAL VERB THAT
R2220   WAS EXECUTED, AND RECYCLES TO EXECUTE THE ORIGINAL VERB/NOUN COMBINATION
R2221   THAT WAS LAST EXECUTED. USED FOR BAD DATA DURING LOAD VERBS AND BY
R2222   MCTBS. ALSO BY MMCHANG IF 2 NUMERICAL CHARACTERS WERE NOT PUNCHED IN
R2223   FOR MM CODE.

 2224   REF   3  LAST  443       4145                     SETLOC  M107     +1
 22245  REF   2 LAST  443  TO  443:     17     17*        COUNT*  $$/PIN
 2225   REF   5  LAST  450       4145  0 4364 1  ALMCYCLE TC      FALTON           TURN ON CHECK FAIL LIGHT.
 2228   REF   3  LAST  439       4146  4 1040 0           CS      VERBSAVE         GET ORIGINAL VERB THAT WAS EXECUTED
 2229   REF  11  LAST  443       4147  55'012 1           TS      REQRET           SET FOR ENTPAS0
 2230   REF  92  LAST  443       4150  0 4616 1           TC      BANKCALL         PUTS ORIGINAL VERB INTO VERBREG AND
 2231   REF   8  LAST  443       4151   62341 0           CADR    UPDATVB -1       DISPLAYS IT IN VERB LIGHTS.
 2232   REF  29  LAST  447       4152  0 4635 0           TC      POSTJUMP
 2233   REF   2  LAST  401       4153   62002 1  ENDALM   CADR    ENTER


R2234   MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
R2235   IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
R2236   MM LIGHTS.
R2237   IT DEMANDS 2 NUMERICAL CHARACTERS BE PUNCHED IN FOR NEW MM CODE.
R2238   IF NOT, IT RECYCLES.

 2239   REF   1              41,3443                      SETLOC  DSPLV +3
 22395  REF   6 LAST  447  TO  448:     27    803*        COUNT*  $$/PIN
 2240   REF   1              41,3443  0 3465 0  MMCHANG   TC      REQMM             ENTPASHI ASSUMES THE TC REQMM AT MMCHANG
A2241                                                                               IF THIS MOVES AT ALL, MUST CHANGE
A2242                                                                               MMADREF AT ENTPASHI.
 2243   REF  23  LAST  378   41,3444  3 4747 1            CAF     BIT5              OCT20 = ND2.
 2244   REF  51  LAST  449   41,3445  6 0776 1            AD      DSPCOUNT          DSPCOUNT MUST = -ND2.
 2245                        41,3446  0 0006 1            EXTEND                    DEMAND THAT 2 NUM CHAR WERE PUNCHED IN.
 2246                        41,3447  1 3451 0            BZF     +2
 2247   REF  14  LAST  440   41,3450  0 4145 0            TC      ALMCYCLE          DSPCOUNT NOT= -ND2. ALARM AND RECYCLE
 2248   REF  92  LAST  447   41,3451  3 4755 1            CAF     ZERO              DSPCOUNT = -ND2.
 2249   REF  12  LAST  441   41,3452  57'001 1            XCH     NOUNREG
 2250   REF 203  LAST  447   41,3453  54 154 0            TS      MPAC
 2251   REF   5  LAST  413   41,3454  3 4361 1            CAF     ND1
 2252   REF  52  LAST  450   41,3455  54 776 0            TS      DSPCOUNT
 2253   REF  93  LAST  450   41,3456  0 4616 1                TC      BANKCALL
 2254   REF   4  LAST  407   41,3457   60601 0                CADR    2BLANK
 2255   REF  10  LAST  449   41,3460  4 4360 1                CS      V01             BLOCK NUM CHAR IN
 2256   REF  53  LAST  450   41,3461  54 776 0                TS      DSPCOUNT
 2257   REF 204  LAST  450   41,3462  3 0154 1                CA      MPAC
 2258   REF  30  LAST  450   41,3463  0 4635 0                TC      POSTJUMP
 2259   REF   1              41,3464   10040 1                CADR    MODROUTB        GO THRU STANDARD LOC.


 2260   REF   2  LAST  300   04,2040          MODROUTB =      V37
 2261   REF 113  LAST  449   41,3465  4 0002 1  REQMM    CS      Q
 2262   REF  12  LAST  450   41,3466  55'012 1                TS      REQRET
 2263   REF   6  LAST  450   41,3467  3 4361 1                CAF     ND1
 2264   REF  54  LAST  451   41,3470  54 776 0                TS      DSPCOUNT
 2265   REF  93  LAST  450   41,3471  3 4755 1                CAF     ZERO
 2266   REF  13  LAST  450   41,3472  55'001 0                TS      NOUNREG
 2267   REF  94  LAST  451   41,3473  0 4616 1                TC      BANKCALL
 2268   REF   5  LAST  451   41,3474   60601 0                CADR    2BLANK
 2269   REF   3  LAST  413   41,3475  0 4427 1                TC      FLASHON
 2270   REF  52  LAST  448   41,3476  3 4753 1                CAF     ONE
 2271   REF  18  LAST  439   41,3477  54 777 1                TS      DECBRNCH        SET FOR DEC
 2272   REF  10  LAST  449   41,3500  0 0136 0                TC      ENTEXIT


R2273   VBRQEXEC ENTERS REQUEST TO EXEC      FOR ANY ADDRESS WITH ANY PRIORITY.
R2274   IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
R2275   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2276   COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
R2277   COMPONENT 2  JOB ADRES (12 BIT )
R2278   COMPONENT 3  BBCON

 2279   REF  21  LAST  448   41,3501  3 4753 1  VBRQEXEC CAF     BIT1
 2280   REF  18  LAST  444   41,3502  7 1044 1           MASK    DSPTEM1
 2281   REF 145  LAST  449   41,3503  10 000 0           CCS     A
 2282   REF   1              41,3504  0 3523 0           TC      SETVAC          IF BIT1 = 1, FINDVAC
 2283   REF   1              41,3505  3 4351 1           CAF     TCNOVAC         IF BIT1 = 0, NOVAC
 2284   REF 205  LAST  451   41,3506  54 154 0  REQEX1   TS      MPAC            TC NOVAC  OR  TC FINDVAC INTO MPAC
 2285   REF  22  LAST  451   41,3507  4 4753 0           CS      BIT1
 2286   REF  19  LAST  451   41,3510  7 1044 1           MASK    DSPTEM1
 2287   REF 206  LAST  451   41,3511  54 160 1           TS      MPAC     +4     PRIO INTO MPAC+4 AS A TEMP
 2288   REF   6  LAST  431   41,3512  0 4457 0  REQUESTC TC      RELDSP
 2289   REF   5  LAST  441   41,3513  3 4217 1           CA      ENDINST
 2290   REF 207  LAST  451   41,3514  54 157 0           TS      MPAC     +3     TC ENDOFJOB INTO MPAC+3
 2291                        41,3515  0 0006 1           EXTEND
 2292   REF  20  LAST  451   41,3516  3 1046 1           DCA     DSPTEM1  +1     JOB ADRES INTO MPAC+1
 2293   REF 208  LAST  451   41,3517  52 156 1           DXCH    MPAC     +1     BBCON INTO MPAC+2
 2294   REF 209  LAST  451   41,3520  3 0160 0           CA      MPAC     +4     PRIO IN A
 2295                        41,3521  0 0004 0           INHINT
 2296   REF 210  LAST  451   41,3522  0 0154 1           TC      MPAC
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L        PINBALL GAME  BUTTONS AND LIGHTS                                                       USER'S PAGE NO.  61      EO S4

 2297    REF    1                 41,3523  3 4354 1  SETVAC    CAF    TCFINOVC
 2298    REF    1                 41,3524  0 3506 1            TC     REQEX1

R2299    VBRQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
R2300    IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
R2301    IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R2302    COMPONENT 1  DELAY (LOW BITS)
R2303    COMPONENT 2  TASK ADRES (12 BIT)
R2304    COMPONENT 3  BBCON      .

 2305    REF    1                 41,3525  3 4352 1  VBRQWAIT CAF     TCWAIT
 2306    REF  211  LAST  451      41,3526  54 154 0            TS     MPAC                 TC WAITLIST INTO MPAC
 2307    REF   21  LAST  451      41,3527  3 1044 0            CA     DSPTEM1              TIME DELAY
 2308    REF    1                 41,3530  0 3511 1  ENDRQWT   TC     REQUESTC -1

R2309    REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R2310    TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R2311    LEAVE IT IN A, INHINT AND TC MPAC.


 2312    REF    2  LAST  449      40,3476                      SETLOC NVSBENDL +1
 23125   REF    7 LAST  448 TO  450:       80    767*          COUNT* $$/PIN
 2313    REF   53  LAST  451      40,3476  3 4753 1  VBPROC    CAF    ONE                  PROCEED WITHOUT DATA
 2314    REF    2  LAST  431      40,3477  55'013 0            TS     LOADSTAT
 2315    REF    2  LAST  450      40,3500  0 4204 0            TC     KILMONON             TURN ON KILL MONITOR BIT
 2316    REF    7  LAST  451      40,3501  0 4457 0            TC     RELDSP
 2317    REF    3  LAST  408      40,3502  0 4433 1            TC     FLASHOFF
 2318    REF    2  LAST  431      40,3503  0 3612 1            TC     RECALTST             SEE IF THERE IS ANY RECALL FROM ENDIDLE


 2319    REF   54  LAST  452      40,3504  4 4753 0  VBTERM    CS     ONE
 2320    REF    2  LAST  411      40,3505  0 3477 0            TC     VBPROC  +1           TERM VERB SETS LOADSTAT NEG


R23201   PROCKEY PERFORMS THE SAME FUNCTION AS VBPROC.  IT MUST BE CALLED UNDER
R23202   EXECUTIVE CONTROL, WITH CHRPRIO.
 232033 REF   19  LAST  443      40,3506  4 1000 1  PROCKEY   CS     VERBREG              DONT ALLOW PROCEED DURING LOAD.
 232036 REF    1                 40,3507  6 3523 0            AD     VBSP2LD*             DEC 22
 23204                           40,3510  0 0006 1            EXTEND
 232043 REF  146  LAST  451      40,3511  26 000 0            DIM    A
 232046                          40,3512  0 0006 1            EXTEND
 23205   REF   18  LAST  450      40,3513  1 3470 0            BZF    CHARALRM
 232053 REF   94  LAST  451      40,3514  3 4755 1  PROCKEY1  CAF    ZERO                 SET REQRET FOR ENTER PASS 0.
 23206   REF   13  LAST  451      40,3515  55'012 1            TS     REQRET
 23207   REF   11  LAST  451      40,3516  4 4360 1            CS     V01                  BLOCK NUMERICAL CHARACTERS, SIGNS, CLEAR
 23208   REF   55  LAST  451      40,3517  54 776 0            TS     DSPCOUNT
 23209   REF    3  LAST  452      40,3520  0 3476 1            TC     VBPROC


R2321    VBRESEQ WAKES ENDIDLE AT SAME LINE AS FINAL ENTER OF LOAD (L+3).
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L        PINBALL GAME  BUTTONS AND LIGHTS                                        USER'S PAGE NO. 62      EO S4

R2322    (MAIN USE IS INTENDED AS RESPONSE TO INTERNALLY INITIATED FLASHING
R2323     DISPLAYS IN ENDIDLE. SHOULD NOT BE USED WITH LOAD VERBS,PLEASE PERFORM,
R2324     OR PLEASE MARK VERBS BECAUSE THEY ALREADY USE L+3 IN ANOTHER CONTEXT.)

 2325    REF  55  LAST  452    40,3521  4 4755 0  VBRESEQ  CS      ZERO              MAKE IT LOOK LIKE DATA IN.
 2326    REF   4  LAST  452    40,3522  0 3477 0           TC      VBPROC +1


 23265                         40,3523   00026 0  VBSP2LD* DEC     22                VB22 = BLOAD

R2327    FLASH IS TURNED OFF BY PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE,
R2328    END OF LOAD.
```

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P2329    KEY RELEASE ROUTINE

R2330    THIS ROUTINE ALWAYS TURNS OFF THE UPACT LIGHT AND ALWAYS CLEARS DSPLOCK.

R2331    THE HIGHEST PRIORITY FUNCTION OF THE KEY RELEASE BUTTON IS THE
R2332    UNSUSPENDING OF A SUSPENDED MONITOR WHICH WAS EXTERNALLY INITIATED.
R2333    THIS FUNCTION IS ACCOMPLISHED BY CLEARING DSPLOCK AND TURNING OFF
R2334    THE KEY RELEASE LIGHT IF BOTH DSPLIST AND CADRSTOR ARE EMPTY.

R2335    IF NO SUCH MONITOR EXISTS, THEN RELDSP IS EXECUTED TO CLEAR DSPLOCK
R2336    AND THE EXTERNAL MONITOR BIT (FREEING THE DISPLAY SYSTEM FOR INTERNAL
R2337    USE), TURN OFF THE KEY RELEASE LIGHT, AND WAKE UP ANY JOB IN DSPLIST.

R2338    IN ADDITION IF THERE IS A JOB IN ENDIDLE, THEN CONTROL IS TRANSFERRED
R2339    TO PINBRNCH (IN DISPLAY INTERFACE ROUTINE) TO RE-EXECUTE THE SERIES OF
R23391   NVSUB CALLS ETC. THAT PRECEDED THE ENDIDLE CALL STILL AWAITING RESPONSE.
R2340    THIS FEATURE IS INTENDED FOR USE WHEN THE OPERATOR HAS BEEN REQUESTED TO
R2341    RESPOND TO SOME INTERNAL ACTION THAT USED ENDIDLE, BUT HE HAS WRITTEN
R2342    OVER THE INFORMATION ON THE DISPLAY PANEL BY SOME DISPLAYS OF HIS OWN
R2343    INITIATION WHICH DO NOT SERVE AS RESPONSES. HITTING KEY RLSE WILL
R2344    RE-ESTABLISH THE DISPLAYS TO THE STATE THEY WERE IN BEFORE HE OBSCURED
R2345    THEM, SO THAT HE CAN SEE THE WAITING REQUEST.  THIS WORKS ONLY FOR
R2346    INTERNAL PROGRAMS THAT USED ENDIDLE THROUGH MARGARETS DISPLAY
R2347    SUBROUTINES.

  2348   REF  22  LAST  426    40,3524  4 4751 1  VBRELDSP CS      BIT3
  2349                         40,3525  0 0006 1           EXTEND
  2350   REF  11  LAST  222    40,3526  03 011 1           WAND    DSALMOUT         TURN OFF UPACT LITE
  2351   REF   2  LAST  400    40,3527  10 115 0           CCS     21/22REG         OLD DSPLOCK
  2352   REF  41  LAST  448    40,3530  3 4736 1           CAF     BIT14
  2353   REF   6  LAST  443    40,3531  7 1020 0           MASK    MONSAVE1         EXTERNAL MONITOR BIT (EMB)
  2354   REF 147  LAST  452    40,3532  10 000 0           CCS     A
  2355   REF   1               40,3533  0 3542 1           TC      UNSUSPEN         OLD DSPLOCK AND EMB BOTH 1, UNSUSPEND.
  2356   REF   8  LAST  452    40,3534  0 4457 0  TSTLTS4  TC      RELDSP           NOT UNSUSPENDING EXTERNAL MONITOR,
  2357   REF   5  LAST  442    40,3535  11'041 1           CCS     CADRSTOR          RELEASE DISPLAY SYSTEM AND
  2358                         40,3536  0 3540 0           TC      +2                DO RE-ESTABLISH IF CADRSTOR IS FULL.
  2359   REF  54  LAST  450    40,3537  0 5155 0           TC      ENDOFJOB
  2360   REF  31  LAST  451    40,3540  0 4635 0           TC      POSTJUMP
  2361   REF   4  LAST  300    40,3541    21051 0           CADR    PINBRNCH
  2362   REF  96  LAST  453    40,3542  3 4755 1  UNSUSPEN CAF     ZERO             EXTERNAL MONITOR IS SUSPENDED,
  2363   REF   5  LAST  442    40,3543  55'011 1           TS      DSPLOCK           JUST UNSUSPEND IT BY CLEARING DSPLOCK.
  2364   REF   6  LAST  454    40,3544  11'041 1           CCS     CADRSTOR          TURN KEY RELEASE LIGHT OFF IF BOTH
  2365   REF  55  LAST  454    40,3545  0 5155 0           TC      ENDOFJOB          CADRSTOR AND DSPLIST ARE EMPTY.
  2366   REF   2  LAST  442    40,3546  0 4502 1           TC      RELDSP1
  23661  REF  56  LAST  454    40,3547  0 5155 0           TC      ENDOFJOB

  2367                         40,3550            ENDRELDS EQUALS
```

```
P2368    NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
R2369    USED TO CALL THE COMBINATION OF ANY DISPLAY, LOAD, OR MONITOR VERB
R2370    TOGETHER WITH ANY NOUN AVAILABLE TO THE KEYBOARD.
R23701   PLACE 0VVVVVVVNNNNNNN INTO A.
R23702   V-S ARE THE 7 BIT VERB CODE.  N-S ARE THE 7 BIT NOUN CODE.

R23703   IF NVSUB IS CALLED WITH THE FOLLOWING NEGATIVE NUMBERS (RATHER THAN THE
R23704   VERB-NOUN CODE) IN A, THEN THE DISPLAY IS BLANKED AS FOLLOWS-
R23705    -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

R2371    NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
R2372    MPAC+2 BEFORE THE STANDARD NVSUB CALL.

R2373     NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
R2374    SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
R2375    IF V:S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
R2376    ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
R2377    FURTHER ACTION).

R2378    IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
R2379    SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
R2380    IT DOES TC ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
R2381    ALARM CONDITION BEFORE RETURN TO CALLER.

R2382    THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
R2383    KEY, EXCEPT ERROR LIGHT RESET
R2384    IT IS RELEASED BY THE KEY RELEASE BUTTON, ALL EXTENDED VERBS,
R2385    PROCEED WITHOUT DATA, TERMINATE, RESEQUENCE, INITIALIZE EXECUTIVE,
R2386    RECALL PART OF RECALTST IF ENDIDLE WAS USED,
R2387    VB = REQUEST EXECUTIVE, VB = REQUEST WAITLIST,
R2388    MONITOR SET UP.

R23881   THE DISPLAY SYSTEM IS ALSO BLOCKED BY THE EXTERNAL MONITOR BIT, WHICH
R23882   INDICATES AN EXTERNALLY INITIATED MONITOR IS RUNNING (SEE MONITOR)

R2389    A NVSUB CALL THAT PASSES DSPLOCK AND THE EXTERNAL MONITOR BIT ENDS OLD
R23891   MONITOR.

R2390    DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
R2391    LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

R23911   NVSUB SHOULD BE USED TWICE IN SUCCESSION FOR :PLEASE PERFORM: SITUATIONS
R23912   (SIMILARLY FOR PLEASE MARK). FIRST PLACE THE CODED NUMBER FOR WHAT
R23913   ACTION IS DESIRED OF OPERATOR INTO THE REGISTERS REFERRED TO BY THE
R23914   :CHECKLIST: NOUN. GO TO NVSUB WITH A DISPLAY VERB AND THE :CHECKLIST:
R23915   NOUN. GO TO NVSUB AGAIN WITH THE :PLEASE PERFORM: VERB AND ZEROS IN THE
R23916   LOW 7 BITS. THIS :PASTES UP: THE :PLEASE PERFORM: VERB INTO THE VERB
R23917   LIGHTS.

R23918   NVMONOPT IS AN ENTRY SIMILAR TO NVSUB, BUT REQUIRING AN ADDITIONAL
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R239181 PARAMETER IN L. IT SHCULD BE LSED CNLY WITH A MONITOR VERB-NDUN CODE IN
R239182 A. AFTER EACH MONITOR DISPLAY A *PLEASE* VERB WILL BE PASTEO IN THE VERB
R239183 LIGHTS CR OATA WILL EE BLANKEC (CR BOTH) ACCORCING TO THE OPTIONS
R239184 SPECIFIEO IN L. IF BITS 8-14 CF L ARE CTHER THAN ZERO, THEN THEY WILL
R239185 BE INTERPRETED AS A VERB COOE ANO PASTED IN THE VERB LIGHTS. (THIS VEPB
R23918E CCOE SHCULO CESIGNATE CNE CF THE *PLEASE* VERBS.) IF BITS 1-3 OF L ARE
R239187 OTHER THAN ZERO, THEN THEY WILL BE USEO TC BLANK OATA BY BEING FEO TO
R2391BE BLANKSUB. IF NVMONOPT IS USEC WITH A VERB OTHER THAN A MONITOR VERB,
R2391B9 THE PARAMETER IN L HAS NC EFFECT.

R2392    NVSUB IN FIXED-FIXEO PLACES 2+CALLING LOC INTO NVQTEM, TC NVSUBEND INTC
R2393    ENTRET. (THIS WILL RESTCRE OLC CALLING BANK BITS)

 2394    REF    1                 4154                          SETLOC ENCALM   +1

 23945   REF    3 LAST  450 TO  450:     7     24*              COUNT* $$/PIN
 2395                             4154   22 007 D  NVSUB        LXCH    7                  ZEPO NVMONOPT CPTICNS
 2396    REF    1                 4155   54 123 D  NVMCNCPT TS      NVTEMP
 2397    REF   42   LAST   454    4156   3 4736 1               CAF     BIT14
 23971   REF    7   LAST   454    4157   7 1020 0               MASK    MONSAVE1           EXTERNAL MONITOR BIT
 23972   REF    6   LAST   454    4160   6 1011 0               AO      OSPLCCK
 23973   REF  148   LAST   454    416I   1D DOD 0               CCS     A
 23974   REF  114   LAST   451    4162   C 0DD2 D               TC      Q                  OSP SYST BLOCKED, RET TO 1+ CALLING LOC
 2398    REF   55   LAST   452    4163   3 4753 I               CAF     ONE                DSP SYST AVAILABLE
 2399    REF  115   LAST   456    4164   6 0002 0  NVSBCOM      AD      Q
 2400    REF    1                 4165   55'036 1               TS      NVQTEM             2+ CALLING LOC INTO NVQTEM
 24001   REF    4   LAST   443    4166   23'021 0               LXCH    MONSAVE2           STOPE NVMONOPT CPTICNS
 2401    PEF    3   LAST   452    4167   C 4204 0               TC      KILMONCN           TUPN ON KILL MONITOR BIT
 2402    PEF    1                 4170   3 4201 0  NVSUBCOM     CAF     NVSBBBNK

 2403    REF   12   LAST   372    4171   56 006 1               XCH     BBANK
 24031                            4172   C 0006 1               EXTENO                     SAVE OLD SUPERBITS
 24032   REF    4   LAST   276    4173   04 007 1               ROR     SUPERBNK
 2404    REF    1                 4174   55'037 0               TS      NVBNKTEM
 24041   REF    2   LAST   276    4175   3 4201 0               CAF     PINSUPBT
 24042                            4176   C 0006 1               EXTEND
 24043   REF    5   LAST   456    4177   C1 007 1               WRITE   SUPERBNK
 2405    REF    1                 4200   C 2000 0               TC      NVSUB8             GO TO NVSUB1 THRU STANDARO LOC
 2406    REF   56   LAST   452    0776                          EBANK=  DSPCOUNT
 2407    REF    2   LAST   408    4201    62101 0  NVSBBBNK     BBCCN   NVSUB1

 24071   REF    2   LAST   456    4201             PINSUPBT =           NVSBBBNK           CONTAINS THE PINBALL SUPERBITS.

 2412    REF    2   LAST   456    4202   53'037 0  NVSUBENO     DXCH    NVQTEM             NVBNKTEM MUST = NVCTEM+1
 2413    REF    2   LAST   285    4203   0 5165 0               TC      SUPDXCHZ           DTCB WITH SUPERBIT SWITCHING

 2414    REF    1              41,3531                          SETLUC ENORQWT +1

 2414C5  REF    7 LAST  450 TD  452:     54    857*             COUNT* $$/PIN
R241412 BLANKOSP BLANKS DISPLAY ACCDROING TO OPTION NUMBER IN NVTEMP AS FCLLOWS
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R241415  -4 FULL BLANK, -3 LEAVE MODE, -2 LEAVE MODE AND VERB, -1 BLANK R-S ONLY

 241419 REF   5  LAST  446    41,3531  6 4757 0  BLANKDSP AD      SEVEN          7,8,9,OR 10 (A HAD 0,1,2,OR 3)
 241422                       41,3532  0 0004 0           INHINT
 241425 REF  13  LAST  449    41,3533  54 124 1           TS      CODE           BLANK SPECIFIED DSPTABS
 241429 REF  20  LAST  255    41,3534  4 4740 1           CS      BIT12
 241432 REF  14  LAST  457    41,3535  50 124 0           INDEX   CODE
 241435 REF  26  LAST  449    41,3536  57'022 0           XCH     DSPTAB
 241439 REF 149  LAST  456    41,3537  10 000 0           CCS     A
 241442 REF   8  LAST  449    41,3540  25'015 1           INCR    NOUT
 241445                       41,3541  0 3542 1           TC      +1
 241449 REF  15  LAST  457    41,3542  10 124 1           CCS     CODE
 241452 REF   1               41,3543  0 3533 1           TC      BLANKDSP +2
 241455                       41,3544  0 0003 1           RELINT
 241459 REF   2  LAST  456    41,3545  50 123 1           INDEX   NVTEMP
 241462                       41,3546  0 3553 1           TC      +5
 241465                       41,3547  0 3550 1           TC      +1             NVTEMP HAS -4 (NEVER TOUCH MODREG)
 241469 REF  20  LAST  452    41,3550  55'000 1           TS      VERBREG                   -3
 241472 REF  14  LAST  451    41,3551  55'001 0           TS      NOUNREG                   -2
 241475 REF  12  LAST  430    41,3552  55'014 1           TS      CLPASS                    -1
 241479 REF  12  LAST  452    41,3553  4 4360 1           CS      VD1
 241482 REF  57  LAST  456    41,3554  54 776 0           TS      DSPCOUNT
 241485 REF   4  LAST  452    41,3555  0 4433 1           TC      FLASHOFF       PROTECT AGAINST INVISIBLE FLASH
 241489 REF   1               41,3556  0 3601 0           TC      ENTSET -2      ZEROS REQRET

 2415   REF   2  LAST  457    41,3557  3 3603 1  NVSUB1   CAF     ENTSET         IN BANK
 2416   REF   6  LAST  443    41,3560  54 136 1           TS      ENTRET         SET RETURN TO NVSUBEND
 24161  REF   3  LAST  457    41,3561  10 123 0           CCS     NVTEMP         WHAT NOW
 24162                        41,3562  0 3566 1           TC      +4             NORMAL NVSUB CALL (EXECUTE VN OR PASTE)
 24163  REF  19  LAST  417    41,3563  0 2353 0           TC      GODSPALM
 24164  REF   2  LAST  457    41,3564  0 3531 0           TC      BLANKDSP       BLANK DISPLAY AS SPECIFIED
 24165  REF  20  LAST  457    41,3565  0 2353 0           TC      GODSPALM
 2417   REF   5  LAST  443    41,3566  3 6077 1           CAF     LOW7
 2418   REF   4  LAST  457    41,3567  7 0123 0           MASK    NVTEMP
 2419   REF 212  LAST  452    41,3570  54 157 0           TS      MPAC     +3    TEMP FOR NOUN (CANT USE MPAC. DSPDECVN
 2420   REF   5  LAST  457    41,3571  3 0123 1           CA      NVTEMP                             USES MPAC, +1, +2
 2422   REF   5  LAST  443    41,3572  54 023 1           TS      EDOP           RIGHT 7
 2423   REF   6  LAST  457    41,3573  3 0023 0           CA      EDOP
 2424   REF 213  LAST  457    41,3574  54 160 1           TS      MPAC     +4    TEMP FOR VERB (CANT USE MPAC+1. DSPDECVN
A2425                                                                                               USES MPAC, +1, +2).
 2426   REF 214  LAST  457    41,3575  10 157 0           CCS     MPAC     +3    TEST NOUN
 2427   REF   1               41,3576  0 3604 0           TC      NVSUB2         IF NOUN NOT +0, GO ON
 2428   REF 215  LAST  457    41,3577  3 0160 0           CA      MPAC     +4
 2429   REF   9  LAST  450    41,3600  0 2341 0           TC      UPDATVB -1     IF NOUN = +0, DISPLAY VERB . THEN RETURN
 24291  REF  97  LAST  454    41,3601  3 4755 1           CAF     ZERO           ZERO REQRET SO THAT PASTED VERBS CAN
 24292  REF  14  LAST  452    41,3602  55'012 1           TS      REQRET         BE EXECUTED BY OPERATOR.
 2430   REF   2  LAST  450    41,3603  0 4202 0  ENTSET   TC      NVSUBEND
 2431   REF 216  LAST  457    41,3604  10 160 1  NVSUB2   CCS     MPAC +4        TEST VERB
 2432                         41,3605  0 3611 1           TC      +4             IF VERB NOT +0, GO ON
 2433   REF 217  LAST  457    41,3606  3 0157 1           CA      MPAC     +3
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L         PINBALL GAME  BUTTONS AND LIGHTS                                                   USER'S PAGE NO.  67       EO S4

 2434    REF   2  LAST  443    41,3607  0 2321 0            TC      UPDATNN -1       IF VERB = +0, DISPLAY NOUN. THEN RETURN
 2435    REF   3  LAST  457    41,3610  0 4202 0            TC      NVSUBEND
 2436    REF 218  LAST  457    41,3611  3 0156 0            CA      MPAC     +2      TEMP FOR MACH CADR TO BE SPEC. (DSPDECVN
 2437    REF 219  LAST  458    41,3612  54 161 0            TS      MPAC     +5                 USES MPAC, +1, +2)
 2438    REF 220  LAST  458    41,3613  3 0160 0            CA      MPAC     +4
 2439    REF  10  LAST  457    41,3614  0 2341 0            TC      UPDATVB -1       IF BOTH NOUN AND VERB NOT +0, DISPLAY
 2440    REF 221  LAST  458    41,3615  3 0157 1            CA      MPAC     +3      BOTH AND GO TO ENTPASO.
 2441    REF   3  LAST  458    41,3616  0 2321 0            TC      UPDATNN -1
 2442    REF  98  LAST  457    41,3617  3 4755 1            CAF     ZERO
 2443    REF   3  LAST  452    41,3620  55'013 0            TS      LOADSTAT         SET FOR WAITING FOR DATA CONDITION
 2444    REF  13  LAST  457    41,3621  55'014 1            TS      CLPASS
 2445    REF  15  LAST  457    41,3622  55'012 1            TS      REQRET           SET REQRET FOR PASS 0.
 2446    REF 222  LAST  458    41,3623  3 0161 1            CA      MPAC     +5      RESTORES MACH CADR TO BE SPEC TO MPAC+2
 2447    REF 223  LAST  458    41,3624  54 156 1            TS      MPAC     +2      FOR USE IN INTMCTBS (IN ENTPASO).
 2448    REF   3  LAST  408    41,3625  0 2035 0  ENDNVSB1  TC      ENTPASO


R2449    IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
R2450    NOUNCADR IN ENTPASO (INTMCTBS ).


 2451    REF   4  LAST  458      4204                       SETLOC  NVSUBEND +2
 24515   REF   4 LAST  456 TO  456:      24     48*         COUNT*  $$/PIN
A2452                                                                            FORCE BIT 15 OF MONSAVE1 TO 1.
 2453    REF  26  LAST  430        4204  3 4735 1  KILMONON CAF     BIT15              THIS IS THE KILL MONITOR BIT.
 2454    REF   8  LAST  456        4205  55'020 0           TS      MONSAVE1         TURN OFF BIT 14, THE EXTERNAL
A2455                                                                             MONITOR BIT.
 2458    REF 116  LAST  456        4206  0 0002 0           TC      Q


R2459    LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
R2460              +1  PROCEED NO DATA. SET BY SPECIAL VERB
R2461            -1 TERMINATE    SET BY SPECIAL VERB
R2462            -0     DATA IN        SET BY END OF LOAD ROUTINE
R2463                 OR RESEQUENCE    SET BY VERB 32


R2464    L  TC ENDIDLE  (FIXED FIXED)
R2465    ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
R2466    WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
R2467    ENDIDLE CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2468    SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.
R2469    RECALTST TESTS LOADSTAT AND WAKES JOB UP TO,
R2470    L+1       FOR TERMINATE
R2471    L+2       FOR PROCEED WITHOUT DATA
R2472    L+3       FOR DATA IN, OR RESEQUENCE
R2473    IT DOES NOTHING IF LOADSTAT INDICATES WAITING FOR DATA.


R2474    ENDIDLE ABORTS (WITH CODE 01206) IF A SECOND JOB ATTEMPTS TO GO TO SLEEP
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R2475     IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO ENDIDLE WHEN
R2476     1) CADRSTOR NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF ENDIDLE IS
R2477     EXCEEDED. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)
R2478     2) DSPLIST NOT= +0. THIS INDICATES A JOB IS ALREADY ASLEEP DUE TO
R2479     NVSUBUSY.

 2480     REF 117  LAST  458          4207  22 002 0  ENCIDLE  LXCH    Q                  RETURN ADDRESS INTO L.
 2481     REF   1                     4210  0 4220 0           TC      ISCADR+0           ABORT IF CADRSTOR NOT= +0
 2482     REF   1                     4211  0 4224 1           TC      ISLIST+0           ABORT IF DSPLIST NOT= +0
 2483     REF  60  LAST  444          4212  3 0001 0           CA      L                  DONT SET DSPLOCK TO 1 SO CAN USE
 2484     REF   4  LAST  372          4213  7 5012 0           MASK    LOW10              ENDIDLE WITH NVSUB INITIATED MONITOR.
 2485     REF   1                     4214  6 0004 0           AD      FBANK              SAME STRATEGY FOR CADR AS MAKECADR.
 2486     REF   7  LAST  454          4215  55'041 1           TS      CADRSTOR
 2487     REF   2  LAST  376          4216  0 5133 0           TC      JOBSLEEP


 2488     REF  57  LAST  454          4217  0 5155 0  ENCINST  TC      ENDOFJOB


 2489     REF   8  LAST  459          4220  11'041 1  ISCADR+0 CCS     CADRSTOR           ABORTS (CODE 01206) IF CADRSTOR NOT= +0.
 2490     REF   1                     4221  0 4227 1           TC      DSPABORT           RETURNS IF CADRSTOR = +0.
 2491     REF 118  LAST  459          4222  0 0002 0           TC      Q
 2492     REF   2  LAST  459          4223  0 4227 1           TC      DSPABORT

 2493     REF   2  LAST  224          4224  11'042 1  ISLIST+0 CCS     DSPLIST            ABORTS (CODE 01206) IF DSPLIST NOT= +0.
 2494     REF   3  LAST  459          4225  0 4227 1           TC      DSPABORT           RETURNS IF DSPLIST = +0.
 2495     REF 119  LAST  459          4226  0 0002 0           TC      Q
 2496     REF   1                     4227  0 5624 1  DSPABORT TC      BAILOUT
 2497                                 4230   31206 1           OCT     31206

R2498     JAMTERM ALLOWS PROGRAMS TO PERFORM THE TERMINATE FUNCTION.
R2499     IT DOES ENDOFJOB.

 2500     REF   3  LAST  456          4231  3 4201 0  JAMTERM  CAF     PINSUPBT
 2501                                 4232  0 0006 1           EXTEND
 25011    REF   6  LAST  456          4233  01 007 1           WRITE   SUPERBNK
 25012    REF   2  LAST  211          4234  3 4242 1           CAF     34DEC
 25013    REF  16  LAST  458          4235  55'012 1           TS      REQRET             LEAVE ENTER SET FOR ENTPASS0.
 2502     REF  13  LAST  457          4236  4 4360 1           CS      VD1
 2503     REF  58  LAST  457          4237  54 776 0           TS      DSPCOUNT
 2504     REF  32  LAST  454          4240  0 4635 0           TC      POSTJUMP
 2505     REF   2  LAST  411          4241   61504 1           CADR    VBTERM

 2506                                 4242   00042 1  34DEC    DEC     34


R2507     JAMPROC ALLOWS PROGRAMS TO PERFORM THE PROCEED/PROCEED WITHOUT DATA
R2508     FUNCTION. IT DOES ENDOFJOB.

 2509     REF   4  LAST  459          4243  3 4201 0  JAMPROC  CAF     PINSUPBT
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  2510                              4244  0 0006 1           EXTEND
  25101  REF    7  LAST  459        4245  01 007 1           WRITE   SUPERBNK
  25102  REF    1                   4246  3 4254 0           CAF     33DEC
  25103  REF   17  LAST  459        4247  55 012 1           TS      REQRET             LEAVE ENTER SET FOR ENTPASS0.
  2511   REF   14  LAST  459        4250  4 4360 1           CS      V01
  2512   REF   59  LAST  459        4251  54 776 0           TS      DSPCOUNT
  2513   REF   33  LAST  459        4252  0 4635 0           TC      POSTJUMP
  2514   REF    5  LAST  453        4253   61476 0           CADR    VBPROC

  2515                              4254   00041 1  33DEC    DEC     33


 R2532   BLANKSUB BLANKS ANY COMBINATION OF R1, R2, R3.
 R2533   CALL WITH BLANKING CODE IN A.
 R2534   BIT1=1 BLANKS R1, BIT2=1 BLANKS R2, BIT3=1 BLANKS R3.
 R2535   ANY COMBINATION OF THESE BITS IS ACCEPTED.

 R2536   DSPCOUNT IS RESTORED TO STATE IT WAS IN BEFORE BLANKSUB WAS EXECUTED.

  2538   REF    6  LAST  457        4255  7 4757 1  BLANKSUB MASK    SEVEN
  25381  REF    6  LAST  457        4256  54 123 0           TS      NVTEMP             STORE BLANKING CODE IN NVTEMP.
  2539   REF   43  LAST  456        4257  3 4736 1           CAF     BIT14
  2540   REF    9  LAST  458        4260  7 1020 0           MASK    MONSAVE1           EXTERNAL MONITOR BIT
  25401  REF    7  LAST  456        4261  6 1011 0           AD      DSPLOCK
  25402  REF  150  LAST  457        4262  10 000 0           CCS     A
  25403  REF  120  LAST  459        4263  0 0002 0           TC      Q                  DSP SYST BLOCKED. RET TO 1+ CALLING LOC
  25404  REF  121  LAST  460        4264  24 002 0           INCR    Q                  DSP SYST AVAILABLE
 A2541                                                                                  SET RETURN FOR 2+ CALLING LOC
  25411  REF    7  LAST  460        4265  10 123 0           CCS     NVTEMP
  25412                             4266  1 4270 1           TCF     +2
  25413  REF  122  LAST  460        4267  0 0002 0           TC      Q                  NOTHING TO BLANK. RET TO 2+ CALLING LOC
  2542   REF  123  LAST  460        4270  22 002 0           LXCH    Q                  SET RETURN FOR 2 + CALLING LOC
  2544   REF    1                   4271  3 4302 1           CAF     BLNKBBNK
  2545   REF   13  LAST  456        4272  56 006 1           XCH     BBANK
  25451                             4273  0 0006 1           EXTEND
  25452  REF    8  LAST  460        4274  04 007 1           ROR     SUPERBNK           SAVE OLD SUPERBITS.
  2546   REF   45  LAST  416        4275  52 131 0           DXCH    BUF
  25461  REF    5  LAST  459        4276  3 4201 0           CAF     PINSUPBT
  25462                             4277  0 0006 1           EXTEND
  25463  REF    9  LAST  460        4300  01 007 1           WRITE   SUPERBNK
  2547   REF    1                   4301  0 3550 1           TC      BLNKSUB1

  2548   REF   60  LAST  460        0776                     EBANK=  DSPCOUNT
  25481  REF    2  LAST  460        4302   60101 1  BLNKBBNK BBCON   BLNKSUB1
  2549                              4303            ENDBLFF  EQUALS

  2550   REF    1               40,3550                      SETLOC  ENDRELOS
  25505  REF    8 LAST  452 TO  456:      42    809*         COUNT*  $$/PIN
  2551   REF   61  LAST  460    40,3550  3 0776 1  BLNKSUB1 CA      DSPCOUNT           SAVE OLD DSPCOUNT FOR LATER RESTORATION
  25511  REF   46  LAST  460    40,3551  54 132 0           TS      BUF      +2
 25512  REF   23  LAST  451    40,3552  3 4753 1                CAF     BIT1               TEST BIT1. SEE IF R1 TO BE BLANKED.
 2552   REF    1               40,3553  0 3572 1                TC      TESTBIT
 2553   REF   12  LAST  444    40,3554  3 4317 0                CAF     P101
 2554   REF    4  LAST  423    40,3555  0 2535 0                TC      5BLANK -1
 2555   REF   25  LAST  435    40,3556  3 4752 0                CAF     BIT2               TEST BIT 2. SEE IF R2 TO BE BLANKED.
 2556   REF    2  LAST  461    40,3557  0 3572 1                TC      TESTBIT
 2557   REF    5  LAST  446    40,3560  3 4320 1                CAF     P201
 2558   REF    5  LAST  461    40,3561  0 2535 0                TC      5BLANK -1
 2559   REF   23  LAST  454    40,3562  3 4751 0                CAF     BIT3               TEST BIT3. SEE IF R3 TO BE BLANKED.
 2560   REF    3  LAST  461    40,3563  0 3572 1                TC      TESTBIT
 2561   REF    5  LAST  424    40,3564  3 4321 0                CAF     P301
 2562   REF    6  LAST  461    40,3565  0 2535 0                TC      5BLANK -1
 2563   REF   47  LAST  460    40,3566  3 0132 1                CA      BUF      +2        RESTORE DSPCOUNT TO STATE IT HAD
 2564   REF   62  LAST  460    40,3567  54 776 0                TS      DSPCOUNT                BEFORE BLANKSUB.
 2565   REF   48  LAST  461    40,3570  52 131 0                DXCH    BUF                CALL L+2 DIRECTLY.
 2566   REF    3  LAST  456    40,3571  0 5166 0                TC      SUPDXCHZ +1        DTCB WITH SUPERBIT SWITCHING

 2567   REF    8  LAST  460    40,3572  7 0123 0    TESTBIT     MASK    NVTEMP             NVTEMP CONTAINS BLANKING CODE
 2568   REF 151  LAST  460    40,3573  10 000 0                CCS     A
 2569   REF 124  LAST  460    40,3574  0 0002 0                TC      Q                  IF CURRENT BIT = 1, RETURN TO L+1.
 2570   REF 125  LAST  461    40,3575  50 002 0                INDEX   Q                  IF CURRENT BIT = 0, RETURN TO L+3.
 2571                          40,3576  0 0002 0                TC      2

 2572                          40,3577              ENDBSUB1    EQUALS


R257205 DSPMM DOES NOT DISPLAY MODREG DIRECTLY. IT PUTS IN EXEC REQUEST WITH
R257206 PRIO 30000 FOR DSPMMJB AND RETURNS TO CALLER.

R257207 IF MODREG CONTAINS -0, DSPMMJB BLANKS THE MODE LIGHTS.

R257209 DSPMM MUST BE IN BANK 27 OR LOWER, SO IT CAN BE CALLED VIA BANKCALL.

 25721                         07,2666                          BANK    7
 257215 REF    1               04,2000                          SETLOC  PINBALL4
 257217                        04,2622                          BANK

 25721E REF    1                                                COUNT*  $$/PIN
 25722  REF 126   LAST  461    04,2622  56 002 0    DSPMM       XCH     Q
 25723  REF 224   LAST  458    04,2623  54 154 0                TS      MPAC
 25724                         04,2624  0 0004 0                INHINT
 25725  REF    3  LAST  442    04,2625  3 4355 0                CAF     CHRPRIO
 25726  REF    6  LAST  442    04,2626  0 5072 1                TC      NOVAC
 25727  REF   63  LAST  461       0776                          EBANK=  DSPCOUNT
 25728  REF    1               04,2627   03577 1                2CADR   DSPMMJB
 25728  REF    1               04,2630   60101 1
 257285                        04,2631  0 0003 1                RELINT
 25729  REF 225   LAST  461    04,2632  0 0154 1    ENDSPMM     TC      MPAC

R2573   DSPMM  PLACE MAJOR MODE CODE INTO MODREG
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L        PINBALL GAME  BUTTCNS AND LICHTS

 25735  REF    1                 40,3577                         SETLOC  ENCBSUB1

 25736  REF    9  LAST  460  TO  461:    23    B32*              CDUNT*  $$/PIN
 2574   REF    1                 40,3577  3 4362 1  DSPMMJB  CAF     MD1          GETS HERE THRU OSPMM
 2575   REF   64  LAST  461      40,3600  56 776 1           XCH     DSPCCUNT
 2576   REF    1                 40,3601  54 140 0           TS      DSPMMTEM     SAVE DSPCCUNT
 2579   REF    7  LAST  265      40,3602  11'010 0           CCS     MODREG
 2580   REF   56  LAST  456      40,3603  6 4753 1           AD      DNE
 25801  REF    4  LAST  447      40,3604  0 3342 1           TC      OSPDECVN     IF MODREG IS + OR +0, DISPLAY MODREG
 25802                           40,3605  0 3607 0           TC      +2           IF MODREG IS -NZ, 00 NOTHING
 25803  REF    6  LAST  451      40,3606  0 2601 1           TC      2BLANK       IE MODREG IS -0, 8LANK MM
 2581   REF    2  LAST  462      40,3607  56 140 1           XCH     DSPMMTEM     RESTORE DSPCOUNT
 2582   REE   65  LAST  462      40,3610  54 776 0           TS      DSPCOUNT
 2583   REE   58  LAST  459      40,3611  0 5155 0           TC      ENODEJOB

R2584   RECALTST IS ENTERED CIRECTLY AFTER OATA IS LOADED (CR RESEQUENCE VER8 IS
R2585   EXECUTED), TERMINATE VERB IS EXECUTED, OR PROCEEO WITHOUT DATA VERB IS
R2586   EXECUTED. IT WAKES UP JO8 THAT CIC TC ENCICLE.

R2587   IF CADRSTOR NOT= +0, IT PUTS +0 INTO DSPLOCK, AND TURNS OFE KEY RLSE
R2588   LIGHT IE DSPLIST IS EMPTY (LEAVES KEY RLSE LIGHT ALONE IF NOT EMPTY).

 2589   REF    9  LAST  459      40,3612  11'041 1  RECALTST CCS     CADRSTOR
 2590   REF    1                 40,3613  0 3615 0           TC      RECAL1
 2591   REF   59  LAST  462      40,3614  0 5155 0           TC      ENDOFJO8     NORMAL EXIT IF KEYBOARD INITIATED
 2592   REE   99  LAST  458      40,3615  3 4755 1  RECAL1   CAF     ZERD
 2593   REF   10  LAST  462      40,3616  57'041 0           XCH     CADRSTCR
 2594                            40,3617  0 0004 0           INHINT
 2595   REF    3  LAST  376      40,3620  0 5137 1           TC      JO8WAKE
 2596   REF    4  LAST  458      40,3621  11'013 0           CCS     LOADSTAT
 2597   REF    1                 40,3622  0 3644 1           TC      DOPPOC       + PROCEEO WITHOUT DATA
 2598   REF   60  LAST  462      40,3623  0 5155 0           TC      ENOOEJO8     PATHALOGICAL CASE EXIT
 2599   REF    1                 40,3624  0 3642 1           TC      DOTERM       -   TERMINATE
 2600   REF   31  LAST  449      40,3625  3 4752 0           CAF     TWD          -0 OATA IN OR RESEQUENCE
 2601   REF    2  LAST  374      40,3626  50 064 0  RECAL2   INDEX   LCCCTR
 2602   REE    3  LAST  374      40,3627  6 0164 1           AD      LOC          LOC IS + EOR 8ASIC JCBS
 2603   REF    3  LAST  462      40,3630  50 064 0           INDEX   LCCCTR
 2604   REF    4  LAST  462      40,3631  54 164 0           TS      LOC
 26041  REF   15  LAST  457      40,3632  3 1001 1           CA      NOUNREG      SAVE VERB IN MPAC, NOUN IN MPAC+1 AT
 26042  REF   61  LAST  459      40,3633  54 0C1 1           TS      L            TIME OE RESPONSE TO ENDIDLE FOR
 26043  PEF   21  LAST  457      40,3634  3 1000 0           CA      VERBREG      POSSIBLE LATER TESTING BY JCB THAT HAS
 26044  REE    4  LAST  462      40,3635  50 064 0           INDEX   LDCCTR       BEEN WAKED UP.
 26045  REF  226  LAST  461      40,3636  52 155 1           OXCH    MPAC
 2605                            40,3637  0 0003 1           RELINT
 2606   REF    9  LAST  454      40,3640  0 4457 0  RECAL3   TC      RELDSP
 2607   REF   61  LAST  462      40,3641  0 5155 0           TC      ENOOFJOB

 2608   REF  100  LAST  462      40,3642  3 4755 1  OOTERM   CAF     ZERD
 2609   REE    1                 40,3643  0 3626 0           TC      RECAL2
 2610   REF  57  LAST  462    40,3644  3 4753 1  CCPROC    CAF     ONE
 2611   REF   2  LAST  462    40,3645  0 3626 0            TC      RECAL2
```

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P2612   MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED


 2613   REF   1                  4303                         SETLOC ENDBLFF

 26135  REF   5 LAST  458 TO  460:     63   111*              COUNT* $$/PIN
R2614   SETNCADR          E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R2615                     ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

 2616   REF   8  LAST  444       4303  55 016 0  SETNCADR TS      NOUNCADR          STORE ECADR
 2617   REF  13  LAST  390       4304  54 003 0           TS      EBANK             SET EBANK BITS
 2618   REF   2  LAST  193       4305  7 4357 0           MASK    LOW8
 2619   REF   1                  4306  6 5007 0           AD      OCT1400
 2620   REF  27  LAST  438       4307  54 145 0           TS      NOUNADD           PUT E ADRES INTO NOUNADD
 2621   REF 127  LAST  461       4310  0 0002 0           TC      Q


R2622   SETNADD           GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R2623                     E ADRES AND PUTS IT INTO NOUNADD.

 2624   REF   9  LAST  464       4311  3 1016 1  SETNADD  CA      NOUNCADR
 2625   REF   7  LAST  433       4312  1 4304 0           TCF     SETNCADR +1


R2626   SETEBANK          E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R2627                     DERIVED AND LEFT IN A.

 2628   REF  14  LAST  464       4313  54 003 0  SETEBANK TS      EBANK             SET EBANK BITS
 2629   REF   3  LAST  464       4314  7 4357 0           MASK    LOW8
 2630   REF   2  LAST  464       4315  6 5007 0           AD      OCT1400           E ADRES LEFT IN A
 2631   REF 128  LAST  464       4316  0 0002 0           TC      Q


 2632                            4317   00016 0  R1D1     OCT     16                THESE 3 CONSTANTS FORM A PACKED TABLE.
 2633                            4320   00011 1  R2D1     OCT     11                DONT SEPARATE.
 2634                            4321   00004 0  R3D1     OCT     4

 2635   REF   3  LAST  234       4322  54 020 1  RIGHT5   TS      CYR
 2636   REF   4  LAST  464       4323  4 0020 1           CS      CYR
 2637   REF   5  LAST  464       4324  4 0020 1           CS      CYR
 2638   REF   6  LAST  464       4325  4 0020 1           CS      CYR
 2639   REF   7  LAST  464       4326  4 0020 1           CS      CYR
 2640   REF   8  LAST  464       4327  56 020 0           XCH     CYR
 2641   REF 129  LAST  464       4330  0 0002 0           TC      Q

 2642   REF  12  LAST  447       4331  54 022 0  LEFT5    TS      CYL
 2643   REF  13  LAST  464       4332  4 0022 0           CS      CYL
 2644   REF  14  LAST  464       4333  4 0022 0           CS      CYL
 2645   REF  15  LAST  464       4334  4 0022 0           CS      CYL
 2646   REF  16  LAST  464       4335  4 0022 0           CS      CYL
 2647   REF  17  LAST  464      4336  56 022 1             XCH     CYL
 2648   REF 130  LAST  464      4337  0 0002 0             TC      Q

 2649                           4340  6 0000 1  SLEFT5     DOUBLE
 2650                           4341  6 0000 1             DOUBLE
 2651                           4342  6 0000 1             DOUBLE
 2652                           4343  6 0000 1             DOUBLE
 2653                           4344  6 0000 1             DOUBLE
 2654   REF 131  LAST  465      4345  0 0002 0             TC      Q


 2655                           4346   00037 0  LOW5       OCT     37                THESE 3 CONSTANTS FORM A PACKED TABLE.
 2656                           4347   01740 0  MID5       OCT     1740              DONT SEPARATE.
 2657                           4350   76000 0  HI5        OCT     76000             MUST STAY HERE

 2658   REF   7  LAST  461      4351  0 5072 1  TCNOVAC    TC      NOVAC
 2659   REF  17  LAST  442      4352  0 5203 0  TCWAIT     TC      WAITLIST
 2660   REF  13  LAST  442      4353  0 5261 1  TCTSKOVR   TC      TASKOVER
 2661   REF  16  LAST  386      4354  0 5105 0  TCFINDVC   TC      FINDVAC


 2662                           4355   30000 1  CHRPRIO    OCT     30000             EXEC PRIORITY OF CHARIN


 2663                           4356   03777 0  LOW11      OCT     3777
 2664   REF   6  LAST  433      4356            B12-1      EQUALS  LOW11
 2665                           4357   00377 1  LOW8       OCT     377


 2667                           4360   00023 0  VD1        OCT     23                THESE 3 CONSTANTS FORM A PACKED TABLE
 2668                           4361   00021 1  ND1        OCT     21                DONT SEPARATE.
 2669                           4362   00025 0  MD1        OCT     25

 2670                           4363   00012 1  BINCON     DEC     10

 2671   REF  20  LAST  407      4364  3 4745 0  FALTON     CA      BIT7              TURN ON OPERATOR ERROR LIGHT
 2672                           4365  0 0006 1             EXTEND
 2673   REF  12  LAST  454      4366  05 011 1             WOR     DSALMOUT          BIT 7 OF CHANNEL 11
 2674   REF 132  LAST  465      4367  0 0002 0             TC      Q

 2675   REF  21  LAST  465      4370  4 4745 1  FALTOF     CS      BIT7              TURN OFF OPERATOR ERROR LIGHT
 2676                           4371  0 0006 1             EXTEND
 2677   REF  13  LAST  465      4372  03 011 1             WAND    DSALMOUT          BIT 7 OF CHANNEL 11
 2678   REF 133  LAST  465      4373  0 0002 0             TC      Q

 2679   REF  24  LAST  450      4374  3 4747 1  RELDSPON   CAF     BIT5              TURN ON KEY RELEASE LIGHT
 2680                           4375  0 0006 1             EXTEND
 2681   REF  14  LAST  465      4376  05 011 1             WOR     DSALMOUT          BIT 5 OF CHANNEL 11
 2682   REF 134  LAST  465      4377  0 0002 0             TC      Q
 2683                                  4400  0 0006 1  LOOSAMPT EXTEND
 2684   REF  13   LAST  368            4401  3 0025 0           DCA     TIME2
 2685   REF   5   LAST  317            4402  52 014 0           DXCH    SAMPTIME
 2686   REF 135   LAST  465            4403  0 0002 0           TC      Q


 2687                                  4404  0 0006 1  TPSL1    EXTEND                         SHIFTS MPAC, +1, +2 LEFT 1
 2688   REF 227   LAST  462            4405  3 0156 0           DCA     MPAC      +1           LEAVES OVFIND SET TO +/- 1 FOR OF/UF
 2689   REF 228   LAST  466            4406  20 156 1           DAS     MPAC      +1
 2690   REF 229   LAST  466            4407  6 0154 1           AD      MPAC
 2691   REF 230   LAST  466            4410  26 154 0           ADS     MPAC
 2692                                  4411  54 007 1           TS      7                      TS A DOES NOT CHANGE A ON OF/UF.
 2693   REF 136   LAST  466            4412  0 0002 0           TC      Q                      NO NET OF/UF
 2694   REF   7   LAST  437            4413  54 162 0           TS      MPAC+6                 MPAC +6 SET TO +/-1 FOR OF/UF
 2695   REF 137   LAST  466            4414  0 0002 0           TC      Q


R2696   IF MPAC, +1 ARE EACH +NZ OR +0 AND C(A)=-0, SHORTMP WRONGLY GIVES +0.
R2697   IF MPAC, +1 ARE EACH -NZ OR -0 AND C(A)=+0, SHORTMP WRONGLY GIVES +0.
R2698   PRSHRTMP FIXES FIRST CASE ONLY, BY MERELY TESTING C(A) AND IF IT = -0,
R2699   SETTING RESULT TO -0.
R2700    (DO NOT USE PRSHRTMP UNLESS MPAC, +1 ARE EACH +NZ OR +0, AS THEY ARE
R2701    WHEN THEY CONTAIN TH E SF CONSTANTS.)

 2702   REF   2   LAST   97            4415  54 135 1  PRSHRTMP TS      MPTEMP
 2703   REF 152   LAST  461            4416  10 000 0           CCS     A
 2704   REF   3   LAST  466            4417  3 0135 0           CA      MPTEMP                 C(A) +, DO REGULAR SHORTMP
 2705   REF   6   LAST  445            4420  1 7313 0           TCF     SHORTMP +1             C(A) +0, DO REGULAR SHORTMP
 2706                                  4421  1 4417 0           TCF     -2                     C(A) -, DO REGULAR SHORTMP
 2707   REF 101   LAST  462            4422  4 4755 0           CS      ZERO                   C(A) -0, FORCE RESULT TO -0 AND RETURN.
 2708   REF 231   LAST  466            4423  54 154 0           TS      MPAC
 2709   REF 232   LAST  466            4424  54 155 1           TS      MPAC      +1
 2710   REF 233   LAST  466            4425  54 156 1           TS      MPAC      +2
 2711   REF 138   LAST  466            4426  0 0002 0           TC      Q


 2712   REF  36   LAST  328            4427  3 4746 0  FLASHON  CAF     BIT6                   TURN ON V/N FLASH
 2713                                  4430  0 0006 1           EXTEND                         BIT 6 OF CHANNEL 11
 2714   REF  15   LAST  465            4431  05 011 1           WOR     DSALMOUT
 2715   REF 139   LAST  466            4432  0 0002 0           TC      Q


 2716   REF  37   LAST  466            4433  4 4746 1  FLASHOFF CS      BIT6                   TURN OFF V/N FLASH
 2717                                  4434  0 0006 1           EXTEND
 2718   REF  16   LAST  466            4435  03 011 1           WAND    DSALMOUT               BIT 6 OF CHANNEL 11
 2719   REF 140   LAST  466            4436  0 0002 0           TC      Q
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P2720    INTERNAL USE OF KEYBOARD AND DISPLAY PROGRAM

R2721    USER MUST SCHEDULE CALLS TC NVSUB SO THAT THERE IS NO CONFLICT OF USE OR
R2722    CONFUSION TO OPERATOR. THE OLD GRABLOCK (INTERNAL/INTERNAL INTERLOCK)
R2723    HAS BEEN REMOVED AND THE INTERNAL USER NO LONGER HAS THE PROTECTION THIS
R2724    OFFERED.

R2725    THERE ARE TWO WAYS A JOB CAN BE PUT TO SLEEP BY THE KEYBOARD + DISPLAY
R2726    PROGRAM.     1) BY ENDIDLE
R2727                 2) BY NVSUBUSY
R2728    THE BASIC CONVENTION IS THAT ONLY ONE JOB WILL BE PERMITTED ASLEEP VIA
R2729    THE KEYBOARD + DISPLAY PROGRAM AT A TIME. IF A JOB ATTEMPTS TO GO TO
R2730    SLEEP BY MEANS OF (1) OR (2) AND THERE IS ALREADY A JOB ASLEEP THAT WAS
R2731    PUT TO SLEEP BY (1) OR (2), THEN AN ABORT IS CAUSED.


R2732    THE CALLING SEQUENCE FOR NVSUB IS
R2733              CAF     V/N
R2734    L         TC      NVSUB
R2735    L+1       RETURN HERE IF OPERATOR HAS INTERVENED
R2736    L+2       RETURN HERE AFTER EXECUTION


R2737          A ROUTINE CALLED  NVSUBUSY IS PROVIDED (USE IS OPTIONAL)  TO PUT
R2738    YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES THE KEYBOARD + DISPLAY
R2739    SYSTEM. NVSUBUSY ALSO TURNS ON THE KEY RELEASE LIGHT.
R2740    NVSUBUSY CANNOT BE CALLED FROM ERASABLE OR F/F MEMORY,
R2741    SINCE JOBSLEEP AND JOBWAKE CAN HANDLE ONLY FIXED BANKS.


R2742           THE CALLING SEQUENCE IS
R2743              CAF     WAKEFCADR
R2744              TC      NVSUBUSY


R2745    .


R2746    NVSUBUSY IS INTENDED FOR USE WHEN AN INTERNAL PROGRAM FINDS THE OPERATOR
R2747    IS USING THE KEYBOARD + DISPLAY PROGRAM (BY HIS OWN INITIATION). IT IS
R2748    NOT INTENDED FOR USE WHEN ONE INTERNAL PROGRAM FINDS ANOTHER INTERNAL
R2749    PROGRAM USING THE KEYBOARD + DISPLAY PROGRAM.


R2750    NVSUBUSY ABORTS (WITH CODE 01206) IF A SECOND JOB ATTEMPTS TO GO TO
R2751    SLEEP IN PINBALL. IN PARTICULAR, IF AN ATTEMPT IS MADE TO GO TO NVSUBUSY
R2752    WHEN
R2753    1) DSPLIST NOT= +0. THIS IS THE CASE WHERE THE CAPACITY OF THE DSPLIST
R2754       IS EXCEEDED.
R2755    2) CADRSTOR NOT= +0. THIS INDICATES THAT A JOB IS ALREADY USING
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R2756    ENDIDLE. (+-NZ INDICATE A JOB IS ALREADY ASLEEP DUE TO ENDIDLE.)

 2757    REF   1                   4437   4 4444 0   PRENVBSY CS      2K+3                SPECIAL ENTRANCE FOR ROUTINES IN FIXED
 2758    REF 141   LAST  466       4440   6 0002 0            AD      Q                   BANKS ONLY DESIRING THE FCADR OF(LOC
 2759    REF   2   LAST  459       4441   6 0004 0            AD      FBANK               FROM WHICH THE TC PRENVBSY WAS DONE) -2
 2760    REF  34   LAST  460       4442   0 4635 0   NVSUBUSY TC      POSTJUMP            TO BE ENTERED.
 2761    REF   1                   4443    10633 0            CADR    NVSUBSY1
 2762                              4444    02003 0   2K+3     OCT     2003

R27625   NVSUBSY1 MUST BE IN BANK 27 OR LOWER, SO IT WILL PUT CALLER TO SLEEP
R27626   WITH HIS PROPER SUPERBITS.

 2763    REF   1                04,2633                       SETLOC  ENDSPMM +1
 27635   REF   2 LAST  461 TO  462:        9      9*          COUNT*  $$/PIN
 2764    REF  62   LAST  462    04,2633  54 001 1   NVSUBSY1 TS      L
 2769    REF   2   LAST  459    04,2634   0 4220 0            TC      ISCADR+0            ABORT IF CADRSTOR NOT= +0.
 2770    REF   2   LAST  459    04,2635   0 4224 1            TC      ISLIST+0            ABORT IF DSPLIST NOT= +0.
 2771    REF   3   LAST  443    04,2636   0 4374 0            TC      RELDSPON
 2772    REF  63   LAST  468    04,2637   3 0001 0            CA      L
 2773    REF   3   LAST  459    04,2640  55 042 1             TS      DSPLIST
 2774    REF   3   LAST  459    04,2641   0 5133 0   ENDNVBSY TC      JOBSLEEP


R2775    NVSBWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R2776    SYSTEM IS NOT BUSY, IT EXECUTES V/N AND RETURNS TO L+1 (L= LOC FROM
R2777    WHICH THE TC NVSBWAIT WAS DONE). IF SYSTEM IS BUSY, IT PUTS CALLING JOB
R2778    TO SLEEP WITH L-1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN SYSTEM
R2779    IS NOT BUSY.

 2780    REF   1                   4445                       SETLOC  NVSUBUSY +3
 27805   REF   6 LAST  464 TO  468:       98    209*          COUNT*  $$/PIN
 2781                              4445  22 007 0   NVSBWAIT LXCH    7                   ZERO NVMONOPT OPTIONS
 2782    REF   9   LAST  461       4446  54 123 0            TS      NVTEMP
 2783    REF  44   LAST  460       4447   3 4736 1            CAF     BIT14
 27831   REF  10   LAST  460       4450   7 1020 0            MASK    MONSAVE1            EXTERNAL MONITOR BIT
 27832   REF   8   LAST  460       4451   6 1011 0            AD      DSPLOCK
 27833   REF 153   LAST  466       4452  10 000 0             CCS     A
 27834   REF   1                   4453   1 4455 0            TCF     NVSBWT1             BUSY
 2784    REF   1                   4454   1 4164 1            TCF     NVSBCOM             FREE. NVSUB WILL SAVE L+1 FOR RETURN
A2785                                                                                     AFTER EXECUTION.
 2786    REF 142   LAST  468       4455  24 002 0   NVSBWT1  INCR    Q                   L+2. PRENVBSY WILL PUT L-1 INTO LIST AND
 2787    REF   1                   4456   1 4437 1            TCF     PRENVBSY            GO TO SLEEP.

R2788    RELDSP IS USED BY VBPROC, VBTERM, VBRQEXEC, VBRQWAIT, VBRELDSP, EXTENDED
R2789    VERB DISPATCHER, VBRESEQ, RECALTST.
R2790    RELDSP1 IS USED BY MONITOR SET UP, VBRELDSP.
 2791    REF 143   LAST  468       4457  56 002 0   RELDSP   XCH     Q                   SET DSPLOCK TO +0, TURN RELDSP LIGHT
 2792    REF   1                   4460  54 144 1            TS      RELRET              OFF,  SEARCH DSPLIST
 27921   REF  45   LAST  468       4461   4 4736 0            CS      BIT14
 27922                          4462  0 0004 0           INHINT
 27923  REF  11  LAST  468      4463  7 1020 0           MASK    MONSAVE1
 27924  REF  12  LAST  469      4464  55'020 0           TS      MONSAVE1         TURN OFF EXTERNAL MONITOR BIT
 2793   REF   4  LAST  468      4465  11'042 1           CCS     DSPLIST
 2794                           4466  0 4470 0           TC      +2
 2795   REF   1                 4467  0 4473 0           TC      RELDSP2          LIST EMPTY
 2796   REF 102  LAST  466      4470  3 4755 1           CAF     ZERO
 2797   REF   5  LAST  469      4471  57'042 0           XCH     DSPLIST
 2799   REF   4  LAST  462      4472  0 5137 1           TC      JOBWAKE
 2800                           4473  0 0003 1  RELDSP2  RELINT
 2801   REF  25  LAST  465      4474  4 4747 0           CS      BIT5             TURN OFF KEY RELEASE LIGHT
 2802                           4475  0 0006 1           EXTEND                   (BIT 5 OF CHANNEL 11)
 2803   REF  17  LAST  466      4476  03 011 1           WAND    DSALMOUT
 2804   REF 103  LAST  469      4477  3 4755 1           CAF     ZERO
 2805   REF   9  LAST  468      4500  55'011 1           TS      DSPLOCK
 2807   REF   2  LAST  468      4501  0 0144 0           TC      RELRET
 2808   REF 144  LAST  468      4502  56 002 0  RELDSP1  XCH     Q                SET DSPLOCK TO +0. NO DSPLIST SEARCH.
 2809   REF   3  LAST  469      4503  54 144 1           TS      RELRET           TURN KEY RLSE LIGHT OFF IF DSPLIST IS
A2810                                                                             EMPTY. LEAVE KEY RLSE LIGHT ALONE IF
A2811                                                                             DSPLIST IS NOT EMPTY.
 2812   REF   6  LAST  469      4504  11'042 1           CCS     DSPLIST
 2813                           4505  0 4507 1           TC      +2               +  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2814   REF   2  LAST  469      4506  0 4473 0           TC      RELDSP2          +0 EMPTY. TURN OFF KEY RLSE LIGHT
 2815   REF 104  LAST  469      4507  3 4755 1           CAF     ZERO             -  NOT EMPTY. LEAVE KEY RLSE LIGHT ALONE
 2816   REF  10  LAST  469      4510  55'011 1           TS      DSPLOCK
 2817   REF   4  LAST  469      4511  0 0144 0           TC      RELRET


 2818                           4512            ENDPINBF EQUALS
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L       PINBALL GAME  BUTTONS AND LIGHTS                                         USER'S PAGE NO.  79      EO S4
P28181  PINTEST IS NEEDED FOR AUTO CHECK OF PINBALL.
 28182  REF   2  LAST  263   43,2002           PINTEST  EQUALS LST2FAN
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P2819    V8TSTLTS TURNS ON ALL CISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2820    OFF THE CAUTION ANO STATUS LIGHTS.

 2B21    REF    1                41,3626                   SETLOC ENDNVSB1 +1

 28215   REF    8 LAST  456 TO  458:      61   918*        COUNT* $$/PIN
 2B22                            41,3626  C 0004 0  VBTSTLTS INHINT
 2B222   REF   95  LAST  451     41,3627  C 4616 1           TC      BANKCALL          OPP ERR IF NOT IN FOO
 28224   REF    6  LAST  292     41,3630   66121 0           CACR    CHKPOOH
 2B23    REF   24  LAST  461     41,3631  4 4753 0           CS      8IT1              SET BIT 1 OF IMODES33 SO IMUMON WONT
 2B24    REF   19  LAST  224     41,3632  7 1300 1           MASK    IMODES33          TURN OUT ANY LAMPS.
 2B25    REF   25  LAST  471     41,3633  6 4753 1           AO      BIT1
 2B26    REF   20  LAST  471     41,3634  55'3CC 1           TS      IMCOES33

 2B27    REF    1                41,3635  3 3674 1           CAF     TSTCON1           TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2B28                            41,3636  0 0006 1           EXTENO                    V/N FLASH, OPERATOR ERROR
 2829    REF   18  LAST  469     41,3637  05 011 1           WOR     OSALMOUT
 2830    REF    1                41,3640  3 3675 0           CAF     TSTCON2           TURN ON NO ATT, GIMBAL LOCK, TRACKER,
 2B31    REF   27  LAST  457     41,3641  55'035 1           TS      DSPTAB  +11O      FROG ALM.
 28311   REF    1                41,3642  0 6022 1           TC      C13STALL
 2B32    REF   21  LAST  420     41,3643  3 4742 1           CAF     8IT10             TURN ON TEST ALARM OUTBIT
 2833                            41,3644  0 C006 1           EXTENO
 2834    REF    5  LAST  222     41,3645  05 013 0           WOR     CHAN13
 2835    REF    5  LAST  402     41,3646  3 4363 0           CAF     TEN
 2836    REF    1                41,3647  54 117 1  TSTLTS1  TS      ERCNT
 2B37    REF    1                41,3650  4 3672 0           CS      FULLOSP
 2838    REF    2  LAST  471     41,3651  50 117 0           INOEX   ERCNT
 2839    REF   28  LAST  471     41,3652  55'022 1           TS      OSPTA8
 2840    REF    3  LAST  471     41,3653  10 117 1           CCS     EPCNT
 2B41    REF    1                41,3654  C 3647 1           TC      TSTLTS1
 2B42    REF    1                41,3655  4 3673 1           CS      FULLOSP1
 2B43    REF   29  LAST  471     41,3656  55'023 0           TS      OSPTAB  +1        TURN ON 3 PLUS SIGNS
 2844    REF   30  LAST  471     41,3657  55'026 0           TS      OSFTAB  +4
 2845    REF   31  LAST  471     41,3660  55'030 1           TS      OSPTA8  +6
 2846    REF    1                41,3661  3 4760 1           CAF     ELEVEN
 2847    REF    9  LAST  457     41,3662  55'015 0           TS      NOUT
 2848                            41,3663  0 0003 1           PELINT
 2B49    REF    1                41,3664  3 3677 1           CAF     SHCLTS
 2B50                            41,3665  0 0004 0           INHINT
 2851    REF   18  LAST  465     41,3666  0 5203 0           TC      WAITLIST
 2852    REF   32  LAST  471        1022                     E8ANK=  DSPTA8
 2853    REF    1                41,3667   03700 0           2CAOR   TSTLTS2
 2853    REF    1                41,3670   62102 0
 2B54    REF   62  LAST  462     41,3671  0 5155 0           TC      ENOOFJ08          OSPLOCK IS LEFT BUSY (FROM KEYBOARO
A2B55                                                                                  ACTION) UNTIL TSTLTS3 TO INSURE THAT
A2856                                                                                  LIGHTS TEST WILL BE SEEN.


 2857                            41,3672   05675 0  FULLOSP  OCT     05675             OISPLAY ALL 8:S
 285B                            41,3673   07675 1  FULLOSP1 OCT     07675             OISPLAY ALL 8:S AND +
L          PINBALL GAME  BUTTONS ANO LIGHTS

 2859                                41,3674   00175 1  TSTCONI   OCT      00175         UPLINK ACTIVITY, TEMR, KEY RLSE,
A2860                                                                                    V/N FLASH, OPERATCR ERROR.
A2861                                                                                    OSRTAB+110 8ITS 3,4,5,6,8,9. LR LITES,
 2862                                41,3675   40674 0  TSTCON2   OCT      40674         NO ATT, GIM8AL LOCK, TRACKER, RROG ALM.
A2863                                                                                    CHAN 11  BITS 1, 3, 4, 7.
 2864                                41,3676   00115 1  TSTCON3   OCT      00115         URLINK ACTIVITY, TEMP, CRERATOR ERROP.
A2865
 2866                                41,3677   C0764 1  SHOLTS    OCT      764           5 SEC


 2867   REF   4  LAST  461           41,3700  3 4355 0  TSTLTS2   CAF      CHRRRIO       CALLEO BY WAITLIST
 2868   REF   8  LAST  465           41,3701  0 5072 1            TC       NOVAC
 2869   REF  33  LAST  471              1022                      EBANK=   OSRTAB
 2870   REF   1                      41,3702   03705 0            2CADR    TSTLTS3
 2870   REF   1                      41,3703   62102 0
 2871   REF  14  LAST  465           41,3704  0 5261 1            TC       TASKOVER


 2872   PEF   1                      41,3705  4 3676 1  TSTLTS3   CS       TSTCON3       CALLEO 8Y EXECUTIVF
 2873                                41,3706  0 0004 0            INHINT
 2874                                41,3707  0 0006 I            EXTENO                 TURN OFF  URLINK ACTIVITY, TEMP,
 2875   REF  19  LAST  471           41,3710  03 011 1            WAND     DSALMOUT      ORERATOR ERROR.
 28751  REF   2  LAST  471           41,3711  C 6022 1            TC       C13STALL
 2876   REF  22  LAST  471           41,3712  4 4742 0            CS       8IT10         TURN OFF TEST ALAPM OUT8IT
 2877                                41,3713  0 0006 1            EXTENO
 2878   REF   6  LAST  471           41,3714  03 C13 0            WANO     CHAN13
 28781  FEF  21  LAST  334           41,3715  3 4750 1            CAF      8IT4          MAKE NO ATT FOLLOW BIT 4 OF CHANNEL 12
 28782                               41,3716  C 0006 1            EXTENO                   (NO ATT LIGHT ON IF IN COARSE ALIGN)
 28783  REF  23  LAST  290           41,3717  02 012 0            RANO     CHAN12
 2879   REF  27  LAST  458           41,3720  6 4735 1            AO       BIT15         TURN OFF AUTO, HOLO, FREE, SPARE,
 2880   REF  34  LAST  472           41,3721  55'035 1            TS       OSRTA8  +110  GIMBAL LCCK, SRARE, TRACKER, RROG ALM
 2881   REF   1                      41,3722  4 3745 0            CS       13-11,I       SET BITS TO INOICATE ALL LAMRS OUT. TEST
 2882   REF  21  LAST  471           41,3723  7 1300 1            MASK     IMOOES33      LIGHTS COMRLETE.
 2883   REF   3  LAST  225           41,3724  6 5026 0            AO       RRI016
 2884   REF  22  LAST  472           41,3725  55'300 1            TS       IMOOES33

 2885   REF   1                      41,3726  4 3747 1            CS       OCT55000
 2886   REF  42  LAST  229           41,3727  7 1277 0            MASK     IMOOES30
 2887   REF   4  LAST  261           41,3730  6 5025 0            AO       PRIO15        15000.
 2888   REF  43  LAST  472           41,3731  55'277 0            TS       IMOOES30

 2889   REF   1                      41,3732  4 3746 0            CS       RFAILS2
 2890   PEF  28  LAST  420           41,3733  7 C110 0            MASK     RACMCDES
 2891   REF   3  LAST  186           41,3734  6 4745 0            AO       RCOUFBIT
 2892   REF  29  LAST  472           41,3735  54 110 0            TS       RAOMOOES

 2893                                41,3736  0 0003 1            RELINT

 2894   REF  96  LAST  471           41,3737  0 4616 1            TC       BANKCALL      PEDISRLAY C(MOOREG)
 2895   REF   1                      41,3740   10622 0            CACR     OSRMM
 2896   REF    4  LAST  456    41,3741  0 4204 0               TC      KILMONON        TURN ON KILL MONITOR BIT.
 2897   REF    5  LAST  457    41,3742  0-4433 1               TC      FLASHOFF        TURN OFF V/N FLASH.
 2898   REF   35  LAST  468    41,3743  0 4635 0               TC      POSTJUMP        DOES RELOSP AND GOES TO PINBRNCH IF
 2899   REF    1               41,3744   61534 1               CADR    TSTLTS4          ENDIDLE IS AWAITING OPERATOR RESPONSE.
 2901                          41,3745   16001 1  13-11,1      OCT     16001
 2902                          41,3746   00330 1  RFAILS2      OCT     330             RADAR CDU AND DATA FAIL FLAGS-
 2903                          41,3747   55000 1  OCT55000     OCT     55000
 2904                          41,3750            ENDPINS2     EQUALS
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R2905    ERROR LIGHT RESET (RSET) TURNS OFF,
R2906    UPLINK ACTIVITY, AUTO, HOLD, FREE, OPERATOR ERROR,
R2907    PROG ALM, TRACKER FAIL.
R2908    LEAVES GIMBAL LOCK AND NO ATT ALONE.
R2909    IT ALSO ZEROES THE :TEST ALARM: OUT BIT, WHICH TURNS OFF STBY,RESTART.
R2910    IT ALSO SETS :CAUTION RESET: TO 1.
R2911    IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

 2912    REF   2  LAST  462    40,3646                          SETLOC DOPROC  +2
 29125   REF  10 LAST  462 TO  464:     39    871*              COUNT* $$/PIN
 2913    REF   3  LAST  454    40,3646  56 115 1  ERROR         XCH    21/22REG         RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
 2914    REF  11  LAST  469    40,3647  55'011 1                TS     DSPLOCK          LIGHT RESET LEAVES DSPLOCK UNCHANGED.
 2915                          40,3650  0 0004 0                INHINT
 2916    REF  23  LAST  472    40,3651  3 4742 1                CAF    BIT10            TURN ON :CAUTION RESET: OUTBIT
 2917                          40,3652  0 0006 1                EXTEND
 2918    REF  20  LAST  472    40,3653  05 011 1                WOR    DSALMOUT         BIT10 CHAN 11
 2919    REF   1               40,3654  3 3735 0                CAF    GL+NOATT         LEAVE GIMBAL LOCK AND NO ATT INTACT,
 2920    REF  35  LAST  472    40,3655  7 1035 1                MASK   DSPTAB +11D      TURNING OFF AUTO, HOLD, FREE,
 2921    REF  28  LAST  472    40,3656  6 4735 1                AD     BIT15            PROG ALARM, AND TRACKER.
 2922    REF  36  LAST  474    40,3657  55'035 1                TS     DSPTAB +11D
 2923    REF   4  LAST  472    40,3660  4 5026 1                CS     PRIO16           RESET FAIL BITS WHICH GENERATE PROG
 2924    REF  23  LAST  472    40,3661  7 1300 1                MASK   IMODES33         ALARM SO THAT IF THE FAILURE STILL
 2925    REF   5  LAST  474    40,3662  6 5026 0                AD     PRIO16           EXISTS, THE ALARM WILL COME BACK.
 2926    REF  24  LAST  474    40,3663  55'300 1                TS     IMODES33
 2927    REF  24  LAST  474    40,3664  4 4742 0                CS     BIT10
 2928    REF  44  LAST  472    40,3665  7 1277 0                MASK   IMODES30
 2929    REF  25  LAST  474    40,3666  6 4742 1                AD     BIT10
 2930    REF  45  LAST  474    40,3667  55'277 0                TS     IMODES30

 2931    REF   1               40,3670  4 3734 0                CS     RFAILS
 2932    REF  30  LAST  472    40,3671  7 0110 0                MASK   RADMODES
 2933    REF   4  LAST  472    40,3672  6 4745 0                AD     RCDUFBIT
 2934    REF  31  LAST  474    40,3673  54 110 0                TS     RADMODES

 29341   REF   3  LAST  472    40,3674  0 6022 1                TC     C13STALL
 2935    REF  26  LAST  474    40,3675  4 4742 0                CS     BIT10            TURN OFF :TEST ALARM: OUTBIT.
 2936                          40,3676  0 0006 1                EXTEND
 2937    REF   7  LAST  472    40,3677  03 013 0                WAND   CHAN13
 2938    REF   1               40,3700  4 3733 1                CS     ERCON            TURN OFF UPLINK ACTIVITY,
 2939                          40,3701  0 0006 1                EXTEND                  OPERATOR ERROR.
 2940    REF  21  LAST  474    40,3702  03 011 1                WAND   DSALMOUT
 2941    REF   2  LAST  445    40,3703  3 4363 0  TSTAB         CAF    BINCON           (DEC 10)
 2942    REF   4  LAST  471    40,3704  54 117 1                TS     ERCNT            ERCNT = COUNT
 2943                          40,3705  0 0004 0                INHINT
 2944    REF   5  LAST  474    40,3706  50 117 0                INDEX  ERCNT
 2945    REF  37  LAST  474    40,3707  11'022 1                CCS    DSPTAB
 2946    REF  58  LAST  463    40,3710  6 4753 1                AD     ONE
 2947    REF   1               40,3711  0 3716 1                TC     ERPLUS
 2948    REF  59  LAST  474    40,3712  6 4753 1                AD     ONE
 2949    REF 154  LAST  468    40,3713  4 0000 0  ERMINUS       CS     A
 2950   REF   1                40,3714  7 3736 1             MASK   NOTBIT12
 2951   REF   1                40,3715  0 3721 0             TC     ERCOM
 2952   REF 155  LAST   474    40,3716  4 0000 0  ERPLUS     CS     A
 2953   REF   2  LAST   475    40,3717  7 3736 1             MASK   NOTBIT12
 2954   REF 156  LAST   475    40,3720  4 0000 0             CS     A                    MIGHT WANT TO RESET CLPASS, DECBRNCH,
 2955   REF   6  LAST   474    40,3721  50 117 0  ERCOM      INDEX  ERCNT                ETC.
 2956   REF  38  LAST   474    40,3722  55'022 1             TS     DSPTAB
 2957                          40,3723  0 0003 1             RELINT
 2958   REF   7  LAST   475    40,3724  10 117 1             CCS    ERCNT
 2959   REF   1                40,3725  0 3704 1             TC     TSTAB    +1
 2960   REF 105  LAST   469    40,3726  3 4755 1             CAF    ZERO
 2961   REF   5  LAST   307    40,3727  54 375 1             TS     FAILREG
 29611  REF   6  LAST   475    40,3730  54 376 1             TS     FAILREG +1
 2962   REF   2  LAST   108    40,3731  55'357 0             TS     SFAIL
 2963   REF  63  LAST   471    40,3732  0 5155 0             TC     ENDOFJOB

 2964                          40,3733   00104 1  ERCON      OCT    104                  CHAN 11 BITS 3,7.
A2965                                                                                   UPLINK ACTIVITY, AND OPERATOR ERROR.
 2966                          40,3734   00330 1  RFAILS     OCT    330                  RADAR CDU AND DATA FAIL FLAGS.
 29665                         40,3735   00050 1  GL+NOATT   OCT    00050                NO ATT AND GIMBAL LOCK LAMPS
 2967                          40,3736   73777 1  NOTBIT12   OCT    73777


 2968                          40,3737            ENDPINS1   EQUALS


 2969   REF   5  LAST   322    30,2000                       SBANK= LOWSUPER
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L         R60,R62                                                              USER'S PAGE NO.  1       EO S?

R0100     MOD NO: 0                    DATE: 1 MAY 1968

R0101     MOD BY: DIGITAL DEVEL GROUP  LOG SECTION R60,R62

R0102     FUNCTIONAL DESCRIPTION:

R0103     CALLED AS A GENERAL SUBROUTINE TO MANEUVER THE LM TO A SPECIFIED
R0104     ATTITUDE.

R0105     1. IF THE 3-AXIS FLAG IS NOT SET THE FINAL CDU ANGLES ARE
R0106     CALCULATED (VECPOINT).

R0107     2. THE FDAI BALL ANGLES (NOUN 18) ARE CALCULATED (BALLANGS).

R0108     3. REQUEST FLASHING DISPLAY V50 N18 PLEASE PERFORM AUTO MANEUVER.

R0109     4. IF PRIORITY DISPLAY FLAG IS SET DO A PHASECHANGE. THEN AWAIT
R0110     ASTRONAUT RESPONSE.

R0111     5. DISPLAY RESPONSE RETURNS:

R0112          A. ENTER - RESET 3-AXIS FLAG AND RETURN TO CLIENT.

R0113          B. TERMINATE - IF IN P00 GO TO STEP 5A. OTHERWISE CHECK IF R61 IS
R0114             THE CALLING PROGRAM. IF IN R61 AN EXIT IS MADE TO GOTOV56. IF
R0115             NOT IN R61 AN EXIT IS DONE VIA GOTOPOOH.

R0116          C. PROCEED - CONTINUE WITH PROGRAM AT STEP 6.

R0117     6. IF THE 3-AXISFLAG IS NOT SET, THE FINAL CDU ANGLES ARE CALCULATED
R0118        (VECPOINT).

R0119     7. THE FDAI BALL ANGLES (NOUN 18) ARE CALCULATED (BALLANGS).

R0120     8. IF THE G+N SWITCH IS NOT SET GO BACK TO STEP 3.

R0121     9. IF THE AUTO SWITCH IS NOT SET GO BACK TO STEP 3.

R0122     10. NONFLASHING DISPLAY V06N18 (FDAI ANGLES).

R0123     11. DO A PHASECHANGE.

R0124     12. DO A MANEUVER CALCULATION AND ICDU DRIVE ROUTINE TO ACHIEVE FINAL

R0125          GIMBAL ANGLES (GOMANUR).
R0126     13. AT END OF MANEUVER GO TO STEP 3.

R0127             IF SATISFACTORY MANEUVER STEP 5A EXITS R60.
R0128             FOR FURTHER ADJUSTMENT OF THE VEHICLE ATTITUDE ABOUT THE
R0129             DESIRED VECTOR, THE ROUTINE MAY BE PERFORMED AGAIN STARTING AT
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R0130            STEP 5C.


R0131     CALLING SEQUENCE:  TC BANKCALL
R0132                        CADR R60LEM

R0133     ERASABLE INITIALIZATION REQUIRED : SCAXIS, POINTVSM (FOR VECPOINT)
R0134                                        3AXISFLG.

R0135     SUBROUTINES CALLED: VECPOINT, BALLANGS, GOPERF2R, LINUS, GODSPER,
R0136                         GOMANUR, DOWNFLAG, PHASCHNG, UPFLAG

R0137     NORMAL EXIT MODES: CAE TEMPR60    (CALLERS RETURN ADDRESS)
R0138                        TC  BANKJUMP

R0139     ALARMS: NONE

R0140     OUTPUT: NONE

R0141     DEBRIS: CPHI, CTHETA, CPSI, 3AXISFLG, TBASE2


 0142                          34,2000                     BANK    34
 0143     REF   1              26,2000                     SETLOC  MANUVER
 0144                          26,2123                     BANK

 0145     REF   1                 1163                     EBANK=  TEMPR60

 0146     REF   1                                          COUNT*  $$/R06
 0147     REF   2  LAST  272   26,2123  0 4645 1  R60LEM   TC      MAKECADR
 0148     REF   2  LAST  477   26,2124  55163 0            TS      TEMPR60

 0149     REF   1              26,2125  3 4746 0  REDOMANN CAF     3AXISBIT
 0150     REF  13  LAST  292   26,2126  7 0101 0           MASK    FLAGWRD5        IS 3-AXIS FLAG SET
 0151     REF 157  LAST  475   26,2127  10 0000 0          CCS     A
 0152     REF   1              26,2130  1 2136 0           TCF     TOBALL          YES
 0153     REF  28  LAST  390   26,2131  0 6042 1           TC      INTPRET
 0154                          26,2132   77624 1           CALL
 0155     REF   2  LAST  342   26,2133   56040 0                   VECPOINT        TO COMPUTE FINAL ANGLES
 0156     REF   5  LAST  371   26,2134   00322 1           STORE   CPHI            STORE FINAL ANGLES - CPHI,CTHETA,CPSI
 0157                          26,2135   77776 1           EXIT

 01571 *REF  14  LAST  300   26,2136  0 5504 0  TOBALL   TC      UPFLAG          INSURE THAT TOTAL ATTITUDE ERRORS ARE
 01572 *REF   3  LAST  267   26,2137   00013 0           ADRES   NEEDLFLG        DISPLAYED ON FDAI ERROR NEEDLES
 01573 *REF  35  LAST  390   26,2140  0 5516 0           TC      DOWNFLAG
 01574 *REF   3  LAST  267   26,2141   00000 1           ADRES   NEED2FLG
 0158  *REF  97  LAST  472   26,2142  0 4616 1           TC      BANKCALL
 01585  REF   2  LAST  342   26,2143   54272 1           CADR    BALLANGS        TO CONVERT ANGLES TO FDAI
 0159   REF   1              26,2144  3 2260 1  TOBALLA  CAF     V06N18
 0160   REF  98  LAST  477   26,2145  0 4616 1           TC      BANKCALL
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L         R60,R62                                                                                         USER'S PAGE NO.   3       E2  S3

 0161    REF    1                 26,2146    20711 1             CADR    GOPERF2R          DISPLAY PLEASE PERFORM AUTO MANEUVER
 0162    REF    1                 26,2147   0 2246 0             TC      R61TEST
 0163    REF    1                 26,2150   0 2154 0             TC      RECOMANC          PROCEED
 0164    REF    1                 26,2151   0 2201 0             TC      ENDMANU1          ENTER I.E. FINISHED WITH R60
 0165    REF    1                 26,2152   0 2205 1             TC      CHKLINUS          TO CHECK FOR PRIORITY DISPLAYS
 0166    REF   64   LAST   475    26,2153   0 5155 0             TC      ENDOFJOB

 0167    REF    2   LAST   477    26,2154   3 4746 0  RECOMANC   CAF     3AXISBIT
 0168    REF   14   LAST   477    26,2155   7 0101 0             MASK    FLAGWRD5          IS 3-AXIS FLAG SET
 0169    REF  158   LAST   477    26,2156  10 000 0              CCS     A
 0170    REF    1                 26,2157   1 2165 0             TCF     TOBALLC           YES
 0171    REF   29   LAST   477    26,2160   0 6042 1             TC      INTPRET
 0172                             26,2161    77624 1             CALL
 0173    REF    3   LAST   477    26,2162    56040 0                     VECPOINT          TO COMPUTE FINAL ANGLES
 0174    REF    6   LAST   477    26,2163    00322 1             STORE   CPHI              STORE ANGLES
 0175                             26,2164    77776 1             EXIT

 0176    REF   99   LAST   477    26,2165   0 4616 1  TOBALLC    TC      BANKCALL
 01765   REF    3   LAST   477    26,2166    54272 1             CADR    BALLANGS          TO CONVERT ANGLES TO FDAI
 0177    REF    1                 26,2167   0 2261 0             TC      G+N,AUTO          CHECK AUTO MODE
 0178    REF  159   LAST   478    26,2170  10 000 0              CCS     A
 0179    REF    1                 26,2171   1 2144 0             TCF     TOBALLA           NOT AUTO, GO REREQUEST AUTO MANEUVER.

 0180    REF    2   LAST   477    26,2172   3 2260 1  AUTOMANV   CAF     V06N18            STATIC DISPLAY DURING AUTO MANEUVER
 0181    REF  100   LAST   478    26,2173   0 4616 1             TC      BANKCALL                                                 -
 0182    REF    1                 26,2174    20452 0             CADR    GODSPR                                                   -
 0183    REF    2   LAST   478    26,2175   0 2205 1             TC      CHKLINUS          TO CHECK FOR PRIORITY DISPLAYS

 0184    REF  101   LAST   478    26,2176   0 4616 1  STARTMNV   TC      BANKCALL          PERFORM MANEUVER VIA KALCMANU
 0185    REF    1                 26,2177    17741 0             CADR    GOMANUR

 0186    REF    2   LAST   478    26,2200   1 2144 0  ENDMANUV   TCF     TOBALLA           FINISHED MANEUVER.
 0187    REF   36   LAST   477    26,2201   0 5516 0  ENDMANU1   TC      DOWNFLAG          RESET 3-AXIS FLAG
 0188    REF    3   LAST   342    26,2202    00124 0             ADRES   3AXISFLG
 0189    REF    3   LAST   477    26,2203   31'163 1             CAE     TEMPR60                                                  -
 0190    REF    6   LAST   449    26,2204   0 4640 1             TC      BANKJUMP                                                 -

 0191    REF    3   LAST   264    26,2205   4 0100 1  CHKLINUS   CS      FLAGWRD4
 0192    REF    1                 26,2206   7 4740 1             MASK    PDSPFBIT          IS PRIORITY DISPLAY FLAG SET?
 0193    REF  160   LAST   478    26,2207  10 000 0              CCS     A                                                        -
 0194    REF  145   LAST   469    26,2210   0 0002 0             TC      Q                 NO - EXIT
 0195    REF  146   LAST   478    26,2211   3 0002 0             CA      Q
 0196    REF  234   LAST   466    26,2212   54 156 1             TS      MPAC +2           SAVE RETURN
 0197    REF   16   LAST   446    26,2213   4 6250 1             CS      THREE             OBTAIN LOCATION FOR RESTART
 0198    REF    4   LAST   372    26,2214   6 0133 0             AD      BUF2              HOLDS Q OF LAST DISPLAY
 0199    REF    1                 26,2215   55'054 0             TS      TBASE2

 0200    REF    3   LAST   290    26,2216   0 5353 1             TC      PHASCHNG
 0201                             26,2217    00132 1             OCT     00132
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L         R60,R62                                                                                USER'S PAGE NO.   4      E2 S3

 0202     REF  22  LAST  465    26,2220  3 4745 0             CAF     BIT7
 0203     REF   1               26,2221  0 5464 1             TC      LINUS              GO SET BITS FOR PRIORITY DISPLAY      -
 0204     REF 235  LAST  478    26,2222  0 0156 0             TC      MPAC +2

 0205     REF   2  LAST  370    26,2223  3 7717 1  RELINUS    CAF     PRIO26             RESTORE ORIGINAL PRIORITY
 0206     REF   6  LAST  301    26,2224  0 5146 1             TC      PRIOCHNG

 0207     REF   3  LAST  289    26,2225  3 4747 1             CAF     TRACKBIT           DON'T CONTINUE R60 UNLESS TRACKFLAG ON.
 0208     REF  15  LAST  296    26,2226  7 0075 1             MASK    FLAGWRD1
 0209     REF 161  LAST  478    26,2227  10 000 0             CCS     A
 0210     REF   1               26,2230  1 2243 1             TCF     RER60

 0211     REF   3  LAST  230    26,2231  3 4745 0             CAF     RNDVZBIT           IS IT P20?
 0212     REF  19  LAST  289    26,2232  7 0074 0             MASK    FLAGWRD0
 0213     REF 162  LAST  479    26,2233  10 000 0             CCS     A
 0214                           26,2234  0 2240 0             TC      +4                 YES
 0215     REF   4  LAST  478    26,2235  0 5353 1             TC      PHASCHNG           NO, MUST BE P25, SET 2.11 SPOT
 0216                           26,2236   40112 1             OCT     40112

 0217     REF  65  LAST  478    26,2237  0 5155 0             TC      ENDOFJOB

 0218     REF   5  LAST  479    26,2240  0 5353 1             TC      PHASCHNG           SET 2.7 SPOT FOR P20
 0219                           26,2241   40072 0             OCT     40072

 0220     REF  66  LAST  479    26,2242  0 5155 0             TC      ENDOFJOB

 0221     REF  15  LAST  477    26,2243  0 5504 0  RER60      TC      UPFLAG             SET PRIO DISPLAY FLAG AFTER RESTART
 0222     REF   1               26,2244   00077 1             ADRES   PDSPFLAG

 0223     REF   2  LAST  478    26,2245  0 1054 1             TC      TBASE2

 0224     REF   8  LAST  462    26,2246  3 1010 1  R61TEST    CA      MODREG             IF WE ARE IN P00 IT MUST BE V49 OR V89
 0225                           26,2247  0 0006 1             EXTEND
 0226     REF   2  LAST  478    26,2250  1 2201 1             BZF     ENDMANU1           THUS WE GO TO ENDEXT VIA USER

 0227     REF   4  LAST  478    26,2251  3 0100 0             CA      FLAGWRD4           ARE WE IN R61  (P20 OR P25)
 0228     REF   2  LAST  478    26,2252  7 4740 1             MASK    PDSPFBIT
 0229                           26,2253  0 0006 1             EXTEND
 0230     REF   3  LAST  247    26,2254  1 6001 1             BZF     GOTOPOOH           NO
 0231     REF   1               26,2255  0 6025 0             TC      GOTOV56            YES

 0232                           26,2256   20100 1  BIT14+7    OCT     20100                                                  -
 0233                           26,2257   00203 0  OCT203     OCT     203
 0234                           26,2260   01422 1  V06N18     VN      0618
R0236             SUBROUTINE TO CHECK FOR G+N CONTROL, AUTO STABILIZATION

R0237             RETURNS WITH C(A) = +  IF NOT SET FOR G+N, AUTO
R0238             RETURNS WITH C(A) = +0 IF SWITCHES ARE SET

 0239                           26,2261  0 0006 1  G+N,AUTO EXTEND
 0240    REF   3  LAST  186    26,2262  00 030 1             READ    CHAN30
 0241    REF  27  LAST  474    26,2263  7 4742 0             MASK    BIT10
 0242    REF 163  LAST  479    26,2264  10 000 0             CCS     A
 0243    REF 147  LAST  478    26,2265  0 0002 0             TC      0                  NOT IN G+N  C(A) = +
 0244                          26,2266  0 0006 1   ISITAUTO  EXTEND                     CHECK FOR AUTO MOOE
 0245    REF   2  LAST  283    26,2267  00 031 0             READ    CHAN31
 0246    REF  46  LAST  468    26,2270  7 4736 0             MASK    BIT14
 0247    REF 148  LAST  480    26,2271  0 0002 0             TC      0                  (+) = NOT IN AUTO,  (+0) = AOK
```

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R0248    PROGRAM DESCRIPTION BALLANGS
R0249    MOD NO.           LOG SECTION  R60,R62

R0250    WRITTEN BY RAMA M.AIYAWAR
R0251    FUNCTIONAL DESCRIPTION

R0252    COMPUTES LM FDAI BALL DISPLAY ANGLES
R0253    CALLING SEQUENCE

R0254             TC      BALLANGS
R0255    NORMAL EXIT MODE

R0256             TC      BALLEXIT         (SAVED Q)

R0257    ALARM OR EXIT MODE  NIL
R0258    SUBROUTINES CALLED
R0259             CD*TR*G
R0260             ARCTAN

R0261    INPUT

R0262    CPHI,CTHETA,CPSI  ARE  THE ANGLES CORRESPONDING TO AOG,AIG,AMG. THEY ARE
R0263    SP,2S COMPLIMENT SCALED TO HALF REVOLUTION.
R0264    OUTPUT

R0265    FDAIX,FDAIY,FDAIZ ARE THE REQUIRED BALL ANGLES SCALED TO HALF REVOLUTION
R0266    SP,2S COMPLIMENT.
R0267    THESE ANGLES WILL BE DISPLAYED AS DEGREES AND HUNDREDTHS, IN THE ORDER  ROLL, PITCH, YAW, USING NOUNS 18 & 19.

R0269    ERASABLE INITIALIZATION REQUIRED

R0270    CPHI,CTHETA,CPSI EACH A SP REGISTER
R0271    DEBRIS

R0272    A,L,Q,MPAC,SINCDU,COSCDU,PUSHLIST,BALLEXIT


R0273    NOMENCLATURE:  CPHI, CTHETA, & CPSI REPRESENT THE OUTER, INNER, & MIDDLE GIMBAL ANGLES, RESPECTIVELY; OR
R0275    EQUIVALENTLY, CDUX, CDUY, & CDUZ.

R0276    NOTE:  ARCTAN CHECKS FOR OVERFLOW AND SHOULD BE ABLE TO HANDLE ANY SINGULARITIES.


 0278    REF   2  LAST  341    26,2000                         SETLOC BAWLANGS
 0279                          26,2272                         BANK

 0280    REF   1                                               COUNT* $$/BALL
 0281    REF   3  LAST  477    26,2272  0 4645 1   BALLANGS TC     MAKECADR
 0282    REF   1               26,2273  55'337 0               TS     BALLEXIT
 0283    REF   7  LAST  478    26,2274  3 0321 1               CA     CPHI
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L        R60,R62

 0284   REF    7  LAST  254    26,2275   54 771 1               TS      CDUSPOT +4
 0285   REF    2  LAST  371    26,2276   3 0322 1               CA      CTHETA
 0286   REF    8  LAST  482    26,2277   54 765 1               TS      CDUSPOT
 0287   REF    3  LAST  371    26,2300   3 0323 0               CA      CPSI
 0288   REF    9  LAST  482    26,2301   54 767 0               TS      CDUSPOT +2

 0289   REF   30  LAST  478    26,2302   0 6042 1               TC      INTPRET
 0290                          26,2303    45001 1               SETPD   CALL
 0291                          26,2304    00001 0                       0D
 0292   REF    1 -             26,2305    47545 0                       CD*TR*G

 0293                          26,2306    41345 0               OLCAO   DMP                         SIN (OGA)
 0294   REF    1               26,2307    00742 0                       SINCDUX                     COS (MGA)
 0295   REF    1               26,2310    00746 1                       COSCDUZ

 0296                          26,2311    57552 1               SL1     DCOMP                       SCALE
 0297                          26,2312    65336 1               ARCSIN  PDDL                        YAW = ARCSIN(-SXCZ) INTO 0 PD
 0298   REF    1               26,2313    00740 1                       SINCDUZ
 0299   REF    4  LAST  324    26,2314    14023 0               STODL   SINTH                       (SINTH = 18D IN PD)
 0300   REF    2  LAST  482    26,2315    00746 1                       COSCDUZ
 0301                          26,2316    72405 0               DMP     SL1                         RESCALE
 0302   REF    1               26,2317    00750 0                       COSCDUX
 0303   REF    4  LAST  324    26,2320    34021 0               STCALL  COSTH                       (COSTH= 16D IN PD)
 0304   REF    1               26,2321    26506 0                       ARCTAN
 0305                          26,2322    41325 0               PDDL    DMP                         ROLL = ARCTAN(SZ/CZCX) INTO 2 PD
 0306   REF    2  LAST  482    26,2323    00740 1                       SINCDUZ
 0307   REF    2  LAST  482    26,2324    00742 0                       SINCDUX
 0308                          26,2325    41512 1               SL2     PUSH                        SXSZ INTO 4 PD
 0309                          26,2326    65205 0               DMP     PDDL                        SXSZCY INTO 4 PD
 0310   REF    1               26,2327    00744 0                       COSCDUY
 0311                          26,2330    65205 0               DMP     PDDL                        SXSZSY INTO 6 PD
 0312   REF    1               26,2331    00736 0                       SINCDUY
 0313   REF    2  LAST  482    26,2332    00750 0                       COSCDUX
 0314                          26,2333    72405 0               DMP     SL1                         CXCY
 0315   REF    2  LAST  482    26,2334    00744 0                       COSCDUY
 0316                          26,2335    45425 0               DSU     STADR                       PULL UP FROM 6 PD
 0317   REF    5  LAST  482    26,2336    63756 0               STODL   COSTH                       COSTH = CXCY - SXSZSY
 0318   REF    2  LAST  482    26,2337    00736 0                       SINCDUY
 0319                          26,2340    72405 0               DMP     SL1
 0320   REF    3  LAST  482    26,2341    00750 0                       COSCDUX                     CXSY
 0321                          26,2342    45415 0               DAD     STADR                       PULL UP FROM 4 PD
 0322   REF    5  LAST  482    26,2343    43754 0               STCALL  SINTH                       SINTH = CXSY + SXSZCY
 0323   REF    2  LAST  482    26,2344    26506 0                       ARCTAN                      RETURNS WITH D(MPAC) = PITCH
 0324                          26,2345    55525 0               PDDL    VDEF                        PITCH INTO 2 PD, ROLL INTO MPAC FROM 2PD
 0325                          26,2346    77634 0               RTB                                 VDEF MAKES V(MPAC) = ROLL, PITCH, YAW
 0326   REF    2  LAST  367    26,2347    21621 1                       V1STO2S
 0327   REF    2  LAST  307    26,2350    02345 1               STORE   FDAIX                       MODE IS TP
 0328                          26,2351    77776 1               EXIT

 0329   REF    2  LAST  481    26,2352   3 1337 1   ENDBALL     CA      BALLEXIT
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L        REC,R62                                                                          USER'S PAGE NO.    8       E2 S3
 03295  REF    7  LAST  478    26,2353  C 4640 1            TC      BANKJUMP
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P0330   PROGRAM DESCRIPTION - VECPOINT

R0331             THIS INTERPRETIVE SUBROUTINE MAY BE USED TO POINT A SPACECRAFT AXIS IN A DESIRED DIRECTION.  THE AXIS
R0333   TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN SUCCESSIVE LOCATIONS OF ERASABLE MEMORY
R0335   BEGINNING WITH THE LOCATION CALLED SCAXIS.  THE COMPONENTS OF THIS VECTOR ARE GIVEN IN SPACECRAFT COORDINATES.
R0337   THE DIRECTION IN WHICH THIS AXIS IS TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN
R0339   SUCCESSIVE LOCATIONS OF ERASABLE MEMORY BEGINNING WITH THE ADDRESS CALLED POINTVSM.  THE COMPONENTS OF THIS
R0341   VECTOR ARE GIVEN IN STABLE MEMBER COORDINATES.  WITH THIS INFORMATION VECPOINT COMPUTES A SET OF THREE GIMBAL
R0343   ANGLES (2S COMPLEMENT) CORRESPONDING TO THE CROSS-PRODUCT ROTATION BETWEEN SCAXIS AND POINTVSM AND STORES THEM
R0345   IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R0346             THIS ROTATION, HOWEVER, MAY BRING THE S/C INTO GIMBAL LOCK.  WHEN POINTING A VECTOR IN THE Y-Z PLANE,
R0348   THE TRANSPONDER AXIS, OR THE AOT FOR THE LEM, THE PROGRAM WILL CORRECT THIS PROBLEM BY ROTATING THE CROSS-
R0350   PRODUCT ATTITUDE ABOUT POINTVSM BY A FIXED AMOUNT SUFFICIENT TO ROTATE THE DESIRED S/C ATTITUDE OUT OF GIMBAL
R0352   LOCK.  IF THE AXIS TO BE POINTED IS MORE THAN 40.6 DEGREES BUT LESS THAN 60.5 DEG FROM THE +X (OR-X) AXIS,
R0354   THE ADDITIONAL ROTATION TO AVOID GIMAL LOCK IS 35 DEGREES.  IF THE AXIS IS MORE THAN 60.5 DEGEES FROM +X (OR -X)
R0356   THE ADDITIONAL ROTATION IS 35 DEGREES.  THE GIMBAL ANGLES CORRESPONDING TO THIS ATTITUDE ARE THEN COMPUTED AND
R0358   STORED AS 2S COMPLIMENT ANGLES IN T(MPAC) BEFORE RETURNING TO THE CALLER.
R0360             WHEN POINTING THE X-AXIS, OR THE THRUST VECTOR, OR ANY VECTOR WITHIN 40.6 DEG OF THE X-AXIS, VECPOINT
R0362   CANNOT CORRECT FOR A CROSS-PRODUCT ROTATION INTO GIMBAL LOCK.  IN THIS CASE A PLATFORM REALIGNMENT WOULD BE
R0364   REQUIRED TO POINT THE VECTOR IN THE DESIRED DIRECTION.  AT PRESENT NO INDICATION IS GIVEN FOR THIS SITUATION
R0366   EXCEPT THAT THE FINAL MIDDLE GIMBAL ANGLE IN MPAC +2 IS GREATER THAN 59 DEGREES.

R0368             CALLING SEQUENCE -
R0369                  1) LOAD SCAXIS, POINTVSM
R0370                  2) CALL
R0371                          VECPOINT

R0372             RETURNS WITH

R0373                  1) DESIRED OUTER  GIMBAL ANGLE IN MPAC
R0374                  2) DESIRED INNER  GIMBAL ANGLE IN MPAC +1
R0375                  3) DESIRED MIDDLE GIMBAL ANGLE IN MPAC +2


R0376             ERASABLES USED -

R0377                  1) SCAXIS          6
R0378                  2) POINTVSM        6
R0379                  3) MIS            18
R0380                  4) DEL            18
R0381                  5) COF             6
R0382                  6) VECQTEMP        1
R0383                  7) ALL OF VAC AREA 43

R0384                          TOTAL     99

 0385   REF    1              27,2000                          SETLOC VECPT
 0386                         27,2032                          BANK
 0387    REF   1                                    COLNT* $$/VECPT

 0388    REF  11  LAST  368    E6,1675              EBANK= BCOU

 038805                        27,2032   40C20 1  VECPNT1  STQ     BOV              THIS ENTRY USES DESIRED CDUS
 03881   REF   I               27,2033   03324 1                   VECQTEMP         NOT PRESENT-ENTER WITH CDUD'S IN MPAC
 038815  REF   1               27,2034   56035 1                   VECPNT2
 03882                         27,2035   52164 0  VECPNT2  AXC,2   GOTO
 038825  REF  11  LAST  367    27,2036   03245 1                   MIS
 038865  REF   1               27,2037   56046 C                   STCRANG
 0389                          27,2040   40C20 1  VECPOINT STQ     BOV              SAVE RETURN ADDRESS
 0390    RFF   2  LAST  485    27,2041   03324 1                   VECQTEMP
 0391    REF   1               27,2042   56C43 C                   VECLEAR          ANC CLEAR OVFIND
 0392                          27,2043   47164 1  VECLEAR  AXC,2   RTB
 0393    REF  12  LAST  485    27,2044   03245 1                   MIS              READ THE PRESENT CDU ANGLES AND
 0394    REF   2  LAST  353    27,2045   44403 0                   READCOUK         STORE THEM IN PD25, 26, 27
 0395                          27,2046   34032 1  STORANG  STCALL  250
 0396    REF   3  LAST  353    27,2047   44410 1                   CDUTCDCM         S/C AXES TO STABLE MEMBER AXES (MIS)
 0397                          27,2050   61375 1           VLOAD   VXM
 0398    REF   3  LAST  341    27,2051   03773 1                   POINTVSM         RESOLVE THE POINTING DIRECTION VF INTO
 0399    REE  13  LAST  485    27,2052   03246 1                   MIS              INITIAL S/C AXES ( VF = POINTVSM)
 0400                          27,2053   77656 1           UNIT
 0401                          27,2054   00035 1           STCRE   28D
A0402                                                                               PD 28 29 30 31 32 33
 0403                          27,2055   53435 0           VXV     UNIT             TAKE THE CROSS PRODUCT VF X VI
 0404    REF  12  LAST  342    27,2056   03765 0                   SCAXIS           WHERE VI = SCAXIS
 0405                          27,2057   5740C 1           BOV     VCOMP
 0406    REE   1               27,2060   56170 1                   PICKAXIS
 0407    REF  40  LAST  366    27,2061   17270 1           STCDL   COF              CHECK MAGNITUDE
 0408                          27,2062   00045 0                   360              OF CROSS PRODUCT
 0409                          27,2063   50025 0           DSU     BMN              VECTOR, IF LESS
 0410    REF   1               27,2064   14415 1                   DPB-14           THAN B-14 ASSUME
 0411    REF   2  LAST  485    27,2065   56170 1                   PICKAXIS         UNIT OPERATION
 0412                          27,2066   50375 C           VLCAD   OCT                       INVALID.
 0413    REF  13  LAST  485    27,2067   03765 0                   SCAXIS
 0414                          27,2070   00035 1                   28D
 0415                          27,2071   65552 0           SLJ     ARCCCS
 0416                          27,2072   77624 I  COMPMATX CALL                     NOW COMPUTE THE TRANSFORMATION FROM
 0417    REE   2  LAST  366    27,2073   44527 1                   DELCOMP          FINAL S/C AXES TO INITIAL S/C AXES  MFI
 0418                          27,2074   75160 1           AXC,1   AXC,2
 0419    REF  14  LAST  485    27,2075   03245 1                   MIS              COMPUTE THE TRANSFORMATION FROM FINAL
 0420    REE  11  LAST  367    27,2076   02230 1                   KEL              S/C AXES TO STABLE MEMBER AXES
 0421                          27,2077   77624 1           CALL                     MFS = MIS MFI
 0422    REF   3  LAST  367    27,2100   44312 1                   MXM3             (IN PD LIST)

 0423                          27,2101   51545 1           DLOAD   ABS
 0424                          27,2102   00007 0                   6                MFS6 = SIN(CPSI)                         $2
 0425                          27,2103   50025 0           DSU     BMN
 0426    REF   1               27,2104   14402 1                   SINGIMLC         = SIN(59 DEGS)                           $2
 0427    REF   1               27,2105   56160 0                   FINDGIMB         /CPSI/ LESS THAN 59 DEGS
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A0428                                                                                  I.E. DESIRED ATTITUDE NOT IN GIMBAL LOCK

 0429                          27,2106   51545 1           DLOAD   ABS                 CHECK TO SEE IF WE ARE POINTING
 0430   REF  14  LAST  485     27,2107   03765 0                   SCAXIS              THE THRUST AXIS
 0431                          27,2110   51025 1           DSU     BRL
 0432   REF   1                27,2111   14404 1                   SINVEC1             SIN 49.4 DEGS                        $2
 0433   REF   2  LAST  485     27,2112   56160 0                   FINDGIMB            IF SO, WE ARE TRYING TO POINT IT INTO
 0434                          27,2113   77775 1           VLOAD                       GIMBAL LOCK, ABORT COULD GO HERE
 0435                          27,2114   77626 0           STADR
 0436   REF  15  LAST  485     27,2115   50515 0           STOVL   MIS +12D
 0437                          27,2116   77626 0           STADR                       STORE MFS (IN PD LIST) IN MIS
 0438   REF  16  LAST  486     27,2117   50523 0           STOVL   MIS +6
 0439                          27,2120   77626 0           STADR
 0440   REF  17  LAST  486     27,2121   50531 0           STOVL   MIS
 0441   REF  18  LAST  486     27,2122   03254 1                   MIS +6              INNER GIMBAL AXIS IN FINAL S/C AXES
 0442                          27,2123   57444 1           BPL     VCOMP               LOCATE THE IG AXIS DIRECTION CLOSEST TO
 0443   REF   1                27,2124   56125 1                   IGSAMEX             FINAL X S/C AXIS

 0444                          27,2125   50035 1  IGSAMEX  VXV     BMN                 FIND THE SHORTEST WAY OF ROTATING THE
 0445   REF  15  LAST  486     27,2126   03765 0                   SCAXIS              S/C OUT OF GIMBAL LOCK BY A ROTATION
 0446   REF   1                27,2127   56134 1                   U=SCAXIS            ABOUT +- SCAXIS, I.E. IF (IG (SGN MFS3)
A0447                                                                                  X SCAXIS . XF) LESS THAN 0, U = SCAXIS
A0448                                                                                  OTHERWISE U = -SCAXIS

 0449                          27,2130   57575 1           VLOAD   VCOMP
 0450   REF  16  LAST  486     27,2131   03765 0                   SCAXIS
 0451   REF  41  LAST  485     27,2132   37270 0           STCALL  CDF                 ROTATE ABOUT -SCAXIS
 0452   REF   1                27,2133   56137 1                   CHEKAXIS
 0453                          27,2134   77775 1  U=SCAXIS VLOAD
 0454   REF  17  LAST  486     27,2135   03765 0                   SCAXIS
 0455   REF  42  LAST  486     27,2136   03270 1           STORE   CDF                 ROTATE ABOUT + SCAXIS
 0456                          27,2137   51545 1  CHEKAXIS DLOAD   ABS
 0457   REF  18  LAST  486     27,2140   03765 0                   SCAXIS              SEE IF WE ARE POINTING THE AOT
 0458                          27,2141   51025 1           DSU     BPL
 0459   REF   1                27,2142   14406 0                   SINVEC2             SIN 29.5 DEGS                        $2
 0460   REF   1                27,2143   56147 0                   PICKANG1            IF SO, ROTATE 50 DEGS ABOUT +- SCAXIS
 0461                          27,2144   52145 0           DLOAD   GOTO                IF NOT, MUST BE POINTING THE TRANSPONDER
 0462   REF   1                27,2145   14412 0                   VECANG2             OR SOME VECTOR IN THE Y, OR Z PLANE
 0463   REF   1                27,2146   56151 1                   COMPMFSN            IN THIS CASE ROTATE 35 DEGS TO GET OUT
A0464                                                                                  OF GIMBAL LOCK (VECANG2  $360)
 0465                          27,2147   77745 1  PICKANG1 DLOAD
 0466   REF   1                27,2150   14410 1                   VECANG1             = 50 DEGS                            $ 360
 0467                          27,2151   77624 1  COMPMFSN CALL
 0468   REF   3  LAST  485     27,2152   44527 1                   DELCOMP             COMPUTE THE ROTATION ABOUT SCAXIS TO
 0469                          27,2153   75160 1           AXC,1   AXC,2               BRING MFS OUT OF GIMBAL LOCK
 0470   REF  19  LAST  486     27,2154   03245 1                   MIS
 0471   REF  12  LAST  485     27,2155   02230 1                   KEL
 0472                          27,2156   77624 1           CALL                        COMPUTE THE NEW TRANSFORMATION FROM
 0473   REF   4  LAST  485     27,2157   44312 1                   MXM3                DESIRED S/C AXES TO STABLE MEMBER AXES
A0474                                                                                  WHICH WILL ALIGN VI WITH VF AND AVOID
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A0475                                                                          GIMBAL LOCK
 0476                          27,2160   45160 1  FINDGIMB AXC,1  CALL
 0477                          27,2161   00000 1                  0             EXTRACT THE COMMANDED CDU ANGLES FROM
 0478   REF   2  LAST  367     27,2162   44654 0                  DCMTOCDU      THIS MATRIX
 0479                          27,2163   40234 0           RTB    SETPD
 0480   REF   3  LAST  482     27,2164   21621 1                  V1STO2S       CONVERT TO 2:S COMPLEMENT
 0481                          27,2165   00001 0                  0
 0482                          27,2166   77650 1           GOTO
 0483   REF   3  LAST  485     27,2167   03324 1                  VECQTEMP      RETURN TO CALLER

 0484                          27,2170   50375 0  PICKAXIS VLOAD  DOT           IF VF X VI = 0,  FIND VF . VI
 0485                          27,2171   00035 1                  28D
 0486   REF  19  LAST  486     27,2172   03765 0                  SCAXIS
 0487                          27,2173   72240 1           BMN    TLOAD
 0488   REF   1                27,2174   54354 1                  ROT180
 0489                          27,2175   00032 0                  25D
 0490                          27,2176   77650 1           GOTO                 IF VF = VI, CDU DESIRED = PRESENT CDU
 0491   REF   4  LAST  487     27,2177   03324 1                  VECQTEMP      PRESENT CDU ANGLES

 0492                          35,2000                     BANK   35
 0493   REF   1                26,2000                     SETLOC MANUVER1
 0494                          26,2354                     BANK
 0495                          26,2354   47375 0  ROT180   VLOAD  VXV           IF VF, VI ANTIPARALLEL, 180 DEG ROTATION
 0496   REF  20  LAST  486     26,2355   03254 1                  MIS +6        IS REQUIRED. Y STABLE MEMBER AXIS IN
 0497   REF   1                26,2356   06522 1                  HIDPHALF      INITIAL S/C AXES.
 0498                          26,2357   47256 0           UNIT   VXV           FIND Y(SM) X X(I)
 0499   REF  20  LAST  487     26,2360   03765 0                  SCAXIS        FIND UNIT(VI X UNIT(Y(SM) X X(I)))
 0500                          26,2361   40056 0           UNIT   BOV           I.E. PICK A VECTOR IN THE PLANE OF X(I),
 0501   REF   1                26,2362   54376 1                  PICKX         Y(SM) PERPENDICULAR TO VI
 0502   REF  43  LAST  486     26,2363   17270 1           STODL  02D
 0503                          26,2364   00045 0                  36D           CHECK MAGNITUDE
 0504                          26,2365   50025 0           DSU    BMN           OF THIS VECTOR.
 0505   REF   2  LAST  485     26,2366   14415 1                  DPB-14        IF LESS THAN B-14,
 0506   REF   2  LAST  487     26,2367   54376 1                  PICKX         PICK X-AXIS.
 0507                          26,2370   77775 1           VLOAD
 0508   REF  44  LAST  487     26,2371   03270 1                  02D
 0509   REF  45  LAST  487     26,2372   17270 1  XROT     STODL  02D
 0510   REF   2  LAST  487     26,2373   06522 1                  HIDPHALF
 0511                          26,2374   77650 1           GOTO
 0512   REF   1                26,2375   56072 1                  COMPMATX
 0513                          26,2376   52175 0  PICKX    VLOAD  GOTO          PICK THE XAXIS IN THIS CASE
 0514   REF   3  LAST  487     26,2377   06522 1                  HIDPHALF
 0515   REF   1                26,2400   54372 0                  XROT
 0516                          26,2401   15555 0  SINGIMLC 2DEC   .4285836003   =SIN(59)              $2
 0516                          26,2402   35172 0
 0517                          26,2403   14113 1  SINVEC1  2DEC   .3796356537   =SIN(49.4)            $2
 0517                          26,2404   36326 0
 0518                          26,2405   07701 0  SINVEC2  2DEC   .2462117800   =SIN(29.5)            $2
 0518                          26,2406   35703 0
 0519                          26,2407   04343 1  VECANG1  2DEC   .1388888889   = 50 DEGREES                       $360
 0519                          26,2410   21616 0
 0520                          26,2411   03070 0  VECANG2  2DEC     .09722222222    = 35 DEGREES                   $360
 0520                          26,2412   34344 0
 0521                          26,2413   00000 1  1BITDP   OCT      0               KEEP THIS BEFORE DPB(-14)      *********
 0522                          26,2414   00001 0  DPB-14   OCT      00001
 0523                          26,2415   00000 1           OCT      00000
```

```
P0524    ROUTINE FOR INITIATING AUTOMATIC MANEUVER VIA KEYBOARD (V49)


 0525                            34,2000                         BANK    34
 0526    REF   1                 23,2000                         SETLOC  R62
 0527                            23,2103                         BANK
 0528    REF  12  LAST  465      E6,1675                         EBANK=  BCDU

 0529    REF   1                                                 COUNT*  $$/R62

 0530    REF   1                 23,2103             R62DISP     EQUALS  R62FLASH

 0531    REF   1                 23,2103  3 5010 0   R62FLASH    CAF     VD6N22          FLASH VD6N22 AND
 0532    REF 102  LAST  478      23,2104  0 4616 1               TC      BANKCALL        ICDU ANGLES
 0533    REF   6  LAST  383      23,2105   20477 1               CADR    GOFLASH
 0534    REF  30  LAST  379      23,2106  1 5472 1               TCF     ENDEXT          TERMINATE
 0535    REF   1                 23,2107  1 2111 0               TCF     GOMOVE          PROCEED
 0536    REF   2  LAST  489      23,2110  1 2103 0               TCF     R62FLASH        ENTER

A0537                                                                                    ASTRONAUT MAY LOAD NEW ICDUS AT THIS
A0538                                                                                    POINT
 0539    REF  16  LAST  479      23,2111  0 5504 0   GOMOVE      TC      UPFLAG          SET FOR 3-AXIS MANEUVER
 0540    REF   4  LAST  478      23,2112   00124 0               ADRES   3AXISFLG

 0541    REF 103  LAST  489      23,2113  0 4616 1               TC      BANKCALL
 0542    REF   2  LAST  342      23,2114   54123 0               CADR    R60LEM
 0543    REF  31  LAST  489      23,2115  1 5472 1               TCF     ENDEXT          END R62
```

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R2000    SUBROUTINE NAME: R05 - S-BAND ANTENNA FOR LM

R2001    MOD0 BY T. JAMES
R2002    MOD1 BY P. SHAKIR

R2003    FUNCTIONAL DESCRIPTION

R2004         THE S-BAND ANTENNA ROUTINE, R05, COMPUTES AND DISPLAYS THE PITCH AND
R2005    YAW ANTENNA GIMBAL ANGLES REQUIRED TO POINT THE LM STEERABLE ANTENNA
R2006    TOWARD THE CENTER OF THE EARTH. THIS ROUTINE IS SELECTED BY THE ASTRO-
R2007    NAUT VIA DSKY ENTRY DURING COASTING FLIGHT OR WHEN THE LM IS ON THE MOON
R2008    SURFACE. THE EARTH OR MOON REFERENCE COORDINATE SYSTEM IS USED DEPENDING
R2009    ON WHETHER THE LM IS ABOUT TO ENTER OR HAS ALREADY ENTERED THE MOON
R2010    SPHERE OF INFLUENCE, RESPECTIVELY.  CAN BE CALLED ANY TIME EXCEPT WHEN
R20101   ANOTHER EXTENDED VERB IS IN USE. DISPLAY IS MEANINGLESS WITH IMU OFF.

R2011    TC CALL SUBROUTINE, ASTRONAUT KEYS IN V 64 E

R2012    SUBROUTINES CALLED-

R2014         INTPRET
R2015         LOADTIME
R2016         LEMCONIC
R2017         LUNPOS
R2018         CDUTRIG
R2019         *SMNB*
R2020         BANKCALL
R2021         B5OFF
R2022         ENDOFJOB
R2023         BLANKET

R2024    RETURNS WITH

R2025         PITCH ANGLE IN PITCHANG  REV. B0
R2026         YAW ANGLE IN YAWANG  REV. B0

R2027    ERASABLES USED

R2028         PITCHANG
R2029         YAWANG
R2030         RLM
R2031         VAC AREA

 2032                          41,3750                        BANK    41
 2033    REF   4  LAST  289    42,2000                        SETLOC  SBAND
 2034                          42,3606                        BANK

 2035    REF   1               E7,1471                        EBANK=  WHOCARES
 2036    REF   2 LAST   46 TO   47:       2      2*           COUNT*  $$/R05
 2039    REF  31  LAST  482    42,3606  0 6042 1  SBANDANT TC        INTPRET
 2040                          42,3607   47001 0               SETPD   RTB
 2041                          42,3610   00001 0                       0D
 2042   REF    5  LAST  382    42,3611   21574 1                       LOADTIME        PICK UP CURRENT TIME
 2043   REF    6  LAST  341    42,3612   34041 0               STCALL  TDEC1           ADVANCE INTEGRATION TO TIME IN TDEC1
 2044   REF    2  LAST  341    42,3613   27077 1                       LEMCONIC        USING CONIC INTEGRATION
 2045                          42,3614   46135 1               SLOAD   BHIZ
 2046   REF    1               42,3615   00050 1                       X2              X2 =0 EARTH SPHERE, X2 =2 MOON SPHERE
 2047   REF    1               42,3616   65634 0                       CONV4
 2048                          42,3617   77775 1               VLOAD
 2049   REF    3  LAST  341    42,3620   00001 0                       RATT
 2050   REF    1               42,3621   16205 1               STODL   RLM
 2051   REF    3  LAST  210    42,3622   00015 0                       TAT
 2052                          42,3623   77624 1    CONV3      CALL
 2053   REF    1               42,3624   33647 1                       LUNPOS          UNIT POSITION VECTOR FROM EARTH TO MOON
 2054                          42,3625   74375 0               VLOAD   VXSC
 2055   REF    2  LAST  125    42,3626   02723 0                       VMOON
 2056   REF    1               42,3627   24001 0                       REMDIST         MEAN DISTANCE FROM EARTH TO MOON
 2057                          42,3630   53372 1               VSL1    VAD
 2058   REF    2  LAST  491    42,3631   02205 1                       RLM
 2059                          42,3632   77650 1               GOTO
 2060   REF    1               42,3633   65636 1                       CONV5
 2061                          42,3634   77775 1    CONV4      VLOAD
 2062   REF    4  LAST  491    42,3635   00001 0                       RATT            UE = -UNIT(RATT)   EARTH SPHERE
 2063                          42,3636   53401 1    CONV5      SETPD   UNIT            UE = -UNIT((REM)(UEM) + RL)  MOON SPHERE
 2064                          42,3637   00001 0                       0D              SET PL POINTER TO 0
 2065                          42,3640   45076 1               VCOMP   CALL
 2066   REF    1               42,3641   47541 1                       CDUTRIG         COMPUTE SINES AND COSINES OF CDU ANGLES
 2067                          42,3642   76521 0               MXV     VSL1            TRANSFORM REF. COORDINATE SYSTEM TO
 2068   REF    7  LAST  341    42,3643   01734 0                       REFSMMAT        STABLE MEMBER  B-1 X B-1 X B+1 = B-1
 2069                          42,3644   71206 0               PUSH    DLOAD           BD
 2070   REF    2  LAST  301    42,3645   06524 1                       HI6ZEROS
 2071   REF    2  LAST  119    42,3646   02201 0               STORE   PITCHANG
 2072   REF    1               42,3647   26203 1               STODL   YAWANG          ZERO OUT ANGLES
 2073                          42,3650   77624 1               CALL
 2074   REF    1               42,3651   47673 0                       *SMNB*
 2075   REF    3  LAST  491    42,3652   16205 1               STODL   RLM             PRE-MULTIPLY RLM BY (NBSM) MATRIX(B0)
 2076   REF    4  LAST  491    42,3653   02207 0                       RLM +2
 2077                          42,3654   45206 1               PUSH    DSU
 2078   REF    5  LAST  491    42,3655   02205 1                       RLM
 2079                          42,3656   77605 1               DMP
 2080   REF    1               42,3657   25767 0                       1OVSQRT2
 2081   REF    6  LAST  491    42,3660   16207 0               STODL   RLM +2
 2082                          42,3661   41215 1               DAD     DMP
 2083   REF    7  LAST  491    42,3662   02205 1                       RLM
 2084   REF    2  LAST  491    42,3663   25767 0                       1OVSQRT2
 2085   REF    8  LAST  491    42,3664   26205 1               STOVL   RLM             R  B-1
 2086   REF    9  LAST  491    42,3665   02205 1                       RLM
 2087                          42,3666   63256 0               UNIT    PDVL
 2088   REF   10  LAST  491    42,3667   02205 1                       RLM
 2089                          42,3670   72431 1               VPROJ   VSL2            PROJECTION OF R ONTO LM XZ PLANE
 2090   REF   1                42,3671   06520 C                      HILNITY
 2091                          42,3672   40045 1             BVSU     BOV          CLEAR OVERFLOW INOICATCR IF ON
 2092   REF  11   LAST  491    42,3673   02205 1                      RLM
 2093   REF   1                42,3674   65675 0                      COVCNV
 2094                          42,3675   40056 0   COVCNV    UNIT     BOV          EXIT ON OVERFLOW
 2095   REF   1                42,3676   65743 1                      SBANDEX
 2096                          42,3677   47206 0             PUSH     VXV          URP VECTOR  B-I
 2097   REF   1                42,3700   06516 0                      HIUNITZ
 2098                          42,3701   57572 0             VSL1     VCCMP        UZ X URP = -(URP X UZ)
 2099   REF  12   LAST  492    42,3702   02205 1             STORE    RLM          X VEC  B-1
 2100                          42,3703   63241 0             OCT      PDVL         SGN(X.UY) UNSCALEO
 2101   REF   2   LAST  492    42,3704   06520 0                      HIUNITY
 2102   REF  13   LAST  492    42,3705   02205 1                      RLM
 2103                          42,3706   75246 0             ABVAL    SIGN
 2104                          42,3707   77736 0             ASIN                  ASIN((SGN(X.UY))ABV(X)) REV BD
 2105   REF   3   LAST  491    42,3710   26201 0             STOVL    PITCHANG
 2106   REF   1                42,3711   0C007 C                      URP
 2107                          42,3712   51041 0             DOT      BPL
 2108   REF   2   LAST  492    42,3713   06516 0                      HIUNITZ
 2109   REF   1                42,3714   65721 0                      NOAOJUST     YES, -90 TO +90
 2110                          42,3715   45345 1             DLOAD    OSU
 2111   REF   4   LAST  487    42,3716   06522 1                      HIDPHALF
 2112   REF   4   LAST  492    42,3717   02201 0                      PITCHANG
 2113   REF   5   LAST  492    42,3720   02201 0             STORE    PITCHANG
 2114                          42,3721   47375 C   NOAOJLST  VLCAO    VXV
 2115   REF   1                42,3722   00001 0                      UR           Z = (UR X URP)
 2116   REF   2   LAST  492    42,3723   00007 0                      URP
 2117                          42,3724   77772 0             VSL1
 2118   REF  14   LAST  492    42,3725   16205 1             STOOL    FLM          Z VEC  B-1
 2119   REF   6   LAST  492    42,3726   02201 0                      PITCHANG
 2120                          42,3727   74356 1             SIN      VXSC
 2121   REF   3   LAST  492    42,3730   06516 0                      HIUNITZ
 2122                          42,3731   71525 0             POOL     COS
 2123   REF   7   LAST  492    42,3732   02201 0                      PITCHANG
 2124                          42,3733   52361 1             VXSC     VSU
 2125   REF   1                42,3734   06522 1                      HIUNITX      (UX COS ALPHA) - (UZ SIN ALPHA)
 2126                          42,3735   63241 0             OOT      PDVL         YAW.Z
 2127   REF  15   LAST  492    42,3736   02205 1                      RLM
 2128   REF  16   LAST  492    42,3737   02205 1                      RLM
 2129                          42,3740   75246 0             ABVAL    SIGN
 2130                          42,3741   77736 0             ASIN
 2131   REF   2   LAST  491    42,3742   02203 1             STORE    YAWANG
 2132                          42,3743   77776 1   SBANOEX   EXIT
 2133   REF   9   LAST  302    42,3744  3 1043 1             CA       EXTVBACT
 2134   REF  26   LAST  469    42,3745  7 4747 0             MASK     BIT5         IS BIT5 STILL ON
 2135                          42,3746  0 0006 1             EXTENO
 2136   REF  32   LAST  489    42,3747  1 5472 1             BZF      ENOEXT       NO
21362   REF   4   LAST  301    42,3750  3 5017 1             CAF      PRIO5
21364   REF   7   LAST  479    42,3751  0 5146 1             TC       PRIOCHNG
 2137   REF   1                42,3752  3 3765 0             CAF      V06N51       OISPLAY ANGLES
 2138   REF 104  LAST  489   42,3753  0 4616 1             TC       BANKCALL
 2139   REF   5  LAST  301   42,3754   20353 0             CADR     GOMARKER
 2140   REF   7  LAST  301   42,3755  0 5563 1             TC       B5OFF            TERMINATE
 2141   REF   8  LAST  493   42,3756  0 5563 1             TC       B5OFF            PROCEED
 2142   REF  67  LAST  479   42,3757  0 5155 0             TC       ENDOFJOB         RECYCLE
 2143   REF  24  LAST  461   42,3760  3 4751 0             CAF      BIT3             IMMEDIATE RETURN
 2144   REF   8  LAST  301   42,3761  0 5464 1             TC       BLANKET          BLANK R3
 2145   REF   4  LAST  301   42,3762  3 4740 0             CAF      PRIO4
 2146   REF   8  LAST  492   42,3763  0 5146 1             TC       PRIOCHNG
 2148   REF   2  LAST  282   42,3764  0 3606 1             TC       SBANDANT         YES, CONTINUE DISPLAYING ANGLES.
 2150                        42,3765   01463 1  V06N51     VN       0651
 2151                        42,3766   26501 1  1CVSQRT2   2DEC     .7071067815      1/SQRT(2)
 2151                        42,3767   07463 1
 2152                           0000            UR         EQUALS 00
 2153                           0006            URP        EQUALS 6D
 2154   REF   6  LAST  475   30,2000                       SBANK= LOWSUPER

*** END OF LEMONAID.104 ***
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 0001                        25,2003                          BANK    25
 0002    REF    1            25,2000                          SETLOC  RRLEADIN
 0003                        25,2003                          BANK

 0004    REF    7  LAST  317 E4,1600                          EBANK=  RSTACK

R0005    RADAR SAMPLING LOOP.

 0006    REF    1                                             COUNT*  $$/RLEAD
 0007    REF    7  LAST  281 25,2003  11'777 0  RADSAMP       CCS     RSAMPDT          TIMES NORMAL ONCE-PER-SECOND SAMPLING.
 0008                        25,2004  1 2006 1                TCF     +2
 0009    REF   15  LAST  472 25,2005  1 5261 0                TCF     TASKOVER         +0 INSERTED MANUALLY TERMINATES TEST.

 0010    REF   19  LAST  471 25,2006  0 5203 0                TC      WAITLIST
 0011    REF    8  LAST  494 E4,1600                          EBANK=  RSTACK
 0012    REF    2  LAST  279 25,2007   02003 0                2CADR   RADSAMP
 0012                        25,2010   52064 1
 0013    REF    1            25,2011  3 7716 0                CAF     PRIO25
 0014    REF    9  LAST  472 25,2012  0 5072 1                TC      NOVAC
 0015    REF    9  LAST  494 E4,1600                          EBANK=  RSTACK
 0016    REF    1            25,2013   02023 1                2CADR   DORSAMP
 0016    REF    1            25,2014   52064 1
 0017    REF   47  LAST  480 25,2015  3 4736 1                CAF     BIT14            FOR CYCLIC SAMPLING, RTSTDEX =
 0018                        25,2016  0 0006 1                EXTEND                   RTSTLOC/2 + RTSTBASE
 0019    REF    3  LAST  280 25,2017  7 1776 1                MP      RTSTLOC
 0020    REF    4  LAST  281 25,2020  6 1775 0                AD      RTSTBASE         0 FOR RR, 2 FOR LR.
 0021    REF    4  LAST  280 25,2021  55'773 1                TS      RTSTDEX
 0022    REF   16  LAST  494 25,2022  1 5261 0                TCF     TASKOVER

R0023    DO THE ACTUAL RADAR SAMPLE.

 0024    REF    1            25,2023  0 2060 0  DORSAMP       TC      VARADAR          SELECTS VARIABLE RADAR CHANNEL.
 0025    REF  105  LAST  493 25,2024  0 4616 1                TC      BANKCALL
 0026    REF    3  LAST  270 25,2025   17705 0                CADR    RADSTALL

 0027    REF    2  LAST  278 25,2026  25'575 1                INCR    RFAILCNT         ADVANCE FAIL COUNTER BUT ACCEPT BAD DATA

 0028                        25,2027  0 0004 0  DORSAMP2      INHINT
 00281   REF   15  LAST  478 25,2030  3 0101 1                CA      FLAGWRD5         DON'T UPDATE RSTACK IF IN R77.
 00282   REF    3  LAST  282 25,2031  7 4741 0                MASK    R77FLBIT
 00283   REF  164  LAST  480 25,2032  10 000 0                CCS     A
 00284   REF    1            25,2033  1 2050 1                TCF     R77IN

 0029    REF    2  LAST  103 25,2034  53'101 1                DXCH    SAMPLSUM
 0030    REF    4  LAST  494 25,2035  51'776 0                INDEX   RTSTLOC
 0031    REF   10  LAST  494 25,2036  53'601 0                DXCH    RSTACK

 00311   REF   32  LAST  474 25,2037  3 0110 1                CA      RADMODES
 00312                       25,2040  0 0006 1                EXTEND
 00313   REF    7  LAST  420 25,2041  06 033 1                RXOR    CHAN33
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L        RADAR LEADIN ROUTINES                                                        USER'S PAGE NO.   2       E4 S3

 00314  REF  38  LAST  466   25,2042  7 4746 1            MASK     BIT6
 00315                       25,2043  0 0006 1            EXTEND
 00316  REF   2  LAST  494   25,2044  1 2050 1            BZF      R77IN

 00317  REF  20  LAST  390   25,2045  0 5567 0            TC       ALARM
 00318                       25,2046   00522 1            OCT      522
 00319  REF   3  LAST  494   25,2047  25'575 1            INCR     RFAILCNT

 0038   REF   5  LAST  494   25,2050  4 1776 1  R77IN     CS       RTSTLOC          CYCLE RTSTLOC
 0039   REF   2  LAST  279   25,2051  6 1774 1            AD       RTSTMAX
 0040                        25,2052  0 0006 1            EXTEND
 0041                        25,2053  1 2056 1            BZF      +3
 0042   REF   6  LAST  495   25,2054  3 1776 0            CA       RTSTLOC
 0043   REF  32  LAST  462   25,2055  6 4752 0            AD       TWO              STORAGE IS DP
 0044   REF   7  LAST  495   25,2056  55'776 1            TS       RTSTLOC
 0045   REF  68  LAST  493   25,2057  1 5155 1            TCF      ENDOFJOB         CONTINUOUS SAMPLING AND 2N TRIES - GONE.

R0056   VARIABLE RADAR DATA CALLER FOR ONE MEASUREMENT ONLY.

 0057   REF  60  LAST  474   25,2060  3 4753 1  VARADAR   CAF      ONE              WILL BE SENT TO RADAR ROUTINE IN A BY
 0058   REF   5  LAST  478   25,2061  54 133 1            TS       BUF2             SWCALL.
 0059   REF   5  LAST  494   25,2062  51'773 0            INDEX    RTSTDEX
 0060   REF   1              25,2063  3 2065 0            CAF      RDRLOCS
 0061   REF   3  LAST  372   25,2064  1 4622 1            TCF      SWCALL           NOT TOUCHING Q.

 0062   REF   1              25,2065   53114 0  RDRLOCS   CADR     RRRANGE          =0
 0063   REF   1              25,2066   53112 0            CADR     RRRDOT           =1
 0064   REF   1              25,2067   53110 1            CADR     LRVELX           =2
 0065   REF   1              25,2070   53106 0            CADR     LRVELY           =3
 0066   REF   1              25,2071   53104 1            CADR     LRVELZ           =4
 0067   REF   1              25,2072   53102 1            CADR     LRALT            =5
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P0001    RENDEZVOUS NAVIGATION PROGRAM 20
R0002    PROGRAM DESCRIPTION
R0003    MOD NO - 2
R0004    BY  P. VOLANTE
R0005    FUNCTIONAL DESCRIPTION
R0006
R0007      THE PURPOSE OF THIS PROGRAM IS TO CONTROL THE RENDEZVOUS RADAR FROM
R0008    STARTUP THROUGH ACQUISITION AND LOCKON TO THE CSM AND TO UPDATE EITHER
R0009    THE LM OR CSM STATE VECTOR (AS SPECIFIED BY THE ASTRONAUT BY DSKY ENTRY)
R0010    ON THE BASIS OF THE RR TRACKING DATA.
R0011    CALLING SEQUENCE -
R0012
R0013    ASTRONAUT REQUEST THROUGH DSKY V37E20E
R0014    SUBROUTINES CALLED
R0015      R02BOTH (IMU STATUS CHECK)                   FLAGUP
R0016      GOFLASH (PINBALL-DISPLAY)                    FLAGDOWN
R0017      R23LEM  (MANUAL ACQUISITION)                 BANKCALL
R0018      LS201   (LOS DETERMINATION)                  TASKOVER
R0019      LS202   (RANGE LIMIT TEST)
R0020      R61LEM  (PREFERRED TRACKING ATTITUDE)
R0021      R21LEM  (RR DESIGNATE)                       ENDOFJOB
R0022      R22LEM  (DATA READ)                          GOPERF1
R0023      R31LEM  (RENDEZVOUS PARAMETER DISPLAY)
R0024      PRIOLARM (PRIORITY DISPLAY)
R0025    NORMAL EXIT MODES-
R0026      P20 MAY BE TERMINATED IN TWO WAYS-ASTRONAUT SELECTION OF IDLING
R0027    PROGRAM (P00) BY KEYING V37E00E OR BY KEYING IN V56E
R0028    ALARM OR ABORT EXIT MODES-
R0029      RANGE GREATER THAN 400 NM DISPLAY
R0030    OUTPUT
R0031      TRKMKCNT = NO OF RENDEZVOUS TRACKING MARKS TAKEN (COUNTER)
R0032    ERASABLE INITIALIZATION REQUIRED
R0033    FLAGS SET + RESET
R0034      SRCHOPT,RNDVZFLG,ACMODFLG,VEHUPFLG,UPDATFLG,TRACKFLG,
R0035    DEBRIS
R0036      CENTRALS-A,Q,L
 0037    REF    7  LAST   493    30,2000                          SBANK= LOWSUPER         FOR LOW 2CADR'S.

 0038                            33,2045                          BANK    33
 0039    REF    1                24,2000                          SETLOC  P20S
 0040                            24,2000                          BANK

 0041    REF    7  LAST   270    E7,1456                          EBANK=  LOSCOUNT
 0042    REF    1                                                 COUNT*  $$/P20
 0042I   REF    2  LAST   236    24,2000             PROG22       =       PROG20
 0043    REF    1                24,2000  0 5327 1   PROG20       TC      2PHSCHNG
 0044                            24,2001   00004 0                OCT     4
 0045                            24,2002   05022 1                OCT     05022
 0046                            24,2003   26000 0                OCT     26000           PRIORITY 26
 0047    REF    1                24,2004  0 2670 1                TC      LUNSFCHK        CHECK IF ON LUNAR SURFACE
 004B   REF   1                24,2005   C 2007 1            TC       ORECHGO        YES
 0049   REF   1                24,2006   0 2036 0            TC       PROG20A -2     NO - CONTINUE WITH P20
 0050   REF  17  LAST  4B9     24,2007   0 5504 0  ORECHGO   TC       UPFLAG         SET VEHUPFLG - CSM STATE
 0051   REF   3  LAST  291     24,2010    00026 0            AORES    VEHUPFLG       VECTOR TO BE UPDATEO
 0052   REF  61  LAST  495     24,2011   3 4753 1            CAF      ONE            SET R2 FOR OPTION CSM WILL NOT
 0053   REF   1                24,2012  55'144 0             TS       OPTION2        CHANGE PRESENT ORBIT
 0054   REF   1                24,2013   3 4363 0            CAF      OCT00012
 0055   REF 106  LAST  494     24,2014   0 4616 1            TC       BANKCALL       OISPLAY ASSUMEO CSM ORBIT OPTION
 0056   REF   1                24,2015    20634 1            CAOR     GOPERF4
 0057   PEF   4  LAST  479     24,2016   C 6001 0            TC       GOTOPOOH       TERMINATE
 0058   REF   1                24,2017   0 2021 0            TC       ORBCHG1        PROCEEO VALUE OF ASSUMEO OPTION OK
 0059                          24,2020   C 2013 1            TC       -5             R2 LOAOEO THRU DSKY
 0060   REF  62  LAST  497     24,2021   4 4753 0  ORECHG1   CS       ONE
 0061   REF   2  LAST  497     24,2022   6 1144 1            AO       OPTION2
 0062                          24,2023   C 0006 1            EXTENO
 0063   REF   2  LAST  497     24,2024   1 2040 0            BZF      PROG20A
 0064   REF   1                24,2025   3 2311 0            CAF      V06N33*
 0065   REF 107  LAST  497     24,2026   C 4616 1            TC       BANKCALL       FLASH VERB-NOUN TO REQUEST ESTIMATEO
 0066   REF   7  LAST  489     24,2027    20477 1            CAOR     GOFLASH        TIME OF LAUNCH
 0067   REF   5  LAST  497     24,2030   C 6001 0            TC       GOTCPCCH       TERMINATE
 0068   REF   1                24,2031   0 2033 0            TC       ORBCHG2        PROCEEO VALUES OK
 0069                          24,2032   0 2025 1            TC       -5             TIME LOAOEO THRU OSKY
 0070   REF  32  LAST  490     24,2033   0 6042 1  ORBCHG2   TC       INTPRET
 0071                          24,2034    77650 1            GOTO
 0072   REF   1                24,2035    64217 1                     ORECHG3
 0073                          32,2217                       BANK     32
 0074   REF   1                32,2000                       SETLOC   P20S4
 0075                          32,2217                       BANK
 0076   REF   1                                              COUNT*   $$/P20

 0077                          32,2217    77624 1  ORECHG3   CALL
 0078   REF   5  LAST  299     32,2220    27410 1                     INTSTALL
 0079                          32,2221    77745 1            OLOAO
 00B0   REF   9  LAST  30B     32,2222    03442 0                     TIG
 00B01  REF   2  LAST  150     32,2223    03661 0            STORE    LNCHTM
 00B1   REF   7  LAST  491     32,2224    00041 1            STORE    TOEC1          ESTIMATED LAUNCH TIME
 00B2                          32,2225    43014 0            CLEAR    CLEAR
 00B3   REF   4  LAST  238     32,2226    01674 0                     VINTFLAG       LM INTEGRATION
 00B4   REF   1                32,2227    01673 1                     INTYPFLG       PRECISION - ENCKE
 0085                          32,2230    43014 0            CLEAR    CLEAR
 0086   REF   3  LAST  23B     32,2231    01676 1                     OIMOFLAG       NO W-MATRIX
 0087   REF   2  LAST  23B     32,2232    01675 1                     060R9FLG
 00BB                          32,2233    77624 1            CALL
 00B9   REF   3  LAST  23B     32,2234    27133 0                     INTEGRV        PLANETARY INERTIAL ORIENTATION
 0090                          32,2235    77624 1            CALL
 0091   REF   1                32,2236    11210 1                     GRP2PC
 0092                          32,2237    77775 1            VLOAO
 0093   REF   2  LAST  211     32,2240    00017 1                     RATT1
 0094   REF   2  LAST  150     32,2241    17631 0            STCOL    RSUBL          SAVE LM POSITION
 0095   REF   4  LAST  491     32,2242    00015 0                     TAT
 0096    REF    8  LAST  497    32,2243    24041 0              STCALL TDEC1
 0097    REF    6  LAST  497    32,2244    27410 1                     INTSTALL
 0098                           32,2245    43014 0              SET    CLEAR
 0099    REF    5  LAST  497    32,2246    01474 1                     VINTFLAG         CSM INTEGRATION
 0100    REF    2  LAST  497    32,2247    01673 1                     INTYPFLG
 0101                           32,2250    43014 0              CLEAR  BOFF
 0102    REF    4  LAST  497    32,2251    01676 1                     DIMOFLAG
 0103    REF    3  LAST  238    32,2252    02756 1                     RENDWFLG         W MATRIX VALID
 0104    REF    1               32,2253    64257 0                     NOWMATX          NO
 0105                           32,2254    43014 0              SET    SET              YES - SET FOR W MATRIX
 0106    REF    5  LAST  498    32,2255    01476 0                     DIMOFLAG
 0107    REF    3  LAST  497    32,2256    01475 0                     D6OR9FLG
 0108                           32,2257    77624 1  NOWMATX     CALL
 0109    REF    4  LAST  497    32,2260    27133 0                     INTEGRV          CSM INTEGRATION
 0110                           32,2261    77624 1              CALL
 0111    REF    2  LAST  497    32,2262    11210 1                     GRP2PC
 0112                           32,2263    77775 1              VLOAD
 0113    REF    6  LAST  211    32,2264    00025 0                     VATT1
 0114    REF    1               32,2265    25761 0              STOVL  VSUBC            SAVE CSM VELOCITY
 0115    REF    3  LAST  497    32,2266    00017 1                     RATT1
 0116    REF    1               32,2267    01101 0              STORE  RSUBC            SAVE CSM POSITION
 0117                           32,2270    53435 0              VXV    UNIT             COMPUTE NORMAL TO CSM ORBITAL PLANE
 0118    REF    2  LAST  498    32,2271    01761 0                     VSUBC            NSUB1=UNIT(R(CM) CROSS V(CM)
 0119                           32,2272    24025 0              STOVL  200              SAVE NSUB1
 0120    REF    3  LAST  497    32,2273    03631 0                     RSUBL            COMPUTE ESTIMATED ORBITAL
 0121                           32,2274    53435 0              VXV    UNIT             PLANE CHANGE
 0122                           32,2275    00025 0                     200              UCSM = UNIT(R(LM) CROSS NSUB1)
 0123    REF    2  LAST  150    32,2276    27637 0              STOVL  UCSM
 0124    REF    2  LAST  498    32,2277    01101 0                     RSUBC            COMPUTE ANGLE BETWEEN UCSM
 0125                           32,2300    50256 0              UNIT   DOT              AND RSUBC
 0126    REF    3  LAST  498    32,2301    03637 0                     UCSM             COS A = UCSM DOT UNIT (R(CM))
 0127                           32,2302    77752 1              SL1
 0128    REF    2  LAST  126    32,2303    02732 0              STORE  CSTH             SAVE ODE TIME-THETA SUBROUTINE
 0129                           32,2304    44316 0              DSQ    BDSU             COMPUTE SINE A
 0130    REF    1               32,2305    06514 1                     ONEB-2
 0131                           32,2306    77766 0              SQRT
 0132    REF    2  LAST  126    32,2307    26730 1              STOVL  SNTH             SAVE FOR TIME-THETA SUBROUTINE
 0133    REF    3  LAST  498    32,2310    01101 0                     RSUBC            POSITION OF CSM AT EST. LAUNCH
 0134    REF    1               32,2311    26655 0              STOVL  RVEC             TIME FOR TIME-THETA   B-27
 0135    REF    3  LAST  498    32,2312    01761 0                     VSUBC            VELOCITY OF CSM AT EST. LAUNCH
 01351                          32,2313    77676 0              VCOMP
 0136    REF    2  LAST  126    32,2314    02744 1              STORE  VVEC             TIME FOR TIME THETA   B-5
 0137                           32,2315    45014 0              CLEAR  CALL
 0138    REF    1               32,2316    03666 1                     RVSW
 0139    REF    1               32,2317    24732 1                     TIMETHET
 01391                          32,2320    77676 0              VCOMP
 0140    REF    2  LAST  150    32,2321    03645 0              STORE  NEWVEL           TERMINAL VELOCITY OF CSM
 01401                          32,2322    77745 1              DLOAD
 01402   REF    1               32,2323    00037 0                     T
 01403   REF    2  LAST  150    32,2324    27663 1              STOVL  TRANSTM          TRANSFER TIME
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01404  REF   3  LAST 498   32,2325   03645 0                   NEWVEL
0141                       32,2326   77646 0           ABVAL
01411                      32,2327   24025 0           STOVL   20D
0142                       32,2330   00001 0                   0D
0143   REF   2  LAST 150   32,2331   03653 1           STORE   NEWPOS      TERMINAL POSITION OF CSM
0144                       32,2332   53435 0           VXV     UNIT        COMPUTE NORMAL TO CSM ORBITAL PLANE
0145   REF   4  LAST 498   32,2333   03631 0                   RSUBL       NSUB2 = UNIT(NEWPOS CROSS R(LM))
0146                       32,2334   53435 0           VXV     UNIT        ROTATE TERMINAL VEL INTO DESIRED
0147   REF   3  LAST 499   32,2335   03653 1                   NEWPOS      ORBITAL PLANE
0148                       32,2336   76561 1           VXSC    VSL1        VSUBC = ABVAL(NEWVEL) $ UNIT( NSUB2
0149                       32,2337   00025 0                   20D
0150   REF   1             32,2340   37665 0           STCALL  NCSMVEL     NEW CSM VELOCITY
0151   REF   3  LAST 498   32,2341   11210 1                   GRP2PC
0152                       32,2342   77624 1           CALL
0153   REF   7  LAST 498   32,2343   27410 1                   INTSTALL
0154                       32,2344   44345 0           DLOAD   BDSU
0155   REF   3  LAST 498   32,2345   03663 1                   TRANSTM     LAUNCH TIME - TRANSFER TIME
01551  REF   3  LAST 497   32,2346   03661 0                   LNCHTM
0156   REF   4  LAST 322   32,2347   25517 0           STOVL   TFT
0157   REF   4  LAST 499   32,2350   03653 1                   NEWPOS
0158   REF   4  LAST 323   32,2351   01535 0           STORE   RCV
0159   REF   2  LAST 111   32,2352   25503 0           STOVL   RRECT
0160   REF   2  LAST 499   32,2353   03665 1                   NCSMVEL
0161   REF   2  LAST 111   32,2354   35511 1           STCALL  VRECT
0162   REF   1             32,2355   27705 0                   MINIRECT
01621                      32,2356   45174 1           AXT,2   CALL
01622                      32,2357   00002 0                   2
0163   REF   2  LAST  37   32,2360   26660 0                   ATOPCSM
0164                       32,2361   77624 1           CALL
0165   REF   1             32,2362   27417 0                   INTWAKE0
0166                       32,2363   77776 1           EXIT
0167   REF 108  LAST 497   32,2364  0 4616 1           TC      BANKCALL
0168   REF   3  LAST 497   32,2365   50040 0           CADR    PROG20A
0169                       24,2036                     BANK    24
0170   REF   2  LAST 496   24,2000                     SETLOC  P20S
0171                       24,2036                     BANK
0172   REF   2 LAST 496 TO 497:    30      30*         COUNT*  $$/P20

0173   REF  27  LAST 478   24,2036  0 5516 0           TC      DOWNFLAG    RESET VEHUPFLG- LM STATE VECTOR
0174   REF   4  LAST 497   24,2037   00026 0           ADRES   VEHUPFLG    TO BE UPDATED
0175   REF 109  LAST 499   24,2040  0 4616 1  PROG20A  TC      BANKCALL
0176   REF   2  LAST 341   24,2041   11233 0           CADR    R02BOTH
0177   REF  18  LAST 497   24,2042  0 5504 0           TC      UPFLAG
0178   REF   2  LAST 289   24,2043   00027 1           ADRES   UPDATFLG    SET UPDATE FLAG
0179   REF  19  LAST 499   24,2044  0 5504 0           TC      UPFLAG
0180   REF   2  LAST 289   24,2045   00031 0           ADRES   TRACKFLG    SET TRACK FLAG
0181   REF  20  LAST 499   24,2046  0 5504 0           TC      UPFLAG
0182   REF   2  LAST 289   24,2047   00010 0           ADRES   RNDVZFLG    SET RENDEZVOUS FLAG
0183   REF  38  LAST 499   24,2050  0 5516 0           TC      DOWNFLAG
0184   REF   2  LAST 289   24,2051   00037 0           ADRES   SRCHOPTN    INSURE SEARCH OPTION OFF
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L         P20-P25                                                                                    USER'S PAGE NO.   5        E7 S3

 0185   REF  39  LAST  499    24,2052  0 5516 0            TC      OOWNFLAG      ALSO MANUAL ACCUISITION FLAG RESET
 0186   REF   1               24,2053   00040 0            ADRES   ACMCOFLG
 0187   REF  40  LAST  500    24,2054  0 5516 0            TC      OOWNFLAG     \TURN CFF RO4FLAG TO ENSURE GETTING
 0188   REF   5  LAST  281    24,2055   00063 1            AORES   RO4FLAG       ALARM 521 IF CANT REAO RADAR
 0189   REF  41  LAST  500    24,2056  0 5516 0            TC      OOWNFLAG      ENSURE R25 GIMBAL MONITOR IS ENA8LEO
 0190   REF   3  LAST  272    24,2057   00126 1            AORES   NORRMON       (RESET NORRMON FLAG)
 0191   REF  42  LAST  500    24,2060  0 5516 0            TC      OOWNFLAG      RESET LOS 8EING COMPUTED FLAG
 0192   REF   1               24,2061   00041 1            AORES   LOSCMFLG
 0193   REF   5  LAST  290    24,2062  0 6011 1            TC      CLRAOMOO
 0195   REF   6  LAST  479    24,2063  0 5353 1  P20LEM1   TC      PHASCHNG
 0196                         24,2064   04022 0            OCT     04022
 0197   REF 106  LAST  475    24,2065  3 4755 1            CAF     ZERO          ZERO MARK COUNTER
 0198   REF   1               24,2066  55'462 1            TS      MARKCTR
 0199   REF  33  LAST  497    24,2067  0 6042 1            TC      INTPRET       LOS OETERMINATION ROUTINE
 0200                         24,2070   77634 0            RT8
 0201   REF   6  LAST  491    24,2071   21574 1                    LCAOTIME
 0202   REF   9  LAST  498    24,2072   34041 0            STCALL  TOEC1
 0203   PEF   1               24,2073   51256 1                    LPS20.1
 0204                         24,2074   77624 1            CALL
 0205   REF   1               24,2075   53570 0                    LPS20.2       TFST RANGE R/UTINE
 0206                         24,2076   77776 1            EXIT
 0207   REF 236  LAST  479    24,2077  50 154 1            INOEX   MPAC
 0208                         24,2100  0 2101 0            TC      +1
 0209   REF   1               24,2101  0 2111 1            TC      P20LEMA       NORMAL PETURN WITHIN 400 N M
 0210   REF   1               24,2102  3 2305 0  526ALARM  CAF     ALRM526       ERROR EXIT - RANGF > 400 N. MI.
 0211   REF 110  LAST  499    24,2103  0 4616 1            TC      8ANKCALL
 0212   PEF   1               24,2104   21563 1            CAOR    PRIOLARM
 0213   REF   2  LAST  479    24,2105  0 6025 0            TC      GOTOV56       TERMINATE EXITS P20 VIA V56 CODING
 0214                         24,2106  0 2102 0            TC      -4            PROC (ILLEGAL
 0215   REF   1               24,2107  0 2063 0            TC      P20LEM1       ENTER RECYCLE
 0216   REF  69  LAST  495    24,2110  0 5155 0            TC      ENDOFJCB


 0217   REF   7  LAST  500    24,2111  0 5353 1  P20LEMA   TC      PHASCHNG
 0218                         24,2112   04022 0            OCT     04022
 0219   REF   2  LAST  496    24,2113  0 2670 1            TC      LUNSFCHK      CHECK LUNAR SURFACE FLAG (P22 FLAG)
 0220   REF   1               24,2114  0 2117 1            TC      P20LEMB
 0221   REF 111  LAST  500    24,2115  0 4616 1            TC      8ANKCALL
 0222   REF   1               24,2116   46116 0            CAOR    R61LEM        PREFERREO TRACKING ATTITUOE ROUTINE
 0223   REF   8  LAST  500    24,2117  0 5353 1  P20LEM8   TC      PHASCHNG
 0224                         24,2120   05022 1            OCT     05022         RESTART AT PRIORITY 10 TO ALLOW V37
 0225                         24,2121   10000 0            OCT     10000         REQUESTEO PROGRAM TC RUN FIPST
 0226   REF   3  LAST  479    24,2122  3 7717 1            CAF     PRIO26        RESTORE PRIORITY 26
 0227   REF   9  LAST  493    24,2123  0 5146 1            TC      PRICCHNG
 02272  REF  16  LAST  479    24,2124  3 0075 0            CA      FLAGWRO1      IS THE TRACK FLAG SET
 02274  REF   4  LAST  479    24,2125  7 4747 0            MASK    TRACKBIT
 02276                        24,2126  0 0006 1            EXTENO
 02278  REF   1               24,2127  1 2232 1            BZF     P20LEMWT       BRANCH - NO - WAIT FOR IT TO 8E SET
 0228   REF  26  LAST  461    24,2130  3 4752 0  P20LEMB7  CAF     BIT2          IS RR AUTO MOOE OISCRETE PRESENT
 0229                         24,2131  0 0006 1            EXTENO
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0230   REF   8  LAST  494   24,2132  02 033 0              RAND     CHAN33
0231                        24,2133  0 0006 1              EXTEND
0232   REF   1              24,2134  1 2170 1              BZF      P20LEMB3       YES - DO AUTOMATIC ACQUISITION (R21)


0233   REF   4  LAST  298   24,2135  4 6007 1   P20LEMB5   CS       OCT24          RADAR NOT IN AUTO CHECK IF
0234   REF   9  LAST  479   24,2136  6 1010 1              AD       MODREG         MAJOR MODE IS 20
0235                        24,2137  0 0006 1              EXTEND
0236   REF   1              24,2140  1 2153 0              BZF      P20LEMB6       BRANCH - YES-OK TO DO PLEASE PERFORM


02363  REF   3  LAST  406   24,2141  6 7751 0              AD       NEG2           ALSO CHECK FOR P22
02366                       24,2142  0 0006 1              EXTEND
02369  REF   2  LAST  501   24,2143  1 2153 0              BZF      P20LEMB6       BRANCH - YES OK TO DO PLEASE PERFORM
0241   REF   1              24,2144  3 2307 1              CAF      ALRM514        TRACK FLAG SET-FLASH PRIORITY ALARM 514-
0242   REF 112  LAST  500   24,2145  0 4616 1              TC       BANKCALL       RADAR GOES OUT OF AUTO MODE WHILE IN USE
0243   REF   2  LAST  500   24,2146   21563 1              CADR     PRIOLARM
0244   REF   3  LAST  500   24,2147  0 6025 0              TC       GOTOV56        TERMINATE EXITS VIA V56
0245   REF   2  LAST  500   24,2150  0 2117 1              TC       P20LEMB        PROCEED AND ENTER BOTH GO BACK
0246   REF   3  LAST  501   24,2151  0 2117 1              TC       P20LEMB        TO CHECK AUTO MODE AGAIN
0247   REF  70  LAST  500   24,2152  0 5155 0              TC       ENDOFJOB
0248   REF   1              24,2153  3 2306 0   P20LEMB6   CAF      OCT201         REQUEST RR AUTO MODE SELECTION
0249   REF 113  LAST  501   24,2154  0 4616 1              TC       BANKCALL
0250   REF   1              24,2155   20624 0              CADR     GOPERF1
0251   REF   4  LAST  501   24,2156  0 6025 0              TC       GOTOV56        TERMINATE EXITS P20 VIA V56 CODING
0252   REF   4  LAST  501   24,2157  0 2117 1              TC       P20LEMB        PROCEED CHECKS AUTO MODE DISCRETE AGAIN
0253   REF   3  LAST  500   24,2160  0 2670 1              TC       LUNSFCHK       ENTER INDICATES MANUAL ACQUISITION (R23)
0254   REF   1              24,2161  0 2166 1              TC       P20LEMB2       YES - R23 NOT ALLOWED-TURN ON OPR ERROR
0255   REF   1              24,2162  0 3137 1              TC       R23LEM         NO - DO MANUAL ACQUISITION


0256   REF  21  LAST  499   24,2163  0 5504 0   P20LEMB1   TC       UPFLAG         RETURN FROM R23 - LOCKON ACHIEVED
0257   REF   2  LAST  500   24,2164   00040 0              ADRES    ACMODFLG       SET MANUAL FLAG AND GO BACK TO CHECK
0258   REF   5  LAST  501   24,2165  0 2117 1              TC       P20LEMB        RR AUTO MODE


0259   REF   6  LAST  450   24,2166  0 4364 1   P20LEMB2   TC       FALTON         TURNS ON OPERATOR ERROR LIGHT ON DSKY
0260   REF   6  LAST  501   24,2167  0 2117 1              TC       P20LEMB        AND GOES BACK TO CHECK AUTO MODE


0261   REF  33  LAST  494   24,2170  4 0110 0   P20LEMB3   CS       RADMODES       ARE RR CDUS BEING ZEROED
0262   REF   1              24,2171  7 4737 1              MASK     RCDU0BIT
0263                        24,2172  0 0006 1              EXTEND
0264   REF   1              24,2173  1 2205 0              BZF      P20LEMB4       BRANCH - YES - WAIT
0265   REF   5  LAST  295   24,2174  3 4355 0              CAF      BIT13-14       IS SEARCH OR MANUAL ACQUISITION FLAG SET
0266   REF   7  LAST  336   24,2175  7 0076 1              MASK     FLAGWRD2
0267                        24,2176  0 0006 1              EXTEND
0268   REF   1              24,2177  1 2211 0              BZF      P20LEMC3       ZERO MEANS AUTOMATIC RR ACQUISTION
0269   REF  43  LAST  500   24,2200  0 5516 0              TC       DOWNFLAG       RESET TO AUTO MODE
0270   REF   3  LAST  499   24,2201   00037 0              ADRES    SRCHOPTN
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 0271   REF  44  LAST  501   24,2202  0 5516 0            TC      OOWNFLAG
 0272   REF   3  LAST  501   24,2203   00040 0            AORES   ACMOOFLG
 0273   REF   2  LAST  500   24,2204  0 2232 0            TC      P20LEMWT      WAIT 2.5 SECONDS THEN GO TO RR OATA REAO


 0274   REF   1              24,2205  3 2304 1  P2DLEMB4  CAF     25DOEC
 D275   REF 114  LAST  501   24,2206  0 4616 1            TC      BANKCALL      WAIT 2.5 SECONDS WHILE RR CDUS ARE BEING
 0276   REF   7  LAST  302   24,2207   01736 1            CAOR    OELAYJDB      ZEROED-THEN GO BACK ANO CHECK AGAIN
 0277   REF   2  LAST  501   24,2210  0 217D 0            TC      P20LEMB3


 027705 REF  34  LAST  500   24,2211  0 6042 1  P20LEMC3  TC      INTPRET
 02771                       24,2212   77634 0            RTB
 027715 REF   7  LAST  500   24,2213   21574 1                    LOADTIME
 02772  REF  10  LAST  500   24,2214   34041 0            STCALL  TOEC1
 027725 REF   1              24,2215   50312 1                    UPPSV
 02779                       24,2216   77776 1  P20LEMC4  EXIT
 0278   REF   9  LAST  500   24,2217  0 5353 1  P20LEMC   TC      PHASCHNG
 0279                        24,2220   04022 0            OCT     04022
 0280   REF  20  LAST  479   24,2221  30 074 1            CAE     FLAGWROO      IS THE RENDEZVOUS FLAG SET
 0281   REF   4  LAST  479   24,2222  7 4745 1            MASK    RNOVZBIT
 0282                        24,2223  0 0006 1            EXTEND
 0283   REF  71  LAST  501   24,2224  1 5155 1            BZF     ENOCFJOB      NO - EXIT P20
 0284   REF  17  LAST  500   24,2225  30 D75 0            CAE     FLAGWRO1      IS TRACK FLAG SET  (BIT 5 FLAGWORO 1)
 0285   REF   5  LAST  500   24,2226  7 4747 0            MASK    TRACKBIT
 0286                        24,2227  D 0006 1            EXTEND
 0287   REF   1              24,2230  1 2264 1            BZF     P20LEMO       BRANCH-TRACK FLAG NOT ON-WAIT 15 SECONDS
 0288   REF   1              24,2231  0 2675 1  P20LEMF   TC      R21LEM


 0291   REF   2  LAST  502   24,2232  3 2304 1  P20LEMWT  CAF     2500EC
 D293   REF   5  LAST  386   24,2233  0 5173 1            TC      TWIDDLE       USE INSTEAO OF WAITLIST SINCE SAME BANK
 0294   REF   2  LAST  241   24,2234   D2244 1            AORES   P2CLEMC1      WAIT 2.5 SECONDS
 0295   REF  18  LAST  502   24,2235  3D 075 D            CAE     FLAGWRD1      IS TRACK FLAG SET
 0296   REF   6  LAST  502   24,2236  7 4747 0            MASK    TRACKBIT
 0297                        24,2237  0 0006 1            EXTEND
 0298   REF  72  LAST  502   24,2240  1 5155 1            BZF     ENOOFJOB      NO-EXIT WITHOUT OOING 2.7 PHASE CHANGE
 D299   PEF  10  LAST  502   24,2241  0 5353 1  P20LMWT1  TC      PHASCHNG
 030D                        24,2242   40072 0            DCT     40072
 0301   REF  73  LAST  502   24,2243  0 5155 0            TC      ENCOFJCB


 03D2   REF  21  LAST  502   24,2244  30 074 1  P20LEMC1  CAE     FLAGWRDO      IS RENOEZVOUS FLAG SET
 03D3   REF   5  LAST  502   24,2245  7 4745 1            MASK    RNDVZBIT
 0304                        24,2246  0 0006 1            EXTEND
 0305   REF  17  LAST  494   24,2247  1 5261 0            BZF     TASKOVER      NO - EXIT P20/R22
 0306   REF  19  LAST  502   24,2250  30 075 0            CAE     FLAGWR01      IS TRACK FLAG SET
 0307   REF   7  LAST  502   24,2251  7 4747 0            MASK    TRACKBIT
 0308                        24,2252  0 00D6 1            EXTENO
 0309   REF   1              24,2253  1 2261 1            BZF     P20LEMC2      NO-OONT SCHEDULE R22 JOB
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0310   REF   4  LAST  500   24,2254  3 7717 1            CAF     PRIO26      YES-SCHEDULE R22 JOB (RR DATA READ)
0311   REF  17  LAST  465   24,2255  0 5105 0            TC      FINDVAC
0312   REF   8  LAST  496   E7,1456                      EBANK=  LOSCOUNT
0313   REF   1              24,2256   02631 1            2CADR   R22LEM42
0313   REF   1              24,2257   50067 0
0314   REF  18  LAST  502   24,2260  0 5261 1            TC      TASKOVER


0315   REF   1              24,2261  0 5221 0  P20LEMC2  TC      FIXDELAY    TRACK FLAG NOT SET ,WAIT 15 SECONDS
0316                        24,2262   02734 0            DEC     1500        AND CHECK AGAIN

0317   REF   3  LAST  502   24,2263  0 2244 1            TC      P20LEMC1

0318   REF   1              24,2264  3 2667 1  P20LEMD   CAF     1500DEC
0319   REF   6  LAST  502   24,2265  0 5173 1            TC      TWIDDLE     WAITLIST FOR 15 SECONDS
0320   REF   1              24,2266   02270 0            ADRES   P20LEM01
0321   REF  74  LAST  502   24,2267  0 5155 0            TC      ENDOFJOB


0322   REF  20  LAST  502   24,2270 30 075 0   P20LEMC1  CAE     FLAGWRD1    IS TRACK FLAG SET
0323   REF   8  LAST  502   24,2271  7 4747 0            MASK    TRACKBIT
0324   REF 165  LAST  494   24,2272 10 000 0             CCS     A
0325   REF   1              24,2273  1 2277 0            TCF     P20LEM02    YES-SCHEDULE DESIGNATE JOB
0326   REF   2  LAST  503   24,2274  0 5221 0            TC      FIXDELAY    NO-WAIT 15 SECONDS
0327                        24,2275   02734 0            DEC     1500
0328   REF   2  LAST  503   24,2276  0 2270 0            TC      P20LEM01


0329   REF   5  LAST  503   24,2277  3 7717 1  P20LEM02  CAF     PRIO26      SCHEDULE JOB TO DO R21
0330   REF  18  LAST  503   24,2300  0 5105 0            TC      FINDVAC
0331   REF   9  LAST  503   E7,1456                      EBANK=  LOSCOUNT
0332   REF   2  LAST  501   24,2301   02211 1            2CADR   P20LEMC3    START AT PERM. MEMORY INTEGRATION
0332                        24,2302   50067 0
0333   REF  19  LAST  503   24,2303  0 5261 1            TC      TASKOVER


0334                        24,2304   00372 1  250DEC    DEC     250
0335                        24,2305   00526 0  ALRM526   OCT     00526
0336                        24,2306   00201 1  OCT201    OCT     00201
0337                        24,2307   00514 1  ALRM514   OCT     514
0338                        24,2310   00074 1  MAXTRIES  DEC     60
0339   REF   3  LAST  474      4363            OCT00012  EQUALS  BINCON
0341   REF   3  LAST  354   23,2513            ONEB-2    EQUALS  DP1/4TH
03415                       24,2311   01441 1  VC6N33*   VN      0633
0342                        24,2312   45020 1  UPPSV     STQ     CALL        UPDATES PERMANENT STATE VECTORS
0343   REF   1              24,2313   01757 0                    LS21X        TO PRESENT TIME
0344   REF   8  LAST  499   24,2314   27410 1                    INTSTALL
0345                        24,2315   77624 1            CALL
0346   REF   2  LAST  238   24,2316   26643 1                    SETIFLGS
0347                        24,2317   43014 0            BOF     SET         IF W-MATRIX INVALID,DONT INTEGRATE IT
```

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 0348   REF   4  LAST  498   24,2320   02756 1                      RENDWFLG
 0349   REF   1              24,2321   50332 0                      UPPSV1
 0350   REF   6  LAST  498   24,2322   01476 0                      DIMOFLAG       SET DIMOFLAG TO INTEGRATE W-MATRIX
 0351                        24,2323   43014 0            BON       SET
 0352   REF   4  LAST  254   24,2324   04307 1                      SURFFLAG       IF ON LUNAR SURFACE W IS 6X6
 0353   REF   1              24,2325   50327 1                      UPPSV5
 0354   REF   4  LAST  498   24,2326   01475 0                      D6OR9FLG       OTHERWISE 9X9
 0355                        24,2327   77614 1  UPPSV5    BOF
 0356   REF   5  LAST  499   24,2330   00747 0                      VEHUPFLG
 0357   REF   1              24,2331   50364 0                      UPPSV3
 0358                        24,2332   77614 1  UPPSV1    SET
 0359   REF   6  LAST  498   24,2333   01474 1                      VINTFLAG
 0361                        24,2334   77624 1            CALL
 0362   REF   5  LAST  498   24,2335   27133 0                      INTEGRV
 0363                        24,2336   77624 1            CALL                     GROUP 2 PHASE CHANGE
 0364   REF   4  LAST  499   24,2337   11210 1                      GRP2PC         TO PROTECT INTEGRATION
 0365                        24,2340   77624 1            CALL
 0366   REF   9  LAST  503   24,2341   27410 1                      INTSTALL
 0367                        24,2342   43145 0            DLOAD     CLEAR          GET TETCSM TO STORE IN TOEC FOR LM INT.
 0368   REF   4  LAST  238   24,2343   01571 0                      TETCSM
 0369   REF   7  LAST  504   24,2344   01674 0                      VINTFLAG
 0370                        24,2345   77624 1  UPPSV4    CALL                     INTEGRATE OTHER VEHICLE
 0371   REF   3  LAST  503   24,2346   26643 1                      SETIFLGS        WITHOUT W-MATRIX
 0372   REF  11  LAST  502   24,2347   34041 0            STCALL    TOEC1
 0373   REF   6  LAST  504   24,2350   27133 0                      INTEGRV
 0374                        24,2351   77214 0            BOFF      VLOAD
 0375   REF   5  LAST  504   24,2352   04347 0                      SURFFLAG
 0376   REF   1              24,2353   50216 1                      P20LEMC4
 0377   REF   1              24,2354   01661 1                      RCVLEM
 0378                        24,2355   77742 0            VSR2
 0379   REF   1              24,2356   26352 1            STOVL     LMPOS
 0380   REF   1              24,2357   01667 1                      VCVLEM
 0381                        24,2360   77742 0            VSR2
 0382   REF   1              24,2361   02360 0            STORE     LMVEL
 0383                        24,2362   77650 1            GOTO
 0384   REF   2  LAST  503   24,2363   01757 0                      LS21X


 0385                        24,2364   45014 0  UPPSV3    CLEAR     CALL
 0386   REF   8  LAST  504   24,2365   01674 0                      VINTFLAG
 0387   REF   7  LAST  504   24,2366   27133 0                      INTEGRV
 0390                        24,2367   77624 1            CALL
 0391   REF   5  LAST  504   24,2370   11210 1                      GRP2PC
 0392                        24,2371   77624 1            CALL
 0393   REF  10  LAST  504   24,2372   27410 1                      INTSTALL
 0394                        24,2373   71214 0            SET       DLOAD
 0395   REF   9  LAST  504   24,2374   01474 1                      VINTFLAG
 0396   REF   2  LAST  112   24,2375   01643 1                      TETLEM         GET TETLEM TO STORE IN TOEC FOR CSM INT,
 0397                        24,2376   77650 1            GOTO
 0398   REF   1              24,2377   50345 0                      UPPSV4
 0399    REF  10  LAST   503    E7,1456                     EBANK= LOSCCUNT
 0400    REF   1                                            COUNT* $$/P22
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R0401   PROGRAM DESCRIPTION
R0402   PREFERRED TRACKING ATTITUDE PROGRAM P25
R0403   MOD NO - 3
R0404   BY  P. VOLANTE
R0405   FUNCTIONAL DESCRIPTION
R0406
R0407     THE PURPOSE OF THIS PROGRAM IS TO COMPUTE THE PREFERRED TRACKING
R0408   ATTITUDE OF THE LM TO CONTINUOUSLY POINT THE LM TRACKING BEACON AT THE
R0409   CSM AND TO PERFORM THE MANEUVER TO THE PREFERRED TRACKING ATTITUDE AND
R0410   CONTINUOUSLY MAINTAIN THIS ATTITUDE WITHIN PRESCRIBED LIMITS
R0411   CALLING SEQUENCE -
R0412     ASTRONAUT REQUEST THROUGH DSKY V37E25E
R0413   SUBROUTINES CALLED -
R0414     BANKCALL                        FLAGUP
R0415     R02BOTH  (IMU STATUS CHECK)     ENDOFJOB
R0416     R61LEM   (PREF TRK ATT ROUT)    WAITLIST
R0417     TASKOVER                        FINDVAC
R0418   NORMAL EXIT MODES  -
R0419     P25 MAY BE TERMINATED IN TWO WAYS-ASTRONAUT SELECTION OF IDLING
R0420   PROGRAM(P00) BY KEYING V37E00E OR BY KEYING IN V56E
R0421   ALARM OR ABORT EXIT MODES -
R0422     NONE
R0423   OUTPUT
R0424   ERASABLE INITIALIZATION REQUIRED
R0425   FLAGS SET + RESET
R0426     TRACKFLG,P25FLAG
R0427   DEBRIS
R0428     NONE
 0429   REF  11  LAST  505   E7,1456                          EBANK=  LOSCOUNT
 0430   REF   1                                               COUNT*  $$/P25
 0431   REF   2  LAST  496   24,2400  0 5327 1  PROG25        TC      2PHSCHNG
 0432                        24,2401   00004 0                OCT     4              MAKE GROUP 4 INACTIVE (VERB 37)
 0433                        24,2402   05022 1                OCT     05022
 0434                        24,2403   26000 0                OCT     26000          PRIORITY 26

 0435   REF 115  LAST  502   24,2404  0 4616 1                TC      BANKCALL
 0436   REF   3  LAST  499   24,2405   11233 0                CADR    R02BOTH        IMU STATUS CHECK
 0437   REF  22  LAST  501   24,2406  0 5504 0                TC      UPFLAG
 0438   REF   3  LAST  499   24,2407   00031 0                ADRES   TRACKFLG       SET TRACK FLAG
 0439   REF  23  LAST  506   24,2410  0 5504 0                TC      UPFLAG
 0440   REF   2  LAST  289   24,2411   00006 1                ADRES   P25FLAG        SET P25FLAG
 04402  REF  45  LAST  502   24,2412  0 5516 0                TC      DOWNFLAG
 04404  REF   3  LAST  499   24,2413   00010 0                ADRES   RNDVZFLG
 0441   REF  11  LAST  502   24,2414  0 5353 1  P25LEM1       TC      PHASCHNG
 0442                        24,2415   04022 0                OCT     04022
 0443   REF   2  LAST  230   24,2416  3 4743 0                CAF     P25FLBIT
 0444   REF  31  LAST  240   24,2417  7 0074 0                MASK    STATE          IS P25FLAG SET
 0445                        24,2420  0 0006 1                EXTEND
 0446   REF  75  LAST  503   24,2421  1 5155 1                BZF     ENDOFJOB
 0447   REF   9  LAST  503   24,2422  3 4747 1                CAF     TRACKBIT       IS TRACKFLAG SET?
 0448   REF  32  LAST  506   24,2423  7 0075 1            MASK     STATE +1
 0449                        24,2424  0 0006 1            EXTEND
 0450   REF   1              24,2425  1 2433 0            BZF      P25LMWT1        NO-SKIP PHASE CHANGE AND WAIT 1 MINUTE
 0451   REF   7  LAST  460   24,2426  3 4757 0            CAF      SEVEN           CALL R65 - FINE PREFERRED
 0452   REF   1              24,2427  5 5745 1            TS       P65CNTR
 0453   REF 116  LAST  506   24,2430  0 4616 1            TC       BANKCALL        TRACKING ATTITUDE ROUTINE
 0454   REF   1              24,2431   46123 0            CADR     R65LEM
 0455   REF   2  LAST  241   24,2432  0 2414 1            TC       P25LEM1         THEN GO CHECK FLAGS
 0458   REF   1              24,2433  3 2444 1  P25LMWT1  CAF      60SCNDS
 0460   REF   7  LAST  503   24,2434  0 5173 1            TC       TWIDDLE         WAIT ONE MINUTE THEN CHECK AGAIN
 0461   REF   1              24,2435   02437 0            ADRES    P25LEM2
 0462   REF  76  LAST  506   24,2436  0 5155 0            TC       ENDOFJOB
 0463   REF   1              24,2437  3 5024 1  P25LEM2   CAF      PRIO14
 0464   REF  19  LAST  503   24,2440  0 5105 0            TC       FINDVAC
 0465   REF  12  LAST  506   E7,1456                      EBANK=   LOSCOUNT
 0466   REF   3  LAST  507   24,2441   02414 1            2CADR    P25LEM1
 0466                        24,2442   50067 0
 0467   REF  20  LAST  503   24,2443  0 5261 1            TC       TASKOVER
 0468                        24,2444   13560 0  60SCNDS   DEC      6000
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R0471    DATA READ ROUTINE 22 (LEM)
R0472    PROGRAM DESCRIPTION
R0473    MOD NO - 2
R0474    BY P VOLANTE
R0475    FUNCTIONAL DESCRIPTION
R0476
R0477       TO PROCESS AUTOMATIC RR MARK DATA TO UPDATE THE STATE VECTOR OF EITHER
R0478    LM OR CSM AS DEFINED IN THE RENDEZVOUS NAVIGATION PROGRAM (P20)
R0479    CALLING SEQUENCE -
R0480                TC      BANKCALL
R0481                CADR    R22LEM
R0482    SUBROUTINES CALLED -
R0483      LSR22.1            GOFLASH         WAITLIST
R0484      LSR22.2            PRIOLARM        BANKCALL
R0485      LSR22.3            R61LEM
R0486    NORMAL EXIT MODES-
R0487       R22 WILL CONTINUE TO RECYCLE,UPDATING STATE VECTORS WITH RADAR DATA
R0488    UNTIL P20 CEASES TO OPERATE (RENDEZVOUS FLAG SET TO ZERO) AT WHICH TIME
R0489    R22 WILL TERMINATE SELF.
R0490    ALARM OR ABORT EXIT MODES-
R0491       PRIORITY ALARM
R0492    PRIORITY ALARM 525 LOS NOT WITHIN 3 DEGREE LIMIT
R0493    OUTPUT
R0494       SEE OUTPUT FROM LSR22.3
R0495    ERASABLE INITIALIZATION REQUIRED
R0496       SEE LSR22.1,LSR22.2,LSR22.3
R0497    FLAGS SET + RESET
R0498       NOANGFLG
R0499    DEBRIS
R0500       SEE LSR22.1,LSR22.2,LSR22.3
 0501    REF   2  LAST  148   E7,1737                          EBANK=  LRS22.1X
 0502    REF   1                                               COUNT*  $$/R22
 0503    REF  12  LAST  506   24,2445  0 5353 1  R22LEM     TC      PHASCHNG
 0504                         24,2446   04022 0             OCT     04022
 0505    REF   6  LAST  502   24,2447  3 4745 0             CAF     RNDVZBIT        IS RENDESVOUS FLAG SET?
 0506    REF  33  LAST  507   24,2450  7 0074 0             MASK    STATE
 0507                         24,2451  0 0006 1             EXTEND
 0508    REF  77  LAST  507   24,2452  1 5155 1             BZF     ENDOFJOB        NO-EXIT R22 AND P20
 0509    REF  10  LAST  506   24,2453  3 4747 1             CAF     TRACKBIT        IS TRACKFLAG SET?
 0510    REF  34  LAST  508   24,2454  7 0075 1             MASK    STATE +1
 0511                         24,2455  0 0006 1             EXTEND
 0512    REF   1              24,2456  1 2640 0             BZF     R22WAIT         NO WAIT
 0513    REF  48  LAST  494   24,2457  3 4736 1  R22LEM12   CAF     BIT14           IS RR AUTO TRACK ENABLE DISCRETE STILL
 0514                         24,2460  0 0006 1             EXTEND                  ON (A MONITOR REPOSITION BY R25 CLEARS IT
 0515    REF  24  LAST  472   24,2461  02 012 0             RAND    CHAN12
 0516                         24,2462  0 0006 1             EXTEND
 0517    REF   2  LAST  500   24,2463  1 2111 0             BZF     P20LEMA         NO - RETURN TO P20
 0518    REF  27  LAST  500   24,2464  3 4752 0             CAF     BIT2            YES
 0519                         24,2465  0 0006 1             EXTEND                  IS RR AUTO MODE DISCRETE PRESENT
 0520    REF   9  LAST  501   24,2466  02 033 0             RAND    CHAN33
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0521                        24,2467  0 0006 1           EXTEND
0522                        24,2470  1 2472 0           BZF      +2              YES CONTINUE
0523   REF   1              24,2471  0 2135 1           TC       P20LEMB5        NO - SET IT
0524   REF  34   LAST  501  24,2472  4 0110 0           CS       RADMODES        ARE RR CDUS BEING ZEROED
0525   REF   2   LAST  501  24,2473  7 4737 1           MASK     RCDU0BIT
0526                        24,2474  0 0006 1           EXTEND
0527   REF   2   LAST  503  24,2475  1 2631 0           BZF      P22LEM42        CDUS BEING ZEROED
0528   REF  13   LAST  508  24,2476  0 5353 1           TC       PHASCHNG        IF A RESTART OCCURS,AN EXTRA RADAR
0529                        24,2477   00152 1           OCT      00152           READING IS TAKEN,SO BAD DATA ISN'T USED
0530   REF 117   LAST  507  24,2500  0 4616 1           TC       BANKCALL        YES READ DATA + CALCULATE LOS
0531   REF   1              24,2501   64366 0           CADR     LRS22.1         DATA READ SUBROUTINE
0532   REF 237   LAST  500  24,2502  50 154 1           INDEX    MPAC
0533                        24,2503  0 2504 1           TC       +1
0534   REF   1              24,2504  0 2525 1           TC       R22LEM2         NORMAL RETURN (GOOD DATA)
0535   REF   1              24,2505  0 2217 1           TC       P20LEMC         COULD NOT READ RADAR-TRY TO REDESIGNATE
0536   REF   1              24,2506  3 2664 1           CAF      ALRM525         RR LOS NOT WITHIN 3 DEGREES (ALARM)
0537   REF 118   LAST  509  24,2507  0 4616 1           TC       BANKCALL
0538   REF   3   LAST  501  24,2510   21563 1           CADR     PRIOLARM
0539   REF   5   LAST  501  24,2511  0 6025 0           TC       GOTOV56         TERMINATE EXITS P20 VIA V56 CODING
0540   REF   1              24,2512  0 2515 1           TC       P22LEM1         PROC (DISPLAY DELTA THETA)
0541                        24,2513  0 2506 0           TC       -5              ENTER(ILLEGAL OPTION)
0542   REF  78   LAST  508  24,2514  0 5155 0           TC       ENDOFJOB


0543   REF  14   LAST  509  24,2515  0 5353 1  R22LEM1  TC       PHASCHNG
0544                        24,2516   04022 0           OCT      04022
0545   REF   1              24,2517  3 2665 0           CAF      V06N05          DISPLAY DELTA THETA
0546   REF 119   LAST  509  24,2520  0 4616 1           TC       BANKCALL
0547   REF   1              24,2521   20510 1           CADR     PRIODSP
0548   REF   6   LAST  509  24,2522  0 6025 0           TC       GOTOV56         TERMINATE EXITS P20 VIA V56 CODING
0549   REF   2   LAST  509  24,2523  0 2525 1           TC       R22LEM2         PROC (OK CONTINUE)
0550   REF   2   LAST  509  24,2524  0 2217 1           TC       P20LEMC         ENTER(RECYCLE)
0551   REF  15   LAST  509  24,2525  0 5353 1  R22LEM2  TC       PHASCHNG
0552                        24,2526   04022 0           OCT      04022
0553   REF   4   LAST  501  24,2527  0 2670 1           TC       LUNSFCHK        CHECK IF ON LUNAR SURFACE (P22FLAG SET)
0554   REF   1              24,2530  0 2545 1           TC       P22LEM3         YES-BYPASS FLAG CHECKS AND LRS22.2
0555   REF  21   LAST  503  24,2531  3 0075 0           CA       FLAGWRD1        IS TRACK FLAG SET
0556   REF  11   LAST  508  24,2532  7 4747 0           MASK     TRACKBIT
0557                        24,2533  0 0006 1           EXTEND
0558   REF   2   LAST  508  24,2534  1 2640 0           BZF      P22WAIT         NO - WAIT
0559   REF 120   LAST  509  24,2535  0 4616 1           TC       BANKCALL        YES
0560   REF   1              24,2536   51334 1           CADR     LRS22.2         CHECKS RR BORESIGHT WITHIN 30 DEG OF +Z
0561   REF 238   LAST  509  24,2537  50 154 1           INDEX    MPAC
0562                        24,2540  0 2541 0           TC       +1
0563   REF   2   LAST  509  24,2541  0 2545 1           TC       R22LEM3         NORMAL RETURN(LOS WITHIN 30  OF Z-AXIS)
0564   REF 121   LAST  509  24,2542  0 4616 1           TC       BANKCALL
0565   REF   2   LAST  500  24,2543   46116 0           CADR     R61LEM
0566   REF   3   LAST  509  24,2544  0 2640 1           TC       P22WAIT         NOT WITHIN 30 DEG OF Z-AXIS
0567   REF  22   LAST  509  24,2545  4 0075 1  R22LEM3  CS       FLAGWRD1        SHOULD WE BYPASS STATE VECTOR UPDATE
0568   REF   1              24,2546  7 4746 1           MASK     NOUPFBIT        (IS NOUPDATE FLAG SET?)
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 0569                            24,2547  0 0006 1          EXTEND
 0570  REF   3  LAST  509        24,2550  1 2631 0          BZF      R22LEM42        BRANCH-YES
 0571  REF  23  LAST  509        24,2551  3 0075 0          CA       FLAGWRD1        IS UPDATE FLAG SET
 0572  REF   1                   24,2552  7 4745 1          MASK     UPDATBIT
 0573                            24,2553  0 0006 1          EXTEND
 0574  REF   4  LAST  510        24,2554  1 2631 0          BZF      R22LEM42        UPDATE FLAG NOT SET
 0575  REF   6  LAST  503        24,2555  3 7717 1          CAF      PRIO26          INSURE HIGH PRIO IN RESTART
 0576  REF   2  LAST  231        24,2556  55'055 1          TS       PHSPRDT2

 0577  REF  35  LAST  502        24,2557  0 6042 1          TC       INTPRET
 0578                            24,2560   77650 1          GOTO
 0579  REF   1                   24,2561   54416 0                   LSR22.3
 0580                            24,2562   77776 1 R22LEM93 EXIT                     NORMAL EXIT FROM LSR22.3
 0581  REF  16  LAST  509        24,2563  0 5353 1          TC       PHASCHNG        PHASE CHANGE TO PROTECT AGAINST
 0582                            24,2564   04022 0          OCT      04022           CONFLICT WITH GRP2PC ERASEABLE
 0583  REF   1                   24,2565  1 2624 1          TCF      R22LEM44
 0584                            24,2566   77776 1 R22LEM96 EXIT
 0585  REF 107  LAST  500        24,2567  3 4755 1          CAF      ZERO            SET N49FLAG = ZERO TO INDICATE
 0586  REF   2  LAST  154        24,2570  55'746 1          TS       N49FLAG         V06 N49 DISPLAY HASNT BEEN ANSWERED
 0587  REF  17  LAST  510        24,2571  0 5353 1          TC       PHASCHNG
 0588                            24,2572   04022 0          OCT      04022           TO PROTECT DISPLAY
 0589  REF   2  LAST  194        24,2573  3 7720 0          CAF      PRIO27          PROTECT DISPLAY
 0590  REF  10  LAST  494        24,2574  0 5072 1          TC       NOVAC
 0591  REF   3  LAST  510        E7,1746                    EBANK=   N49FLAG
 0592  REF   1                   24,2575   02645 1          2CADR    N49DSP
 0592  REF   1                   24,2576   50067 0
 0593  REF  36  LAST  510        24,2577  0 6042 1          TC       INTPRET
 0594                            24,2600   77735 0          SLOAD
 0595  REF   4  LAST  510        24,2601   03747 0                   N49FLAG
 0596                            24,2602   50054 0          BZE      BMN             LOOP TO CHECK IF FLAG
 0597                            24,2603   50600 1                   -3              SETTING CHANGED-BRANCH - NO
 0598  REF   1                   24,2604   50612 1                   R22LEM7         PROCEED
 0599                            24,2605   77650 1          GOTO                     DISPLAY ANSWERED BY RECYCLE-INCORPORATE
 05991 REF   3  LAST  147        24,2606   03675 0                   LGRET                  NEXT MEASUREMENT
 0600  REF  33  LAST  495        24,2607  4 4752 1 V34TON49 CS       TWO
 0601  REF   5  LAST  510        24,2610  55'746 1          TS       N49FLAG
 0602  REF  79  LAST  509        24,2611  0 5155 0          TC       ENDOFJOB
 0603                            24,2612   77776 1 R22LEM7  EXIT
 06032 REF   6  LAST  510        24,2613  3 1746 0          CA       N49FLAG         WAS ANSWER TO DISPLAY PRO OR TERM
 06034 REF  34  LAST  510        24,2614  6 4752 0          AD       TWO
 06036                           24,2615  0 0006 1          EXTEND
 06038 REF   1                   24,2616  1 2445 1          BZF      R22LEM          BRANCH - TERM - TAKE ANOTHER RR READING
 06039 REF  37  LAST  510        24,2617  0 6042 1          TC       INTPRET
 0604                            24,2620   77624 1          CALL
 0605  REF   6  LAST  504        24,2621   11210 1                   GRP2PC          PHASE CHANGE AND
 0606                            24,2622   77650 1          GOTO                     GO TO INCORPORATE DATA.
 0607  REF   1                   24,2623   55431 1                   ASTOK
 0608  REF   2  LAST  500        24,2624  25'462 0 R22LEM44 INCR     MARKCTR         INCREMENT COUNT OF MARKS INCORPORATED.
 0609  REF   5  LAST  509        24,2625  0 2670 1          TC       LUNSFCHK        ARE WE ON LUNAR SURFACE
 0610  REF   1                   24,2626  0 2642 0          TC       R22LEM46        YES - WAIT 2 SECONDS
 0611    REF  10  LAST  430    24,2627  3 4756 1            CA       FIVE              NOT ON LUNAR SURFACE
 0612    REF   1               24,2630  0 2634 1            TC       R22LEM45          R65COUNTER = 5
 0613    REF   6  LAST  510    24,2631  0 2670 1  R22LEM42  TC       LUNSFCHK          CHECK IF ON LUNAR SURFACE (P22FLAG SET)
 0614    REF   2  LAST  510    24,2632  0 2642 0            TC       R22LEM46          YES - WAIT 2 SECONDS
 0615    REF  35  LAST  510    24,2633  3 4752 0            CA       TWO               NO-SET R65COUNTER = 2
 0616    REF   2  LAST  507    24,2634  55'745 1  R22LEM45  TS       R65CNTR
 0617    REF 122  LAST  509    24,2635  0 4616 1            TC       BANKCALL
 0618    REF   2  LAST  507    24,2636   46123 0            CADR     R65LEM            FIND PREFERREO TRACKING ATTITUOE
 0619    REF   2  LAST  510    24,2637  0 2445 0            TC       R22LEM
 0620    REF   2  LAST  503    24,2640  3 2667 1  R22WAIT   CAF      1500DEC
 0621    REF   3  LAST  502    24,2641  0 2233 1            TC       P20LEMWT +1


 0622    REF 123  LAST  511    24,2642  0 4616 1  R22LEM46  TC       BANKCALL
 06226   REF   3  LAST  280    24,2643   01735 1            CADR     2SECOELY          WAIT 2 SECONOS ANO TAKE ANOTHER MARK
 0623    REF   3  LAST  511    24,2644  0 2445 0            TC       R22LEM

 0624    REF   1               24,2645  3 2666 0  N49DSP    CAF      V06N49NB
 0625    REF 124  LAST  511    24,2646  0 4616 1            TC       BANKCALL          EXCESSIVE STATE VECTOR UPOATE - FLASH
 0626    REF   2  LAST  509    24,2647   20510 1            CAOR     PRIOOSP           VERB 06 NOUN 49 R1=OELTA R, R2=OELTA V
 0627    REF   1               24,2650  0 2607 1            TC       V34TON49          TERMINATE - SET N49FLAG = -2
 0628    REF  63  LAST  497    24,2651  4 4753 0            CS       ONE               PROCEEO - N49FLAG = -1
 0629    REF   7  LAST  510    24,2652  55'746 1            TS       N49FLAG           RECYCLE - N49FLAG = + VALUE
 0630    REF  80  LAST  510    24,2653  0 5155 0            TC       ENOOFJOB
 0631    REF  18  LAST  510    24,2654  0 5353 1  R22RSTRT  TC       PHASCHNG          IF A RESTART OCCURS WHILE REAOING RAOAR
 0632                          24,2655   00152 1            OCT      00152             COME HERE TO TAKE A RANGE-RATE REAOING
 0633    REF 125  LAST  511    24,2656  0 4616 1            TC       BANKCALL          WHICH ISNT USEO TO PREVENT TAKING A BAO
 0634    REF   2  LAST  495    24,2657   53112 0            CAOR     RRROOT            REAOING ANO TRYING TO INCORPORATE THE
 0635    REF 126  LAST  511    24,2660  0 4616 1            TC       BANKCALL          BAO OATA
 0636    REF   4  LAST  494    24,2661   17705 0            CAOR     RAOSTALL          WAIT FOR REAO COMPLETE
 0637    REF   3  LAST  509    24,2662  0 2217 1            TC       P20LEMC           COULO NOT REAO RAOAR-TRY TO REOESIGNATE
 0638    REF   4  LAST  511    24,2663  0 2445 0            TC       R22LEM            REAO SUCCESSFUL-CONTINUE AT R22


 0639                          24,2664   00525 0  ALRM525   OCT      00525
 0640                          24,2665   01405 1  V06N05    VN       00605
 0641                          24,2666   01461 0  V06N49NB  VN       00649
 0642                          24,2667   02734 0  1500OEC   OEC      1500
R0644    LUNSFCHK-CLOSEO SUBROUTINE TO CHECK IF ON LUNAR SURFACE (P22FLAG)
R0645              RETURNS TO CALLER +1 IF P22FLAG SET
R0646                        TO CALLER +2 IF P22FLAG NOT SET


 0647    REF   2 LAST  505 TO  506:      0       0*             COUNT*   $$/P22
 0648    REF   5  LAST  338    24,2670  4 0104 0  LUNSFCHK  CS       FLAGWROB          CHECK IF ON LUNAR SURFACE
 0649    REF   4  LAST  338    24,2671  7 4744 0            MASK     SURFFBIT          IS SURFFLAG SET?
 0650    REF 166  LAST  503    24,2672  10 000 0            CCS      A                 BRANCH - P22FLAG SET
 0651    REF 149  LAST  480    24,2673  24 002 0            INCR     Q                 NOT SET
 0652    REF 150  LAST  511    24,2674  0 0002 0            TC       Q                 RETURN
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R0653   RR DESIGNATE ROUTINE (R21LEM)
R0654   PROGRAM DESCRIPTION
R0655   MOD NO - 2
R0656   BY P VOLANTE
R0657   FUNCTIONAL DESCRIPTION
R0658
R0659     TO POINT THE RENDEZVOUS RADAR AT THE CSM UNTIL AUTOMATIC ACQUISITION
R0660   OF THE CSM IS ACCOMPLISHED BY THE RADAR. ROUTINE IS CALLED BY P20.
R0661   CALLING SEQUENCE -
R0662             TC     BANKCALL
R0663             CADR   R21LEM
R0664   SUBROUTINES CALLED -
R0665     FINDVAC        FLAGUP          ENDOFJOB        PRIOLARM
R0666     NOVAC          INTPRET         LPS20.1         PHASCHNG
R0667     WAITLIST       JOBSLEEP        JOBWAKE         FLAGDOWN
R0668     TASKOVER       BANKCALL        RADSTALL        RRDESSM
R0669   NORMAL EXIT MODES
R0670     WHEN LOCK-ON IS ACHIEVED,BRANCH WILL BE TO P20 WHERE R22 (DATA READ
R0671   WILL BE SELECTED OR A NEED FOR A MANEUVER(BRANCH TO P20LEMA)
R0672   ALARM OR ABORT EXIT MODES-
R0673     PRIORITY ALARM 503 WHEN LOCK-ON HASN:T BEEN ACHIEVED AFTER 30SECS -
R0674   THIS REQUIRES ASTRONAUT INTERFACE- SELECTION OF SEARCH OPTION OF
R0675   ACQUISITION
R0676   OUTPUT
R0677     SEE LPS20.1,RRDESSM
R0678   ERASABLE INITIALIZATION REQUIRED
R0679     RRTARGET,RADMODES ARE USED BY LPS20.1 AND RRDESSM
R0680   FLAGS SET + RESET
R0681     LOSCMFLG      LOKONSW
R0682   DEBRIS
R0683     SEE LPS20.1,RRDESSM
 0684   REF  13  LAST  507   E7,1456                           EBANK= LOSCOUNT
 0685   REF   1                                                COUNT* $$/R21
 0686   REF  49  LAST  508   24,2675  4 4736 0  R21LEM     CS     BIT14            REMOVE RR SELF TRACK ENABLE
 0687                        24,2676  0 0006 1             EXTEND
 0688   REF  25  LAST  508   24,2677  03 012 1             WAND   CHAN12
 0689   REF   7  LAST  511   24,2700  0 2670 1             TC     LUNSFCHK
 0690   REF   1              24,2701  0 2706 1             TC     R21LEM5
 0691   REF 108  LAST  510   24,2702  3 4755 1             CAF    ZERO                  COMMAND ANTENNA TO MODE CENTER
 0692   REF   4  LAST  318   24,2703  55'106 0             TS     TANG             IF NOT ON SURFACE-MODE 1-(T=0,S=0)
 0693   REF   5  LAST  512   24,2704  55'107 1             TS     TANG +1
 0694   REF   1              24,2705  0 2716 0             TC     R21LEM6
 0695   REF  21  LAST  457   24,2706  3 4740 0  R21LEM5    CAF    BIT12
 0696   REF  35  LAST  509   24,2707  7 0110 0             MASK   RADMODES
 0697   REF 167  LAST  511   24,2710  10 000 0             CCS    A
 0698   REF   1              24,2711  0 2726 0             TC     R21LEM10
 0699   REF  29  LAST  474   24,2712  3 4735 1             CAF    BIT15
 0700   REF   6  LAST  512   24,2713  55'106 0             TS     TANG
 0701   REF   4  LAST  375   24,2714  4 4736 0             CS     HALF
 0702   REF   7  LAST  512   24,2715  55'107 1             TS     TANG +1
 0703   REF  46  LAST  506    24,2716  0 5516 0  R21LEM6  TC      OOWNFLAG
 0704   REF   3  LAST  272    24,2717   00012 1           AORES   LOKONSW
 0705   REF 127  LAST  511    24,2720  0 4616 1           TC      BANKCALL
 0706   REF   2  LAST  270    24,2721   52506 0           CADR    RPDESNB
 0707                         24,2722  0 2723 0           TC      +1
 0708   REF 128  LAST  513    24,2723  0 4616 1           TC      BANKCALL
 0709   REF   5  LAST  511    24,2724   17705 0           CADR    RAOSTALL
 0710   REF   1               24,2725  0 2761 0           TC      P21-503       BAO RETURN FROM OESIGNATE -ISSUE ALARM
 0711   REF  24  LAST  506    24,2726  0 5504 0  R21LEM10 TC      UPFLAG
 0712   REF   2  LAST  500    24,2727   00041 1           AORES   LOSCMFLG      EVERY FOURTH PASS THRU OOOES
 0713   REF   1               24,2730  3 2310 1           CAF     MAXTRIES      ALLOW 60 PASSES (APPROX 45 SECONOS)
 0714   REF   1               24,2731  55'113 1           TS      OESCOUNT      TO DESIGNATE ANO LOCK ON
 0715   REF  17  LAST  478    24,2732  3 6250 0  R21LEM2  CAF     THREE
 0716   REF  14  LAST  512    24,2733  55'456 0           TS      LOSCOUNT
 0717   REF  38  LAST  510    24,2734  0 6042 1  R21LEM1  TC      INTPRET
 0718                         24,2735   43234 0           RTB     OAO
 0719   REF   8  LAST  502    24,2736   21574 1                   LOAOTIME
 0720   REF   1               24,2737   11122 0                   HALFSEC       EXTRAPOLATE TO PRESENT TIME +  5 SEC.
 0721   REF  12  LAST  504    24,2740   34041 0           STCALL  TOEC1         LOS OETERMINATION ROUTINE
 0722   REF   2  LAST  500    24,2741   51256 1                   LPS20.1
 0723                         24,2742   77776 1           EXIT
 0724   REF  25  LAST  513    24,2743  0 5504 0  R21LEM3  TC      UPFLAG        SET LOKONSW TO RADAR-ON DESIREO
 0725   REF   4  LAST  513    24,2744   00012 1           AORES   LOKONSW
 0726   REF  47  LAST  513    24,2745  0 5516 0           TC      OOWNFLAG
 0727   REF   4  LAST  500    24,2746   00126 1           AORES   NORRMON
 0728   REF  39  LAST  513    24,2747  0 6042 1           TC      INTPRET
 0729                         24,2750   77624 1           CALL                  INPUT (RRTARGET UPDATEO BY LPS20.1)
 0730   REF   1               24,2751   52404 0                   RROESSM       OESIGNATE ROUTINE
 0731                         24,2752   77776 1           EXIT
 0732   REF   1               24,2753  0 3002 0           TC      P21LEM4       LOS NOT IN MOOE 2 COVERAGE
A0733                                                                           ON LUNAR SURFACE
 0734   REF   3  LAST  508    24,2754  0 2111 1           TC      P20LEMA       VEHICLE MANEUVER REOUIREO.
 0735   PEF 129  LAST  513    24,2755  0 4616 1           TC      BANKCALL      NO VEHICLE MANEUVER REOUIREO
 0736   REF   6  LAST  513    24,2756   17705 0           CADR    RAOSTALL      WAIT FOR OESIGNATE COMPLETE - LOCKON OR
 0737                         24,2757  0 2761 0           TC      +2            BAOENO-LOCKON NOT ACHIEVED IN 60 TRIES
 0738   REF   1               24,2760  0 2770 0           TC      R21ENO        EXIT ROUTINE RETURN TO P20 (LOCK-ON)
 0739   REF   1               24,2761  3 3000 1  R21-503  CAF     ALRM503       ISSUE ALARM 503
 0740   REF 130  LAST  513    24,2762  0 4616 1           TC      BANKCALL
 0741   REF   4  LAST  509    24,2763   21563 1           CADR    PRIOLARM
 0742   REF   7  LAST  509    24,2764  0 6025 0           TC      GOTOV56       TERMINATE EXITS P20 VIA V56 COOING
 0743   REF   1               24,2765  0 2775 0           TC      R21SRCH       PROC
 0744   REF   3  LAST  503    24,2766  0 2211 1           TC      P20LEMC3
 0745   REF  81  LAST  511    24,2767  0 5155 0           TC      ENOOFJOB
 0746   REF  48  LAST  513    24,2770  0 5516 0  R21ENO   TC      OOWNFLAG
 0747   REF   3  LAST  513    24,2771   00041 1           AORES   LOSCMFLG      RESET LOSCMFLG
 07473  REF   8  LAST  512    24,2772  0 2670 1           TC      LUNSFCHK      ARE WE ON LUNAR SURFACE
 07476  REF   4  LAST  511    24,2773  0 2232 0           TC      P20LEMWT      YES - BYPASS V 50 N 72 OISPLAY
 0748   REF   1               24,2774  0 3123 1           TC      R21OISP       PUT UP VERIFY MAIN LOBE LOCKON OISPLAY
 0749   REF  19  LAST  511    24,2775  0 5353 1  R21SRCH  TC      PHASCHNG
 0750                         24,2776   04022 0           OCT     04022
 0751    REF    1               24,2777  0 3210 1            TC       R24LEM          SEARCH ROUTINE
 0752                           24,3000   00503 1  ALRM503   OCT      00503
 0753                           24,3001   00527 1  ALRM527   OCT      527


 0754    REF    2  LAST  513    24,3002  3 2310 1  R21LEM4   CAF      MAXTRIES        SET UP COUNTER FOR
 0755    REF    2  LAST  141    24,3003  55'423 1            TS       REPOSCNT        60 PASSES (APPROX 600 SECS.)
 0756    REF   26  LAST  513    24,3004  0 5504 0            TC       UPFLAG
 0757    REF    1               24,3005   00005 1            ADRES    FSPASFLG        SET FIRST PASS FLAG
 0758    REF   49  LAST  513    24,3006  0 5516 0            TC       DOWNFLAG        RESET LOS BEING
 0759    REF    4  LAST  513    24,3007   00041 1            ADRES    LOSCMFLG        COMPUTED FLAG
 0760    REF   40  LAST  513    24,3010  0 6042 1            TC       INTPRET
 0761                           24,3011   77634 0  R21LEM12 RTB
 0762    REF    9  LAST  513    24,3012   21574 1                     LOADTIME
 07625                          24,3013   77615 0  R21LEM00 DAD
 0763    REF    1               24,3014   11120 1                     TENSEC          TIME T = T + 10 SECS.
 0764    REF    2  LAST  141    24,3015   03425 1            STORE    REPOSTM         SAVE FOR LONGCALL AND UPPSV
 0765    REF   13  LAST  513    24,3016   34041 0            STCALL   TDEC1
 0766    REF    3  LAST  513    24,3017   51256 1                     LPS20.1         COMPUTE LOS AT TIME T
 0767                           24,3020   77624 1            CALL
 0768    REF    2  LAST  513    24,3021   52404 0                     PROESSM
 0769                           24,3022   77776 1            EXIT
 0770    REF    1               24,3023  0 3035 1            TC       R21LEM13        LOS NOT IN MODE 2 COVERAGE
 0771    REF   82  LAST  513    24,3024  0 5155 0            TC       ENDOFJOB        VEHICLE MANEUVER REQUIRED
 07721   REF    1               24,3025  0 6032 0            TC       KILLTASK
 07722   REF    1               24,3026   52604 1            CADR     BEGDES
 07724   REF   41  LAST  514    24,3027  0 6042 1            TC       INTPRET
 0773                           24,3030   43014 0            BOF      CLRGO
 0774    REF    2  LAST  514    24,3031   00345 0                     FSPASFLG        FIRST PASS THRU REPOSITION
 0775    REF    1               24,3032   51045 1                     R21LEM8         NO-GO TO CONTINUOUS DESIGNATE
 0777    REF    3  LAST  514    24,3033   00225 1                     FSPASFLG        YES-RESET FIRST PASS FLAG
 0778    REF    1               24,3034   51042 0                     R21LEM50
 0779    REF    3  LAST  514    24,3035  11'423 1  R21LEM13  CCS      REPOSCNT        HAVE WE TRIED 60 TIMES?
 0780    REF    1               24,3036  0 3040 0            TC       R21LEM7         NO-ADD 10 SECS. RECOMPUTE LOS
 0781    REF    1               24,3037  0 3107 1            TC       R21LEM11        YES-PUT OUT ALARM 530
 0782    REF    4  LAST  514    24,3040  55'423 1  R21LEM7   TS       REPOSCNT
 07821   REF   42  LAST  514    24,3041  0 6042 1            TC       INTPRET
 07822                          24,3042   52145 0  R21LEM50  DLOAD    GOTO
 07823   REF    3  LAST  514    24,3043   03425 1                     REPOSTM
 07824   REF    1               24,3044   51013 1                     R21LEM00
 0784                           24,3045   77745 1  R21LEM8   DLOAD
 0785    REF    4  LAST  514    24,3046   03425 1                     REPOSTM
 0786    REF   14  LAST  514    24,3047   34041 0            STCALL   TDEC1
 0787    REF    2  LAST  502    24,3050   50312 1                     UPPSV
 0788                           24,3051   77776 1            EXIT
 0789    REF   27  LAST  514    24,3052  0 5504 0            TC       UPFLAG          SET RADMODES BIT 15 FOR
 0790    REF    2  LAST  272    24,3053   00264 1            ADRES    CDESFLAG        CONTINUOUS DESIGNATION
 0791    REF   50  LAST  514    24,3054  0 5516 0            TC       DOWNFLAG
 0792    REF    5  LAST  513    24,3055   00012 1            ADRES    LOKONSW
 0793    REF   28  LAST  514    24,3056  0 5504 0            TC       UPFLAG
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L         P20-P25                                                                              USER'S PAGE NO.  20       E7 S3

 0794   REF   5  LAST  513   24,3057   00126 1              ADRES  NORRMON
 0795   REF 131  LAST  513   24,3060  0 4616 1              TC     BANKCALL
 0796   REF   3  LAST  513   24,3061   52506 0              CADR   RRDESNB
 0797                        24,3062  0 3063 1              TC     +1
 07971  REF  43  LAST  514   24,3063  0 6042 1              TC     INTPRET
 0798                        24,3064   44234 1              RTB    BDSU
 0799   REF  10  LAST  514   24,3065   21574 1                     LOADTIME        COMPUTE DELTA TIME
 0800   REF   5  LAST  514   24,3066   03425 1                     REPOSTM         FOR LONGCALL
 0801   REF   1              24,3067   03427 0              STORE  DELTATM
 0802                        24,3070   77776 1              EXIT
 08021                       24,3071  0 0006 1              EXTEND
 0803   REF   2  LAST  515   24,3072  3 1427 1              DCA    DELTATM
 0804   REF   2  LAST  376   24,3073  0 5277 0              TC     LONGCALL
 0805   REF  15  LAST  513   E7,1456                        EBANK= LOSCOUNT
 0806   REF   1              24,3074   03077 1              2CADR  R21LEM9
 0806   REF   1              24,3075   50067 0
 0807   REF  83  LAST  514   24,3076  0 5155 0              TC     ENDOFJOB
 0808   REF   2  LAST  514   24,3077  0 6032 0  R21LEM9     TC     KILLTASK
 0809   REF   1              24,3100   52613 1              CADR   STDESIG
 0810   REF   6  LAST  500   24,3101  0 6011 1              TC     CLRADMOD
 0811   REF   7  LAST  510   24,3102  3 7717 1              CAF    PRIO26
 0812   REF  20  LAST  507   24,3103  0 5105 0              TC     FINDVAC
 0813   REF  16  LAST  515   E7,1456                        EBANK= LOSCOUNT
 0814   REF   2  LAST  512   24,3104   02726 0              2CADR  R21LEM10
 0814                        24,3105   50067 0
 0815   REF  21  LAST  507   24,3106  0 5261 1              TC     TASKOVER
 0816   REF   1              24,3107  3 3116 1  R21LEM11    CAF    ALRM530         ALARM 530-LOS NOT IN COVERAGE
 0817   REF 132  LAST  515   24,3110  0 4616 1              TC     BANKCALL        AFTER TRYING TO DESIGNATE FOR
 0818   REF   5  LAST  513   24,3111   21563 1              CADR   PRIOLARM        600 SECS.
 0819   REF   8  LAST  513   24,3112  0 6025 0              TC     GOTOV56
 0820   REF   9  LAST  515   24,3113  0 6025 0              TC     GOTOV56
 0821   REF  10  LAST  515   24,3114  0 6025 0              TC     GOTOV56
 0822   REF  84  LAST  515   24,3115  0 5155 0              TC     ENDOFJOB
 0824                        24,3116   00530 1  ALRM530     OCT    00530
 0825                        24,3117   00000 1  TENSEC      2DEC   1000 B-28
 0825                        24,3120   01750 1
 0826                        24,3121   00000 1  HALFSEC     2DEC   50
 0826                        24,3122   00062 0
 0827   REF  20  LAST  513   24,3123  0 5353 1  R21DISP     TC     PHASCHNG
 0828                        24,3124   04022 0              OCT    04022
 0829   REF   1              24,3125  3 3136 0              CAF    V06N72PV        FLASH V 50 N 72 - PLEASE PERFORM RR
 0830   REF 133  LAST  515   24,3126  0 4616 1              TC     BANKCALL        MAIN LOBE LOCKON VERIFICATION
 0831   REF   2  LAST  478   24,3127   20711 1              CADR   GOPERF2R
 0832   REF  11  LAST  515   24,3130  0 6025 0              TC     GOTOV56         TERMINATE EXITS VIA V 56
 0833   REF   5  LAST  513   24,3131  0 2232 0              TC     R20LEMWT        PROCEED CONTINUES TO R22
 0834                        24,3132  0 3125 1              TC     -5              ENTER ILLEGAL
 0835   REF  23  LAST  479   24,3133  3 4745 0              CAF    BIT7
 0836   REF   2  LAST  479   24,3134  0 5464 1              TC     LINUS           SET BITS TO MAKE THIS A PRIORITY DISPLAY
 0837   REF  85  LAST  515   24,3135  0 5155 0              TC     ENDOFJOB
 0838                        24,3136   01510 1  V06N72PV VN      00672
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P0839    MANUAL ACQUISITION ROUTINE R23LEM
R0840    PROGRAM DESCRIPTION
R0841    MOD NO - 2
R0842    BY P VOLANTE
R0843    FUNCTIONAL DESCRIPTION
R0844
R0845      TO ACQUIRE THE CSM BY MANUAL OPERATION OF THE RENDEZVOUS RADAR
R0846    CALLING SEQUENCE -
R0847              TC      R23LEM
R0848    SUBROUTINES CALLED
R0849      BANKCALL        R61LEM
R0850      SETMINDB        GOPERF1
R0851    NORMAL EXIT MODES -
R0852      IN RESPONSE TO THE GOPERF1  ,SELECTION OF ENTER WILL RECYCLE R23
R0853                                  ,SELECTION OF PROC  WILL CONTINUE R23
R0854                                  ,SELECTION OF TERM  WILL TERMINATE R23 +P20
R0855    ALARM OR ABORT EXIT MODES -
R0856      SEE NORMAL EXIT MODES ABOVE
R0857    OUTPUT
R0858      N.A.
R0859    ERASABLE INITIALIZATION REQUIRED-
R0860      ACMODFLG MUST BE SET TO 1 (MANUAL MODE)
 0861    REF   1                1142                        EBANK= GENRET
 0862    REF   1                                            COUNT* $$/R23
 0863    REF  29  LAST  514   24,3137  0 5504 0  R23LEM     TC      UPFLAG          SET NO ANGLE MONITOR FLAG
 0864    REF   6  LAST  515   24,3140   00126 1             ADRES   NORRMON
 0865                         24,3141  0 0004 0             INHINT
 0866    REF  17  LAST  336   24,3142  0 4674 0             TC      IBNKCALL        SELECT MINIMUM DEADBAND
 0867    REF   1              24,3143   40141 1             CADR    SETMINDB
 0868                         24,3144  0 0003 1             RELINT
 0869    REF  50  LAST  512   24,3145  3 4736 1  R23LEM1    CAF     BIT14           ENABLE TRACKER
 0870                         24,3146  0 0006 1             EXTEND
 0871    REF  26  LAST  512   24,3147  05 012 1             WOR     CHAN12
 0872    REF   1              24,3150  3 3207 1             CAF     OCT205
 0873    REF 134  LAST  515   24,3151  0 4616 1             TC      BANKCALL
 0874    REF   2  LAST  501   24,3152   20624 0             CADR    GOPERF1
 0875    REF   1              24,3153  0 3200 0             TC      R23LEM2         TERMINATE
 0876    REF   1              24,3154  0 3156 0             TC      R23LEM11        PROCEED
 0877    REF   1              24,3155  0 3203 0             TC      R23LEM3         ENTER- DO ANOTHER MANUVER
 0878                         24,3156  0 0004 0  R23LEM11   INHINT
 0879    REF   2  LAST  189   24,3157  0 4523 1             TC      RRLIMCHK        YES - CHECK IF ANTENNA IS WITHIN LIMITS
 0880    REF   4  LAST  318   24,3160   00035 1             ADRES   CDUT
 0881    REF   1              24,3161  0 3170 1             TC      OUTOFLIM        NOT WITHIN LIMITS
 0882    REF  18  LAST  517   24,3162  0 4674 0             TC      IBNKCALL        RESTORE DEADBAND TO
 0883    REF   4  LAST  297   24,3163   40115 0             CADR    RESTORDB        ASTRONAUT SELECTED VALUE
 0884                         24,3164  0 0003 1             RELINT
 0885    REF  51  LAST  514   24,3165  0 5516 0             TC      DOWNFLAG        CLEAR NO ANGLE MONITOR FLAG
 0886    REF   7  LAST  517   24,3166   00126 1             ADRES   NORRMON
 0887    REF   1              24,3167  0 2163 1             TC      P20LEMB1        RADAR IS LOCKED ON CONTINUE IN P20
 0888                         24,3170  0 0003 1  OUTOFLIM   RELINT
 0889   REF   1                 24,3171   3 3206 0              CAF      OCT501PV
 0890   REF 135  LAST   517     24,3172   0 4616 1              TC       BANKCALL         ISSUE ALARM - RR ANTENNA NOT WITHIN
 0891   REF   6  LAST   515     24,3173    21563 1              CADR     PRIOLARM         LIMITS
 0892   REF   2  LAST   517     24,3174   0 3200 0              TC       R23LEM2          TERMINATE - EXIT R23 TO R00 (GO TO POOH)
 0893   REF   2  LAST   517     24,3175   0 3171 0              TC       OUTOFLIM +1      PROCEED ILLEGAL
 0894   REF   2  LAST   517     24,3176   0 3203 0              TC       R23LEM3          RECYCLE- DO ANOTHER MANUVER
 0895   REF  86  LAST   515     24,3177   0 5155 0              TC       ENDOFJOB
 0896   REF  52  LAST   517     24,3200   0 5516 0   R23LEM2    TC       DOWNFLAG         CLEAR NO ANGLE MONITOR FLAG
 0897   REF   8  LAST   517     24,3201 .  00126 1              ADRES    NORRMON
 0898   REF  12  LAST   515     24,3202   0 6025 0              TC       GOTOV56          AND EXIT VIA V56
 0899   REF 136  LAST   518     24,3203   0 4616 1   R23LEM3    TC       BANKCALL
 0900   REF   3  LAST   509     24,3204    46116 0              CADR     R61LEM
 0901   REF   1                 24,3205   0 3145 1              TC       R23LEM1


 0902                           24,3206    00501 0   OCT501PV   OCT      501
 0903                           24,3207    00205 0   OCT205     OCT      205
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R0904    SEARCH ROUTINE R24LEM
R0905    PROGRAM DESCRIPTION
R0906    MOD NO - 2
R0907    BY  P. VOLANTE
R0908    FUNCTIONAL DESCRIPTION
R0909
R0910      TO ACQUIRE THE CSM BY A SEARCH PATTERN WHEN THE RENDEZVOUS RADAR HAS
R0911    FAILED TO ACQUIRE THE CSM IN THE AUTOMATIC TRACKING MODE AND TO ALLOW
R0912    THE ASTRONAUT TO CONFIRM THAT REACQUISITION HAS NOT BEEN BY SIDELOBE.
R0913    CALLING SEQUENCE
R0914             CAF     PRIONN
R0915             TC      FINDVAC
R0916             EBANK=  DATAGOOD
R0917             2CADR   R24LEM
R0918    SUBROUTINES CALLED
R0919      FLAGUP         FLAGDOWN       BANKCALL
R0920      R61LEM         GOFLASHR       FINDVAC
R0921      ENDOFJOB       NOVAC          LSR24.1
R0922    NORMAL EXIT MODES-
R0923      ASTRONAUT RESPONSE TO DISPLAY OF OMEGA AND DATAGOOD.HE CAN EITHER
R0924    REJECT BY TERMINATING (SEARCH OPTION AND RESELECTING P20) OR ACCEPT BY
R0925    PROCEEDING (EXIT ROUTINE AND RETURN TO AUTO MODE IN P20)
R0926    ALARM OR ABORT EXIT MODES-
R0927      SEE NORMAL EXIT MODES ABOVE
R0928    OUTPUT -
R0929      SEE OUTPUT FROM LSR24.1 + R61LEM
R0930    ERASABLE INITIALIZATION REQUIRED
R0931      SEE INPUT FOR LSR24.1
R0932    FLAGS SET + RESET
R0933      SRCHOPT,ACMODFLG
 0934    REF   3  LAST  318   E7,1733                        EBANK=  DATAGOOD
 0935    REF   1                                             COUNT*  $$/R24
 0936    REF  30  LAST  517   24,3210  0 5504 0  R24LEM      TC      UPFLAG
 0937    REF   4  LAST  501   24,3211   00037 0              ADRES   SRCHOPTN          SET SRCHOPT FLAG
 0938    REF  53  LAST  518   24,3212  0 5516 0              TC      DOWNFLAG          RESET LOS BEING COMPUTED FLAG TO MAKE
 0939    REF   5  LAST  514   24,3213   00041 1              ADRES   LOSCMFLG          SURE DODES DOESN'T GO TO R21
 0940    REF 109  LAST  512   24,3214  3 4755 1  R24LEM1     CAF     ZERO
 0941    REF   4  LAST  519   24,3215  55'733 0              TS      DATAGOOD          ZERO OUT DATA INDICATOR
 0942    REF   2  LAST  318   24,3216  55'734 1              TS      OMEGAD            ZERO OMEGA DISPLAY REGS
 0943    REF   3  LAST  519   24,3217  55'735 0              TS      OMEGAD +1         ZERO OMEGA DISPLAY REGS
 0944    REF  21  LAST  515   24,3220  0 5353 1  R24LEM2     TC      PHASCHNG
 0945                         24,3221   04022 0              OCT     04022
 0946    REF   1              24,3222  3 3255 0              CAF     V16N80
 0947    REF 137  LAST  518   24,3223  0 4616 1              TC      BANKCALL
 0948    REF   1              24,3224   20505 0              CADR    PRIODSPR
 0949    REF  13  LAST  518   24,3225  0 6025 0              TC      GOTOV56
 0950    REF   1              24,3226  0 3232 1              TC      R24END            PROCEED EXIT R24 TO P20LEM1


 0951    REF   1              24,3227  0 3236 0              TC      R24LEM3           RECYCLE - CALL R61 TO MANEUVER S/C
 0952   REF 138  LAST  519    24,3230  0 4616 1            TC      BANKCALL
 0953   REF   1               24,3231   55442 0            CADR    LRS24.1
 0955   REF   3  LAST  515    24,3232  0 6032 0  R24END    TC      KILLTASK
 0956   REF   1               24,3233   55643 0            CADR    CALLDGCH
 0957   REF   7  LAST  515    24,3234  0 6011 1            TC      CLRADMOD           CLEAR BITS 10 & 15 OF RADMODES.
 0958   REF   2  LAST  500    24,3235  1 2063 1            TCF     P20LEM1            AND GO TO 400 MI. RANGE CHECK IN P20.

 0959                            6011                      BLOCK   3
 0960   REF   1                  6000                      SETLOC  FFTAG6
 0961                            6011                      BANK
 0962   REF   1                                            COUNT*  $$/R24

 0963   REF   1                  6011  4 6021 0  CLRADMOD CS      BIT10+15
 0964                            6012  0 0004 0            INHINT
 0965   REF  36  LAST  512       6013  7 0110 0            MASK    RADMODES
 0966   REF  37  LAST  520       6014  54 110 0            TS      RADMODES
 0967   REF  28  LAST  508       6015  4 4752 1            CS      BIT2               DISABLE RR ERROR COUNTERS
 0968                            6016  0 0006 1            EXTEND
 0969   REF  27  LAST  517       6017  03 012 1            WAND    CHAN12             USER WILL RELINT

 0970   REF 151  LAST  511       6020  0 0002 0            TC      Q


 0971                            6021   41000 1  BIT10+15  OCT     41000
 0972                         24,3236                      BANK    24
 0973   REF   3  LAST  499    24,2000                      SETLOC  P20S
 0974                         24,3236                      BANK
 0975   REF   2 LAST  519 TO  520:     22    22*           COUNT*  $$/R24

 0976   REF  22  LAST  519    24,3236  0 5353 1  R24LEM3   TC      PHASCHNG
 0977                         24,3237   04022 0            OCT     04022
 0979   REF   4  LAST  520    24,3240  0 6032 0            TC      KILLTASK
 0980   REF   2  LAST  520    24,3241   55643 0            CADR    CALLDGCH           KILL WAITLIST FOR NEXT POINT IN PATTERN
 0981   REF   8  LAST  520    24,3242  0 6011 1            TC      CLRADMOD           CLEAR BITS 10 + 15 OF RADMODES
 0983   REF   1               24,3243  3 4774 1            CAF     .5SEC
 0984   REF 139  LAST  520    24,3244  0 4616 1            TC      BANKCALL           WAIT FOR DESIGNATE LOOP TO DIE
 0985   REF   8  LAST  502    24,3245   01736 1            CADR    DELAYJOB
 0986   REF   9  LAST  513    24,3246  0 2670 1            TC      LUNSFCHK           CHECK IF ON LUNAR SURFACE
 0987   REF   1               24,3247  0 3252 1            TC      R24LEM4            YES-DONT DO ATTITUDE MANEUVER
 0988   REF 140  LAST  520    24,3250  0 4616 1            TC      BANKCALL           CALL R61 TO DO PREFERRED TRACKING
 0989   REF   4  LAST  518    24,3251   46116 0            CADR    R61LEM             ATTITUDE MANEUVER
 0990   REF 110  LAST  519    24,3252  3 4755 1  R24LEM4   CAF     ZERO               ZERO OUT RADCADR (WHICH WAS SET BY
 0991   REF   2  LAST  224    24,3253  55 303 1            TS      RADCADR            ENDRADAR WHEN DESIGNATE STOPPED) SO THAT
A0992                                                                                 RRDESSM  WILL RETURN TO CALLER
 0993   REF   1               24,3254  0 3220 1            TC      R24LEM2            AND GO BACK TO PUT UP V16 N80 DISPLAY


 0994                         24,3255   04120 0  V16N80    VN      01680
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R0995    PREFERRED TRACKING ATTITUDE ROUTINE R61LEM
R0996    PROGRAM DESCRIPTION
R0997    MCO NO : 3                                 DATE : 4-11-67
R0998    MCO BY : P VOLANTE  SDC


R0999    FUNCTIONAL DESCRIPTION-
R1000      TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE LM TO ENABLE RR
R1001    TRACKING OF THE CSM AND TO PERFORM THE MANEUVER TO THE PREFERRED
R1002    ATTITUDE.
R1003    CALLING SEQUENCE-
R1004              TC      BANKCALL
R1005              CADR    R61LEM
R1006    SUBROUTINES CALLED
R1007        LPS20.1         VECPOINT
R1008        KALCMAN3


R1009    NORMAL EXIT MODES-
R1010      NORMAL RETURN IS TC CALLER + 1
R1011    ALARM OR ABORT EXIT MODES-
R1012      TERMINATE P20 + R61 BY BRANCHING TO P20END IF BOTH TRACKFLAG +
R1013    RENDEZVOUS FLAG ARE NOT SET.
R1014    OUTPUT -
R1015      SEE OUTPUT FOR LPS20.1 + ATTITUDE MANEUVER ROUTINE (R60)
R1016    ERASABLE INITIALIZATION REQUIRED
R1017      GENRET USED TO SAVE Q FOR RETURN
R1018    FLAGS SET + RESET
R1019      3AXISFLG
R1020    DEBRIS
R1021      SEE SUBROUTINES
 1022    REF   1             23,2000                        SETLOC R61
 1023                        23,2116                        BANK
 1024    REF  17  LAST  515  E7,1456                        EBANK= LOSCOUNT
 1025    REF   1                                            COUNT* $$/R61
 1026    REF   4  LAST  481  23,2116  0 4645 1  R61LEM      TC     MAKECADR
 1027    REF   2  LAST  517  23,2117  55'142 0              TS     GENRET
 1028    REF  31  LAST  519  23,2120  0 5504 0              TC     UPFLAG         SET R61 FLAG
 1029    REF   1             23,2121   00024 1              ADRES  R61FLAG
 1030    REF   1             23,2122  0 2152 0              TC     R61C+L02
 1031    REF   5  LAST  521  23,2123  0 4645 1  R65LEM      TC     MAKECADR
 1032    REF   3  LAST  521  23,2124  55'142 0              TS     GENRET
 1033    REF  54  LAST  519  23,2125  0 5516 0              TC     DOWNFLAG       RESET R61 FLAG
 10331   REF   2  LAST  521  23,2126   00024 1              ADRES  R61FLAG
 10332   REF  22  LAST  472  23,2127  3 4750 1  R61C+L01    CAF    BIT4           BYPASS RADAR READING IF DATA
 10333                       23,2130  0 0006 1              EXTEND                GOOD NOT PRESENT
 10334   REF  10  LAST  508  23,2131  02 033 0              RAND   CHAN33
 10335   REF 168  LAST  512  23,2132  10 000 0              CCS    A
 1034    REF   2  LAST  521  23,2133  1 2152 1              TCF    R61C+L02       NO DATA GOOD
 10341   REF  32  LAST  521  23,2134  0 5504 0              TC     UPFLAG
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10342  REF   6  LAST  500   23,2135   00063 1             ADRES  R04FLAG        PREVENT 521 ALM
10343  REF 141  LAST  520   23,2136  0 4616 1             TC     BANKCALL       READ RR RANGE AND RDOT
10344  REF   3  LAST  511   23,2137   53112 0             CADR   RRRDOT          EVERY R65 PASS (3 TIMES
10345  REF 142  LAST  522   23,2140  0 4616 1             TC     BANKCALL        BEFORE FIRST MARK, ONCE
10346  REF   7  LAST  513   23,2141   17705 0             CADR   RADSTALL        DURING ANY MARK PROCESSING,
10347                       23,2142  12 143 1             NOOP
10348  REF 143  LAST  522   23,2143  0 4616 1             TC     BANKCALL
10349  REF   2  LAST  495   23,2144   53114 0             CADR   RRRANGE
1035   REF 144  LAST  522   23,2145  0 4616 1             TC     BANKCALL
10351  REF   8  LAST  522   23,2146   17705 0             CADR   RADSTALL
10352                       23,2147  12 150 0             NOOP
10353  REF  55  LAST  521   23,2150  0 5516 0             TC     DOWNFLAG
10354  REF   7  LAST  522   23,2151   00063 1             ADRES  R04FLAG
10355  REF  12  LAST  509   23,2152  3 4747 1  R61C+L02   CAF    TRACKBIT       TRACKFLAG
1036   REF  35  LAST  508   23,2153  7 0075 1             MASK   STATE +1
1037                        23,2154  0 0006 1             EXTEND
1038   REF   1              23,2155  1 2314 1             BZF    R65WAIT        NOT SET
1039   REF  44  LAST  515   23,2156  0 6042 1  R61C+L03   TC     INTPRET
1040                        23,2157   77775 1             VLOAD
1041   REF   4  LAST  492   23,2160   06516 0                    HIUNITZ
1042   REF  21  LAST  487   23,2161   03765 0             STORE  SCAXIS         TRACK AXIS UNIT VECTOR
1043                        23,2162   43234 0  R61LEM1    RTB    DAD
1044   REF  11  LAST  515   23,2163   21574 1                    LOADTIME       EXTRAPOLATE FORWARD TO CENTER
1046   REF   1              23,2164   15712 1                    6SECONDS       SIX SECOND PERIOD.
1047   REF  15  LAST  514   23,2165   34041 0             STCALL TDEC1
1048   REF   4  LAST  514   23,2166   51256 1                    LPS20.1        LOS DETERMINATION + VEH ATTITUDE
1049                        23,2167   77775 1             VLOAD
1050   REF   2  LAST  103   23,2170   01101 0                    RRTARGET
1051   REF   4  LAST  485   23,2171   03773 1             STORE  POINTVSM
1052                        23,2172   45034 1             RTB    CALL              GET DESIRED CDU'S FOR VECPNT1
10525  REF   1              23,2173   46322 0                    READCDUD
1053   REF   1              23,2174   56032 0                    VECPNT1        COMPUTES FINAL ANGLES FROM PRESENT CDUDS
1054   REF   8  LAST  481   23,2175   00322 1             STORE  CPHI           STORE FINAL ANGLES - CPHI,CTHETA,CPSI
1055                        23,2176   77776 1             EXIT
1056   REF  23  LAST  520   23,2177  0 5353 1             TC     PHASCHNG
1057                        23,2200   04022 0             OCT    04022
1058   REF  13  LAST  522   23,2201  3 4747 1             CAF    TRACKBIT        IS TRACK FLAG SET
1059   REF  24  LAST  510   23,2202  7 0075 1             MASK   FLAGWRD1
1060                        23,2203  0 0006 1             EXTEND
1061   REF   2  LAST  522   23,2204  1 2314 1             BZF    R65WAIT
1062   REF 145  LAST  522   23,2205  0 4616 1             TC     BANKCALL
1063   REF   2  LAST  478   23,2206   54261 0             CADR   G+N,AUTO       CHECK FOR AUTO MODE
1064   REF 169  LAST  521   23,2207  10 000 0             CCS    A
1065   REF   1              23,2210  0 2302 1             TC     R61C+L04       NOT IN AUTO
1072   REF  45  LAST  522   23,2211  0 6042 1             TC     INTPRET
1073                        23,2212   45175 0             VLOAD  CALL
1074   REF   3  LAST  522   23,2213   01101 0                    RRTARGET
1075   REF   1              23,2214   47650 1                    CDU*SMNB
1076                        23,2215   45345 1             DLOAD  DSU            GET PHI - ARCCOS OF Z-COMPONENT OF LOS
1077   REF 239  LAST  509   23,2216   00162 1                    MPAC +5
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1079  REF   1             23,2217   06320 0                     COS15DEG
1080                      23,2220   77440 1  R61LEM2   BMN     EXIT         BRANCH - PHI > 15 DEGREES
1082  REF   1             23,2221   46236 1                     R61C+L05     PHI GRE 10DEG
1083  REF   9  LAST  371  E6,1634                      EBANK=  CDUXD
1085  REF   4  LAST  296  23,2222  3 5015 0            CAF     EBANK6
1086  REF  15  LAST  464  23,2223   54 003 0            TS      EBANK
1087                      23,2224  0 0004 0            INHINT
1088                      23,2225  0 0006 1            EXTEND
1089  REF   9  LAST  522  23,2226  3 0322 1            DCA     CPHI
1090  REF  10  LAST  523  23,2227  53'635 1            DXCH    CDUXD
1091  REF   4  LAST  482  23,2230  3 0323 0            CA      CPSI
1092  REF   2  LAST  371  23,2231  55'636 1            TS      CDUZD
1093                      23,2232  0 0003 1            RELINT
1094  REF  18  LAST  521  E7,1456                      EBANK=  LOSCOUNT
1095  REF   2  LAST  389  23,2233  3 5016 0            CAF     EBANK7
1096  REF  16  LAST  523  23,2234   54 003 0            TS      EBANK
1097  REF   1             23,2235  0 2261 0            TC      R61C+L06
1098                      23,2236   77776 1  R61C+L05  EXIT
1099                      23,2237  0 0004 0            INHINT
1100  REF  19  LAST  517  23,2240  0 4674 0            TC      IBNKCALL
1101  REF   3  LAST  365  23,2241   40154 0            FCADR   ZATTEROR
1102  REF  20  LAST  523  23,2242  0 4674 0            TC      IBNKCALL
1103  REF   2  LAST  517  23,2243   40141 1            FCADR   SETMINDB     REDUCE ATTITUDE ERROR
1104  REF  56  LAST  522  23,2244  0 5516 0            TC      DOWNFLAG
1105  REF   5  LAST  489  23,2245   00124 0            ADRES   3AXISFLG
1106  REF  33  LAST  521  23,2246  0 5504 0            TC      UPFLAG
1107  REF   2  LAST  479  23,2247   00077 1            ADRES   PDSPFLAG     SET PRIORITY DISPLAY FLAG
1108  REF 146  LAST  522  23,2250  0 4616 1            TC      BANKCALL
1109  REF   3  LAST  489  23,2251   54123 0            CADR    R60LEM
1110                      23,2252  0 0004 0            INHINT
1111  REF  21  LAST  523  23,2253  0 4674 0            TC      IBNKCALL
1112  REF   5  LAST  517  23,2254   40115 0            FCADR   RESTORDB
1113  REF  24  LAST  522  23,2255  0 5353 1            TC      PHASCHNG
1114                      23,2256   04022 0            OCT     04022
1115  REF  57  LAST  523  23,2257  0 5516 0            TC      DOWNFLAG
1116  REF   3  LAST  523  23,2260   00077 1            ADRES   PDSPFLAG     RESET PRIORITY DISPLAY FLAG
1117  REF  25  LAST  522  23,2261  3 0075 0  R61C+L06  CA      FLAGWRD1
1118  REF   1             23,2262  7 4742 0            MASK    R61FLBIT
1119  REF 170  LAST  522  23,2263  10 000 0            CCS     A
1120  REF   1             23,2264  0 2305 0            TC      R61C+L4
1123  REF   3  LAST  511  23,2265  11'745 1            CCS     R65CNTR
1124                      23,2266  0 2270 0            TC      +2
1125  REF   2  LAST  523  23,2267  0 2305 0            TC      R61C+L4      R65CNTR = 0 - EXIT ROUTINE
1126  REF   4  LAST  523  23,2270  55'745 1            TS      R65CNTR
1127  REF   1             23,2271  3 2321 0            CAF     06SEC
1129  REF   8  LAST  507  23,2272  0 5173 1            TC      TWIDDLE
1130  REF   1             23,2273   02275 0            ADRES   R61C+L2
1131  REF  87  LAST  518  23,2274  0 5155 0            TC      ENDOFJOB
1132  REF   8  LAST  515  23,2275  3 7717 1  R61C+L2   CAF     PRIO26
1133  REF  21  LAST  515  23,2276  0 5105 0            TC      FINDVAC
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 1134   REF  19  LAST  523   E7,1456                     EBANK=  LOSCCUNT
 1135   REF   1              23,2277   02127 1           2CADR   R61C+L01
 1135   REF   1              23,2300   46067 1
 1136   REF  22  LAST  515   23,2301  0 5261 1           TC      TASKOVER
 1137   REF 147  LAST  523   23,2302  0 4616 1  R61C+L04 TC      BANKCALL         TO CONVERT ANGLES TO FDAI
 1138   REF   4  LAST  478   23,2303   54272 1           CADR    BALLANGS
 1139   REF   2  LAST  523   23,2304  0 2261 0           TC      R61C+L06
 1140   REF   4  LAST  521   23,2305  31'142 1  R61C+L4  CAE     GENRET
 1141   REF   8  LAST  483   23,2306  1 4640 0           TCF     BANKJUMP         EXIT R61
 1142   REF   1              23,2307  3 2316 1  R61C+L1  CAF     BIT7+9PV         IS RENDEZVOUS OR P25FLAG SET
 1143   REF  36  LAST  522   23,2310  7 0074 0           MASK    STATE
 1144                        23,2311  0 0006 1           EXTEND
 1145   REF  88  LAST  523   23,2312  1 5155 1           BZF     ENDOFJOB         NO-EXIT ROUTINE AND PROGRAM.
 1146   REF   3  LAST  524   23,2313  0 2261 0           TC      R61C+L06         YES EXIT ROUTINE
 11463  REF  36  LAST  473   23,2314  0 4635 0  R65WAIT  TC      POSTJUMP
 11466  REF   6  LAST  515   23,2315   50232 1           CADR    P20LEMWT


 1147                        23,2316   00500 1  BIT7+9PV OCT     00500
 1148                        23,2317   17350 1  COS15DEG 2DEC    0.96593 B-1
 1148                        23,2320   34602 1
 1149                        23,2321   01130 1  06SEC    DEC     600
 1150                           0024            PHI      EQUALS  20D
 1152                        23,2322  0 0004 0  READCDUD INHINT                   READS DESIRED CDU'S AND STORES IN
 11521  REF   5  LAST  523   23,2323  3 5015 0           CAF     EBANK6           MPAC TP EXITS WITH MODE SET TO TP
 11522  REF  17  LAST  523   23,2324  56 003 1           XCH     EBANK
 11523  REF  20  LAST  259   23,2325  54 070 1           TS      RUPTREG1
 11524  REF  11  LAST  523   E6,1634                     EBANK=  CDUXD
 11525  REF  12  LAST  524   23,2326  3 1634 1           CA      CDUXD
 11526  REF 240  LAST  522   23,2327  54 154 0           TS      MPAC
 11527                       23,2330  0 0006 1           EXTEND
 11528  REF   2  LAST  371   23,2331  3 1636 0           DCA     CDUYD
 11529  REF 241  LAST  524   23,2332  52 156 1           DXCH    MPAC +1
 1153   REF  21  LAST  524   23,2333  3 0070 0           CA      RUPTREG1
 11531  REF  18  LAST  524   23,2334  54 003 0           TS      EBANK
 11532                       23,2335  0 0003 1           RELINT
 11533  REF   1              23,2336  1 6502 1           TCF     TMODE
 1155                           4512                     BLOCK   02
 1156   REF   1                 4000                     SETLOC  RADARFF
 1157                           4512                     BANK

 1158   REF  20  LAST  524   E7,1456                     EBANK=  LOSCCUNT
 1159   REF   1                                          COUNT*  $$/RRSUB
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P1160   THE FOLLOWING SUBROUTINE RETURNS TO CALLER + 2 IF THE ABSOLUTE VALUE OF VALUE OF C(A) IS GREATER THAN THE
R1162   NEGATIVE OF THE NUMBER AT CALLER +1. OTHERWISE IT RETURNS TO CALLER +3. MAY BE CALLED IN RUPT OR UNDER EXEC.

 1164                           4512  0 0006 1  MAGSUB   EXTEND
 1165                           4513  6 4515 1           BZMF    +2
 1166                           4514  1 4516 0           TCF     +2
 1167                           4515  4 0000 0           COM

 1168   REF 152  LAST  520      4516  50 002 0           INDEX   Q
 1169                           4517  6 0000 1           AD      0
 1170                           4520  0 0006 1           EXTEND
 1171   REF   1                 4521  6 6744 0           BZMF    Q+2            ABS(A) <= CONST  GO TO L+3
 1172   REF   3  LAST  269      4522  1 6742 1           TCF     Q+1            ABS(A) >  CONST  GO TO L+2
```

```
P1173    PROGRAM NAME_  RRLIMCHK                                                    ARE IN THE LIMITS OF THE CURRENT MODE.

R1175    FUNCTIONAL DESCRIPTION_
R1176    RRLIMCHK CHECKS RR DESIRED GIMBAL ANGLES TO SEE IF THEY ARE WITHIN
R1177    THE LIMITS OF THE CURRENT MODE. INITIALLY THE DESIRED TRUNNION AND
R1178    SHAFT ANGLES ARE STORED IN ITEMP1 AND ITEMP2. THE CURRENT RR
R1179    ANTENNAE MODE (RADMODES BIT 12) IS CHECKED WHICH IS = 0 FOR
R1180    MODE 1 AND =1 FOR MODE 2.
R1181    MODE 1 - THE TRUNNION ANGLE IS CHECKED AT MAGSUB TO SEE IF IT IS
R1182    BETWEEN -55 AND +55 DEGREES. IF NOT, RETURN TO L +2. IF WITHIN LIMITS,
R1183    THE SHAFT ANGLE IS CHECKED TO SEE IF IT IS BETWEEN -70 AND +59 DEGREES.
R1184    IF NOT, RETURN TO L +2. IF IN LIMITS, RETURN TO L +3.
R1185    MODE 2 - THE SHAFT ANGLE IS CHECKED AT MAGSUB TO SEE IF IT IS
R1186    BETWEEN -139 AND -25 DEGREES. IF NOT, RETURN TO L +2. IF WITHIN
R1187    LIMITS, THE TRUNNION ANGLE IS CHECKED TO SEE IF IT IS BETWEEN +125
R1188    AND -125 (+235) DEGREES. IF NOT, RETURN TO L +2. IF IN LIMITS, RETURN
R1189    TO L +3.

R1190    CALLING SEQUENCE:
R1191    L  TC  RRLIMCHK (WITH INTERRUPT INHIBITED)
R1192    L +1  ADRES  T,S  (DESIRED TRUNNION ANGLE ADDRESS)

R1193    ERASABLE INITIALIZATION REQUIRED:
R1194    RADMODES, MODEA, MODEB (OR DESIRED TRUNNION AND SHAFT
R1195    ANGLES ELSEWHERE IN CONSECUTIVE LOCATIONS - UNSWITCHED ERASABLE OR
R1196    CURRENT EBANK).

R1197    SUBROUTINES CALLED_  MAGSUB

R1198    JOBS OR TASKS INITIATED_  NONE

R1199    ALARMS_  NONE

R1200    EXIT_  L + 2 (EITHER OR BOTH ANGLES NOT WITHIN LIMITS OF CURRENT MODE)
R1201    L + 3 (BOTH ANGLES WITHIN LIMITS OF CURRENT MODE)

 1202                            4523  0 0006 1  RRLIMCHK EXTEND
 1203    REF 153  LAST  525      4524  5 0002 0           INDEX   Q
 1204                            4525  5 0000 1           INDEX   0
 1205                            4526  3 0001 0           DCA     0
 1206    REF 154  LAST  526      4527  24 002 0           INCR    Q
 1207    REF   6  LAST  259      4530  52 062 1           DXCH    ITEMP1
 1208    REF 155  LAST  526      4531  22 002 0           LXCH    Q                L(CALLER +2) TO L.

 1209    REF   2  LAST  325      4532  3 4740 0           CAF     ANTENBIT         SEE WHICH MODE RR IS IN.
 1210    REF  38  LAST  520      4533  7 0110 0           MASK    RADMODES
 1211    REF 171  LAST  523      4534  10 000 0           CCS     A
 1212    REF   1                 4535  1 4550 1           TCF     MODE2CHK

 1213    REF   7  LAST  526      4536  3 0061 0           CA      ITEMP1           MODE 1 IS DEFINED AS
 1214   REF   1                  4537  0 4512 0            TC      MAGSUB              1. ABS(T) L 55 DEGS.
 1215                            4540   66161 1            DEC     -.30555             2. ABS(S + 5.5 DEGS) L 64 5 DEGS
 1216   REF  64  LAST  468       4541  0 0001 0            TC      L                      (SHAFT LIMITS AT +59, -70 DEGS)

 1217   REF   1                  4542  3 4562 1            CAF     5.5DEGS
 1218   REF   3  LAST   95       4543  6 0062 0            AD      ITEMP2          S
 1219   REF   2  LAST  527       4544  0 4512 0            TC      MAGSUB
 1220                            4545   64420 0            DEC     -.35833         64.5 DEGS
 1221   REF  65  LAST  527       4546  0 0001 0            TC      L
 1222   REF   1                  4547  0 4560 0            TC      RRLIMOK         IN LIMITS.

 1223   REF   1                  4550  3 4563 0  MODE2CHK  CAF     82DEGS          MODE 2 IS DEFINED AS
 1224   REF   4  LAST  527       4551  6 0062 0            AD      ITEMP2              1. ABS(T) G 125 DEGS.
 1225   REF   3  LAST  527       4552  0 4512 0            TC      MAGSUB              2. ABS(S + 82 DEGS) L 57 DEGS
 1226                            4553   65673 0            DEC     -.31667                (SHAFT LIMITS AT -25, -139 DEGS)
 1227   REF  66  LAST  527       4554  0 0001 0            TC      L

 1228   REF   8  LAST  526       4555  3 0061 0            CA      ITEMP1
 1229   REF   4  LAST  527       4556  0 4512 0            TC      MAGSUB
 1230                            4557   51615 1            DEC     -.69444         125 DEGS

 1231   REF  67  LAST  527       4560  50 001 0  RRLIMOK   INDEX   L
 1232   REF  68  LAST  527       4561  0 0001 0            TC      L               ( = TC 1)

 1233                            4562   00765 0  5.5DEGS   DEC     .03056
 1234                            4563   16450 1  82DEGS    DEC     .45556
```

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P1235   PROGRAM NAME_  SETTRKF                                                  - IF EITHER:

R1237   FUNCTIONAL DESCRIPTION_
R1238   SETTRKF UPDATES THE TRACKER FAIL LAMP ON THE DSKY.                      HER THE ALT OR VEL INFORMATION.
R1240   INITIALLY THE LAMP TEST FLAG (IMODES33 BIT 1) IS CHECKED.
R1241   IF A LAMP TEST IS IN PROGRESS, THE PROGRAM EXITS TO L +1.
R1242   IF NO LAMP TEST THE FOLLOWING IS CHECKED SEQUENTIALLY_
R1243   1) RR CDU:S BEING ZEROED, RR CDU OK, AND RR NOT IN
R1244   AUTO MODE (RADMODES BITS 13, 7, 2).
R1245   2) LR VEL DATA FAIL AND NO LR POS DATA (RADMODES BITS
R1246   8,5)
R1247   3) NO RR DATA (RADMODES BIT 4)
R1248   THE ABSENCE OF ALL THREE SIMULTANEOUSLY IN (1), THE PRESENCE OF BOTH
R1249   IN (2), AND THE PRESENCE OF (3) RESULTS IN EITHER THE TRACKER FAIL
R1250   LAMP (DSPTAB +11D BIT 8) BEING TURNED ON OR LEFT ON. OTHERWISE,
R1251   THE TRACKER FAIL LAMP IS TURNED OFF OR IS LEFT OFF. THEREFORE, THE
R1252   TRACKER FAIL LAMP IS TURNED ON IF_
R1253   A ) RR CDU FAILED WITH RR IN AUTO MODE AND RR CDU:S NOT BEING ZEROED.
R1254   B) N SAMPLES OF LR DATA COULD NOT BE TAKEN IN 2N TRIES WITH
R1255   EITHER THE ALT OR VEL INFORMATION
R1256   C) N SAMPLES OF RR DATA COULD NOT BE OBTAINED FROM 2N TRIES
R1257   WITH EITHER THE AL

R1258   CALLING SEQUENCE:
R1259   L  TC  SETTRKF

R1260   ERASABLE INITIALIZATION REQUIRED: IMODES33, RADMODES, DSPTAB +11D
R1261   SUBROUTINES CALLED_  NONE

R1262   JOBS OR TASKS INITIATED_  NONE

R1263   ALARMS_  TRACKER FAIL LAMP

R1264   EXIT_  L +1 (ALWAYS)                                                     ED.

 1266   REF  26  LAST  471      4564  3 4753 1  SETTRKF  CAF     BIT1            NO ACTION IF DURING LAMP TEST.
 1267   REF  25  LAST  474      4565  7 1300 1           MASK    IMODES33
 1268   REF 172  LAST  526      4566  10 000 0           CCS     A
 1269   REF 156  LAST  526      4567  0 0002 0           TC      Q

 1270   REF  25  LAST  336      4570  3 4744 1  RRTRKF   CA      BIT8
 1271   REF  69  LAST  527      4571  54 001 1           TS      L

 1272   REF   2  LAST  187      4572  3 4615 1           CAF     13,7,2          SEE IF CDU FAILED.
 1273   REF  39  LAST  526      4573  7 0110 0           MASK    RADMODES
 1274                           4574  0 0006 1           EXTEND
 1275   REF   1                 4575  1 4601 0           BZF     TRKFLCN         CONDITION 3 ABOVE.

 1276   REF   1                 4576  3 4750 1  RRCHECK  CAF     RRDATABT        SEE IF RR DATA FAILED.
 1277   REF  40  LAST  528      4577  7 0110 0           MASK    RADMODES
 1278   REF 173  LAST  528     4600  10 000 0            CCS     A
 1279   REF  70  LAST  528     4601  3 0001 0  TRKFLON   CA      L
 1280   REF  39  LAST  475     4602  6 1035 0            AD      DSPTAB +11D     HALF ADD DESIRED AND PRESENT STATES.
 1281   REF  71  LAST  529     4603  7 0001 1            MASK    L
 1282                          4604  0 0006 1            EXTEND
 1283   REF   4  LAST  276     4605  1 6745 0            BZF     TCQ             NO CHANGE.

 1284   REF  40  LAST  529     4606  3 1035 0  FLIP      CA      DSPTAB +11D     CANT USE LXCH DSPTAB +11D (RESTART PROB)
 1285                          4607  0 0006 1            EXTEND
 1286   REF  10  LAST  260     4610  06 001 0            RXOR    LCHAN
 1287   REF  11  LAST  436     4611  7 4733 0            MASK    POSMAX
 1288   REF  30  LAST  512     4612  6 4735 1            AD      BIT15
 1289   REF  41  LAST  529     4613  55'035 1            TS      DSPTAB +11D
 1290   REF 157  LAST  528     4614  0 0002 0            TC      Q

 1291                          4615   10102 0  13,7,2    OCT     10102
 1292                          4616            ENDRMODF  EQUALS
```

```
P1293    PROGRAM NAME_  RRTURNON

R1294    FUNCTIONAL DESCRIPTION_

R1295    RRTURNON IS THE TURN-ON SEQUENCE WHICH, ALONG WITH
R1296    RRZERDSB, ZEROS THE CDU:S AND DETERMINES THE RR MODE.
R1297    INITIALLY, CONTROL IS TRANSFERRED TO RRZEROSB FOR THE
R1298    ACTUAL TURN-ON SEQUENCE. UPON RETURN THE PROGRAM
R1299    WAITS 1 SECOND BEFORE REMOVING THE TURN-ON FLAG
R1300    (RADMODES BIT1) SO THE REPOSITION ROUTINE WON:T
R1301    INITIATE PROGRAM ALARM 00501. A CHECK IS THEN MADE
R1302    TO SEE IF A PROGRAM IS USING THE RR (STATE BIT 7), IF
R1303    SO, THE PROGRAM EXITS TO ENDRADAR SO THAT THE RR CDU
R1304    FAIL FLAG (RADMODES BIT 7) CAN BE CHECKED BEFORE
R1305    RETURNING TO THE WAITING PROGRAM. IF NOT, THE PROGRAM EXITS
R1306    TO TASKOVER.

R1307    CALLING SEQUENCE: WAITLIST TASK FROM RRAUTCHK IF THE RR POWER ON AUTO
R1308    BIT (CHAN 33 BIT 2) CHANGES TO 0 AND NO PROGRAM WAS USING
R1309    THE RR (STATE BIT 7).

R1310    ERASABLE INITIALIZATION REQUIRED:
R1311    RADMODES, STATE

R1312    SUBROUTINES CALLED_  RRZEROSB, FIXDELAY, TASKOVER, ENDRADAR

R1313    JOBS OR TASKS INITIATED_
R1314    NONE

R1315    ALARMS_  NONE (SEE RRZEROSB)

R1316    EXIT_  TASKOVER, ENDRADAR (WAITING PROGRAM)

 1317                           24,3256                    BANK    24
 1318    REF   1                25,2000                    SETLOC  P20S1
 1319                           25,2073                    BANK

 1320    REF  21  LAST  524     E7,1456                    EBANK=  LOSCOUNT
 1321    REF   1                                           COUNT*  $$/RSUB
 1322    REF   1                25,2073  0 2102 0  RRTURNON TC      RRZEROSB
 1323    REF   3  LAST  503     25,2074  0 5221 0           TC      FIXDELAY          WAIT 1 SEC BEFORE REMOVING TURN ON FLAG
 1324                           25,2075   00144 0           DEC     100               SO A MONITOR REPOSITION WONT ALARM.
 1325    REF   1                25,2076  4 4753 0           CS      TURNONBT
 1326    REF  41  LAST  528     25,2077  7 0110 0           MASK    RADMODES
 1327    REF  42  LAST  530     25,2100  54 110 0           TS      RADMODES
 1328    REF  23  LAST  524     25,2101  1 5261 0           TCF     TASKOVER
```

```
P1329     PROGRAM NAME_  RRZEROSB

R1330     FUNCTIONAL DESCRIPTION_
R1331     RRZEROSB IS A CLOSED SUBROUTINE TO ZERO THE RR CDU:S,
R1332     DETERMINE THE RR MODE, AND TURNS ON THE TRACKER FAIL
R1333     LAMP IF REQUIRED. INITIALLY THE RR CDU ZERO BIT (CHAN 12
R1334     BIT 1) IS SET. FOLLOWING A 20 MILLISECOND WAIT, THE LGC
R1335     RR CDU COUNTERS (OPTY, OPTX) ARE SET = 0 AFTER
R1336     WHICH THE RR CDU ZERO DISCRETE (CHAN 12 BIT 1) IS
R1337     REMOVED. A 4 SECOND WAIT IS SET TO ALL THE RR CDU:S
R1338     TO REPEAT THE ACTUAL TRUNNION AND SHAFT ANGLES. THE
R1339     RR CDU ZERO FLAG (RADMODES BIT 13) IS REMOVED. THE
R1340     CONTENTS OF OPTY IS THEN CHECKED TO SEE IF THE TRUNNION
R1341     ANGLE IS LESS THAN 90 DEGREES. IF NOT, BIT 12 OF
R1342     RADMODES IS SET = 1 TO INDICATE RR ANTENNA MODE 2.
R1343     IF LESS THAN 90 DEGREES, BIT 12 OF RADMODES IS SET = 0 TO
R1344     INDICATE RR ANTENNA MODE 1. SETTRKF IS THEN CALLED TO
R1345     SEE IF THE TRACKER FAIL LAMP SHOULD BE TURNED ON.

R1346     CALLING SEQUENCE: L   TC  RRZEROSB (FROM RRTURNON AND RRZERO)
R1347     ERASABLE INITIALIZATION REQUIRED:
R1348     RADMODES (BIT 13 SET), DSPTAB +11D

R1349     SUBROUTINES CALLED_  FIXDELAY, MAGSUB, SETTRKF

R1350     JOBS OR TASKS INITIATED_
R1351     NONE

R1352     ALARMS_  TRACKER FAIL

R1353     EXIT_  L +1 (ALWAYS)

 1354                          25,2102  0 0006 1  RRZEROSB EXTEND
 1355     REF   2  LAST  106   25,2103  22 312 0           QXCH    RRRET
 1356     REF  27  LAST  528   25,2104  3 4753 1           CAF     BIT1              BIT 13 OF RADMODES MUST BE SET BEFORE
 1357                          25,2105  0 0006 1           EXTEND                    COMING HERE.
 1358     REF  28  LAST  520   25,2106  05 012 1           WOR     CHAN12            TURN ON ZERO RR CDU
 1359     REF   4  LAST  530   25,2107  0 5221 0           TC      FIXDELAY
 1360                          25,2110   00002 0           DEC     2

 1361     REF 111  LAST  520   25,2111  3 4755 1           CAF     ZERO
 1362     REF   5  LAST  517   25,2112  54 035 0           TS      CDUT
 1363     REF   4  LAST  318   25,2113  54 036 0           TS      CDUS
 1364     REF  64  LAST  511   25,2114  4 4753 0           CS      ONE               REMOVE ZEROING BIT.
 1365                          25,2115  0 0006 1           EXTEND
 1366     REF  29  LAST  531   25,2116  03 012 1           WAND    CHAN12
 1367     REF   5  LAST  531   25,2117  0 5221 0           TC      FIXDELAY
 1368                          25,2120   01750 1           DEC     1000              RESET FAIL INHIBIT IN 10 SECS - D.281

 1369     REF   3  LAST  509   25,2121  4 4737 1           CS      RCDU0BIT          REMOVE ZEROING IN PROCESS BIT.
 1370    REF  43  LAST  530    25,2122  7 0110 0            MASK    RADMODES
 1371    REF  44  LAST  532    25,2123  54 110 0            TS      RADMODES

 1372    REF   6  LAST  531    25,2124  3 0035 1            CA      COUT
 1373    REF   5  LAST  527    25,2125  0 4512 0            TC      MAGSUB
 1374                          25,2126   57777 1            DEC     -.5
 1375                          25,2127  1 2132 1            TCF     +3                 IF MODE 2.

 1376    REF 112  LAST  531    25,2130  3 4755 1            CAF     ZERO
 1377                          25,2131  1 2133 0            TCF     +2
 1378    REF   3  LAST  526    25,2132  3 4740 0            CAF     ANTENBIT
 1379    REF  45  LAST  532    25,2133  56 110 1            XCH     RADMODES
 1380    REF   1               25,2134  7 7744 0            MASK    -BIT12
 1381    REF  46  LAST  532    25,2135  26 110 0            ADS     RADMODES

 1382    REF   2  LAST  197    25,2136  0 4564 1            TC      SETTRKF            TRACKER LAMP MIGHT GO ON NOW.

 1383    REF   3  LAST  531    25,2137  0 1312 0            TC      RRRET              DONE.

 1384    REF   1                  7744          -BIT12      EQUALS  -1/8               IN SPROOT
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R1385    PROGRAM NAME_  DORREPOS
R1386    FUNCTIONAL DESCRIPTION_
R1387    DORREPOS IS A SEQUENCE OF TASKS TO DRIVE THE RENDEZVOUS RADAR
R1388    TO A SAFE POSITION. INITIALLY SETRRECR IS CALLED WHERE THE RR
R1389    ERROR COUNTERS (CHAN 12 BIT 2) ARE ENABLED AND LASTYCMD
R1390    AND LASTXCMD SET = 0 TO INDICATE THE DIFFERENCE BETWEEN THE
R1391    DESIRED STATE AND PRESENT STATE OF THE COMMANDS. THE RR
R1392    TURN-ON FLAG (RADMODES BIT 1) IS CHECKED AND IF NOT PRESENT,
R1393    PROGRAM ALARM 00501 IS REQUESTED BEFORE CONTINUING. IN EITHER
R1394    CASE, FOLLOWING A 20 MILLISECOND WAIT THE PROGRAM CHECKS THE CURRENT
R1395    RR ANTENNA MODE (RADMODES BIT 12). RRTONLY IS THEN CALLED
R1396    TO DRIVE THE TRUNNION ANGLE TO 0 DEGREES IF IN MODE 1 AND TO 180
R1397    DEGREES IF IN MODE 2. UPON RETURN, THE CURRENT RR ANTENNA
R1398    MODE (RADMODES BIT 12) IS AGAIN CHECKED. RRSONLY IS THEN
R1399    CALLED TO DRIVE THE SHAFT ANGLE TO 0 DEGREES IF IN MODE 1 AND TO
R1400    -90 DEGREES IF IN MODE 2. IF DURING RRTONLY OR RRSONLY A
R1401    REMODE HAS BEEN REQUESTED (RADMODES BIT 14), AND ALWAYS
R1402    FOLLOWING COMPLETION OF RRSONLY, CONTROL IS TRANSFERRED TO
R1403    REPOSRPT. HERE THE REPOSITION FLAG (RADMODES BIT 11) IS
R1404    REMOVED. A CHECK IS THEN MADE ON THE DESIGNATE FLAG (RADMODES
R1405    BIT 10). IF PRESENT, CONTROL IS TRANSFERRED TO BEGDES. IF NOT PRESENT
R1406    INDICATING NO FURTHER ANTENNA CONTROL REQUIRED, THE RR ERROR
R1407    COUNTER BIT (CHAN 12 BIT 2) IS REMOVED AND THE ROUTINE EXITS TO
R1408    TASKOVER.

R1409    CALLING SEQUENCE:
R1410    WAITLIST CALL FROM RRGIMON IF TRUNNION AND SHAFT CDU ANGLES
R1411    NOT WITHIN LIMITS OF CURRENT MODE.

R1412    ERASABLE INITIALIZATION REQUIRED:
R1413    RADMODES

R1414    SUBROUTINES CALLED_
R1415    RRTONLY, RRSONLY, BEGDES (EXIT)

R1416    JOBS OR TASKS INITIATED_
R1417    NONE

R1418    ALARMS-  NONE

R1419    EXIT_  TASKOVER, BEGDES

 1420    REF   1               25,2140   0 2167 0  DORREPOS TC      SETRRECR        SET UP RR CDU ERROR COUNTERS.

R1421    ALARM 501 DELETED IN DANCE 279 PER PCR 97.

 1422    REF   6  LAST  531    25,2141   0 5221 0           TC      FIXDELAY
 1423                          25,2142    00002 0           DEC     2

 1424    REF   4  LAST  532    25,2143   3 4740 0           CAF     ANTENBIT        MANEUVER TRUNNION ANGLE TO NOMINAL POS.
 1425   REF  47  LAST  532   25,2144  7 0110 0             MASK    RADMODES
 1426   REF 174  LAST  529   25,2145  10 000 0             CCS     A
 1427   REF  31  LAST  529   25,2146  3 4735 1             CAF     BIT15          0 FOR MODE 1 AND 180 FOR MODE 2.
 1428   REF   1              25,2147  0 2252 0             TC      RRTONLY

 1429   REF   5  LAST  533   25,2150  3 4740 0             CAF     ANTENBIT       NOW PUT SHAFT IN RIGHT POSITION
 1430   REF  48  LAST  534   25,2151  7 0110 0             MASK    RADMODES
 1431   REF 175  LAST  534   25,2152  10 000 0             CCS     A
 1432   REF   5  LAST  512   25,2153  4 4736 0             CS      HALF           -90 FOR MODE 2.
 1433   REF   1              25,2154  0 2255 1             TC      RRSONLY

 1434   REF   2  LAST  189   25,2155  4 4741 0  REPOSRPT   CS      REPOSBIT       RETURNS HERE FROM RR1AXIS IF REMODE
A1435                                                                             REQUESTED DURING REPOSITION.
 1436   REF  49  LAST  534   25,2156  7 0110 0             MASK    RADMODES       REMOVE REPOSITION BIT.
 1437   REF  50  LAST  534   25,2157  54 110 0             TS      RADMODES
 1438   REF   1              25,2160  7 4742 0             MASK    DESIGBIT       SEE IF SOMEONE IS WAITING TO DESIGNATE.
 1439   REF 176  LAST  534   25,2161  10 000 0             CCS     A
 1440   REF   2  LAST  514   25,2162  1 2604 0             TCF     BEGDES
 1441   REF  29  LAST  520   25,2163  4 4752 1             CS      BIT2           IF NO FURTHER ANTENNA CONTROL REQUIRED,
 1442                        25,2164  0 0006 1             EXTEND                 REMOVE ERROR COUNTER ENABLE.
 1443   REF  30  LAST  531   25,2165  03 012 1             WAND    CHAN12
 1444   REF  24  LAST  530   25,2166  1 5261 0             TCF     TASKOVER

 1445   REF  30  LAST  534   25,2167  3 4752 0  SETRRECR   CAF     BIT2           SET UP RR ERROR COUNTERS.
 1446                        25,2170  0 0006 1             EXTEND
 1447   REF  31  LAST  534   25,2171  02 012 0             RAND    CHAN12
 1448   REF 177  LAST  534   25,2172  10 000 0             CCS     A              DO NOT CLEAR LAST COMMAND IF
 1449   REF 158  LAST  529   25,2173  0 0002 0             TC      Q              ERROR COUNTERS ARE ENABLED.

 1450   REF   7  LAST  204   25,2174  54 112 1             TS      LASTYCMD
 1451   REF   1              25,2175  54 113 0             TS      LASTXCMD
 1452   REF  31  LAST  534   25,2176  3 4752 0             CAF     BIT2
 1453                        25,2177  0 0006 1             EXTEND
 1454   REF  32  LAST  534   25,2200  05 012 1             WOR     CHAN12         ENABLE RR CDU ERROR COUNTERS.
 1455   REF 159  LAST  534   25,2201  0 0002 0             TC      Q
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L          P20-P25                                                                                 USER'S PAGE NO.  40       E7 S3

P1456      PROGRAM NAME_  REMODE                                                               IVES SHAFT TO -45, AND FINALLY DRIVES

R1458      FUNCTIONAL DESCRIPTION_                                                             S DONE WITH SINGLE AXIS ROTATIONS (SEE
R1460      REMODE IS THE GENERAL REMODING SUBROUTINE. IT DRIVES THE
R1461      TRUNNION ANGLE TO 0 DEGREES IF THE CURRENT MODE IS MODE 1,
R1462      180 DEGREES FOR MODE 2, THEN DRIVES THE SHAFT ANGLE TO -45
R1463      DEGREES, AND FINALLY DRIVES THE TRUNNION ANGLE TO -130 DEGREES,
R1464      TO PLACE THE RR IN MODE 2, -50 DEGREES FOR MODE 1, BEFORE
R1465      INITIATING 2-AXIS CONTROL. ALL REMODING IS DONE WITH SINGLE
R1466      AXIS ROTATIONS (RR1AXIS). INITIALLY THE RR ANTENNA MODE FLAG
R1467      (RADMODES BIT 12) IS CHECKED. CONTROL IS THEN TRANSFERRED TO
R1468      RRTONLY TO DRIVE THR TRUNNION ANGLE TO 0 DEGREES IF IN MODE 1
R1469      OR 180 DEGREES IF IN MODE 2. RRSONLY IS THEN CALLED TO DRIVE
R1470      THE SHAFT ANGLE TO -45 DEGREES. THE RR ANTENNA MODE FLAG
R1471      (RADMODES BIT 12) IS CHECKED AGAIN. CONTROL IS AGAIN
R1472      TRANSFERRED TO RRTONLY TO DRIVE THE TRUNNION ANGLE TO -130
R1473      DEGREES TO PLACE THE RR IN MODE 2 IF CURRENTLY IN MODE 1 OR TO
R1474      -50 DEGREES IF IN MODE 2 TO PLACE THE RR IN MODE 1. RMODINV
R1475      IS THEN CALLED TO SET RADMODES BIT 12 TO INDICATE THE NEW
R1476      RR ANTENNA MODE. THE REMODE FLAG (RADMODES BIT 14)
R1477      IS REMOVED TO INDICATE THAT REMODING IS COMPLETE. THE PROGRAM
R1478      THEN EXITS TO STDESIG TO BEGIN 2-AXIS CONTROL.

R1479      CALLING SEQUENCE:
R1480      FROM EEGCES WHEN REMODE FLAG (RADMODES BIT 14) IS SET.
R1481      THIS FLAG MAY BE SET IN RRDESSM AND RRDESNB IF RRLIMCHK
R1482      DETERMINES THAT THE DESIRED ANGLES ARE WITHIN THE LIMITS OF THE
R1483      OTHER MODE.

R1484      ERASABLE INITIALIZATION REQUIRED:
R1485      RADMODES

R1486      SUBROUTINES CALLED_
R1487      RRTONLY, RRSONLY, RMODINV (ACTUALLY PART OF)

R1488      JOBS OR TASKS INITIATED_
R1489      NONE

R1490      ALARMS_  NONE

R1491      EXIT_  STDESIG

 1492      REF   6  LAST  534     25,2202   3 4740 0   REMODE     CAE      ANTENBIT          DRIVE TRUNNION TO 0 (180)
 1493      REF  51  LAST  534     25,2203   7 0110 0              MASK     RADMODES          (ERROR COUNTER ALREADY ENABLED)
 1494      REF 178  LAST  534     25,2204  10 000 0               CCS      A
 1495      REF  32  LAST  534     25,2205   3 4735 1              CAF      BIT15
 1496      REF   2  LAST  534     25,2206   0 2252 0              TC       RRTONLY

 1497      REF   1                25,2207   3 7743 0              CAF      -45DEGSR
 1498      REF   2  LAST  534     25,2210   0 2255 1              TC       RRSONLY
 1499   REF  52  LAST  535   25,2211   4 0110 0              CS      RADMODES
 1500   REF   7  LAST  535   25,2212   7 4740 1              MASK    ANTENBIT
 1501   REF 179  LAST  535   25,2213  10 000  0              CCS     A
 1502   REF   1              25,2214   3 2243 0              CAF     -80DEGSR        GO TO T = -130 (-50).
 1503   REF   1              25,2215   6 2242 1              AD      -50DEGSR
 1504   REF   3  LAST  535   25,2216   0 2252 0              TC      RRTONLY

 1505   REF  53  LAST  536   25,2217   4 0110 0              CS      RADMODES
 1506   REF   8  LAST  536   25,2220   7 4740 1              MASK    ANTENBIT
 1507   REF 180  LAST  536   25,2221  10 000  0              CCS     A
 1508   REF  33  LAST  535   25,2222   3 4735 1              CAF     BIT15           GO TO T = -180 (+0).
 1509   REF   4  LAST  536   25,2223   0 2252 0              TC      RRTONLY

 1510   REF  54  LAST  536   25,2224   4 0110 0              CS      RADMODES        GO TO S = -90 (+0).
 1511   REF   9  LAST  536   25,2225   7 4740 1              MASK    ANTENBIT
 1512   REF 181  LAST  536   25,2226  10 000  0              CCS     A
 1513   REF   6  LAST  534   25,2227   4 4736 0              CS      HALF
 1514   REF   3  LAST  535   25,2230   0 2255 1              TC      RRSONLY

 1515   REF   1              25,2231   0 2244 1              TC      RMODINV

 1516   REF   1              25,2232   4 4736 0              CS      REMODBIT        END OF REMODE.
 1517   REF  55  LAST  536   25,2233   7 0110 0              MASK    RADMODES
 1518   REF  56  LAST  536   25,2234  54 110  0              TS      RADMODES

 1519   REF   2  LAST  534   25,2235   3 4742 1              CAF     DESIGBIT        WAS REMODE CALLED DURING DESIGNATE?
 1520   REF  57  LAST  536   25,2236   7 0110 0              MASK    RADMODES        (BIT10 RADMODES = 1)
 1521                        25,2237   0 0006 1              EXTEND
 1522   REF   1              25,2240   1 3560 0              BZF     RGOODEND        NO-RETURN TO CALLER WAITING IN RADSTALL
 1523   REF   2  LAST  515   25,2241   0 2613 1              TC      STDESIG         YES - RETURN TO DESIGNATE
 1524   REF   2  LAST  284        7743            -45DEGSR   =       13,14,15
 1525                        25,2242    67070 1   -50DEGSR   DEC     -.27778
 1526                        25,2243    61615 1   -80DEGSR   DEC     -.44444

 1527   REF  58  LAST  536   25,2244  22 110  1   RMODINV    LXCH    RADMODES        INVERT THE MODE STATUS.
 1528   REF  10  LAST  536   25,2245   3 4740 0              CAF     ANTENBIT
 1529                        25,2246   0 0006 1              EXTEND
 1530   REF  11  LAST  529   25,2247  06 001  0              RXOR    LCHAN
 1531   REF  59  LAST  536   25,2250  54 110  0              TS      RADMODES
 1532   REF 160  LAST  534   25,2251   0 0002 0              TC      Q
```

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P1533    PROGRAM NAMES_  RRTONLY, RRSONLY

R1534    FUNCTIONAL DESCRIPTION_
R1535    RRTONLY AND RRSONLY ARE SUBROUTINES FOR DOING SINGLE AXIS
R1536    RR MANEUVERS FOR REMODE AND REPOSITION. IT DRIVES TO
R1537    WITHIN 1 DEGREE. INITIALLY, AT RR1AX2, THE REMODE AND REPOSITION
R1538    FLAGS (RADMODES BITS 14, 11) ARE CHECKED. IF BOTH EXIST,
R1539    THE PROGRAM EXITS TO REPOSRPT (SEE DORREPOS). THIS INDICATES
R1540    THAT SOMEONE POSSIBLY REQUESTED A DESIGNATE (RADMODES BIT 10)
R1541    WHICH REQUIRES A REMODE (RADMODES BIT 14) AND THAT A
R1542    REPOSITION IS IN PROGRESS (RADMODES BIT 11). IF NONE
R1543    OR ONLY ONE OF THE FLAGS EXIST, REMODE OR REPOSITION, MAGSUB
R1544    IS CALLED TO SEE IF THE APPROPRIATE ANGLE IS WITHIN 1 DEGREE. IF YES,
R1545    CONTROL RETURNS TO THE CALLING ROUTINE. IF NOT, CONTROL IS
R1546    TRANSFERRED TO RROUT FOR SINGLE AXIS MANEUVERS WITH THE OTHER
R1547    ANGLE SET = 0. FOLLOWING A .5 SECOND WAIT, THE ABOVE PROCEDURE IS
R1548    REPEATED.

R1549    CALLING SEQUENCE: L-1 CAF *ANGLE*  (DESIRED ANGLE SCALED PI)
R1550    L  TC  RRTONLY (TRUNNION ONLY)
R1551    RRSONLY (SHAFT ONLY)
R1552    RRTONLY IS CALLED BY RREPOS29;
R1553    RRTONLY AND RRSONLY ARE CALLED BY DORREPOS AND REMODE

R1554    ERASABLE INITIALIZATION REQUIRED:
R1555    C(A) = DESIRED ANGLE, RADMODES

R1556    SUBROUTINES CALLED_
R1557    FIXDELAY, REPOSRPT, MAGSUB, RROUT

R1558    JOBS OR TASKS INITIATED_
R1559    NONE

R1560    ALARMS_  NONE

R1561    EXIT_  REPOSRPT (REMODE AND REPOSITION FLAGS PRESENT - RADMODES
R1562    BITS 14, 11)
R1563    L+1  (ANGLE WITHIN ONE DEGREE OR RR OUT OF AUTO MODE)

 1564    REF   2  LAST  106    25,2252  55'313 0  RRTONLY  TS      TDES              DESIRED TRUNION ANGLE.
 1565    REF 113  LAST  532    25,2253  3 4755 1           CAF     ZERO
 1566    REF   1               25,2254  1 2257 1           TCF     RR1AXIS

 1567    REF   3  LAST  537    25,2255  55'313 0  RRSONLY  TS      SDES              SHAFT COMMANDS ARE UNRESOLVED SINCE THIS
 1568    REF  65  LAST  531    25,2256  3 4753 1           CAF     ONE               ROUTINE ENTERED ONLY WHEN T = 0 OR 180.

 1569    REF   1               25,2257  55'314 1  RR1AXIS  TS      RRINDEX
 1570                          25,2260  0 0006 1           EXTEND
 1571    REF   4  LAST  532    25,2261  23'312 0           DXCH    RRRET
 1572    REF   1               25,2262  1 2265 0           TCF     RR1AX2
 1573    REF   7  LAST  533    25,2263  0 5221 0  NXTRR1AX TC      FIXDELAY
 1574                          25,2264   00062 0           DEC     50                 2 SAMPLES PER SECOND.

 1575    REF  60  LAST  536    25,2265  4 0110 0  RR1AX2   CS      RADMODES           IF SOMEONE REQUESTES AS DESIGNATE WHICH
 1576    REF   2  LAST  292    25,2266  7 7713 1           MASK    PRIO22             REQUIRES A REMODE AND A REPOSITION IS IN
 1577                          25,2267  0 0006 1           EXTEND                     PROGRESS, INTERRUPT IT AND START THE
 1578    REF   1               25,2270  1 2155 0           BZF     REPOSRPT           REMODE IMMEDIATELY.

 1579    REF   4  LAST  537    25,2271  3 1313 1           CA      RDES
 1580                          25,2272  0 0006 1           EXTEND
 1581    REF   2  LAST  537    25,2273  5 1314 0           INDEX   RRINDEX
 1582    REF   7  LAST  532    25,2274  20 035 0           MSU     CDUT
 1583    REF   9  LAST  527    25,2275  54 061 1           TS      ITEMP1             SAVE ERROR SIGNAL.
 1584                          25,2276  0 0006 1           EXTEND
 1585    REF   1               25,2277  7 2316 0           MP      RRSPGAIN           TRIES TO NULL .7 OF ERROR OVER NEXT .5
 1586    REF  72  LAST  529    25,2300  54 001 1           TS      L
 1587    REF  61  LAST  538    25,2301  3 0110 1           CA      RADMODES
 1588    REF   4  LAST  189    25,2302  7 4752 1           MASK    AUTOMBIT
 1589    REF  10  LAST  538    25,2303  56 061 0           XCH     ITEMP1             STORE RR-OUT-OF-AUTO-MODE BIT.
 1590    REF   6  LAST  532    25,2304  0 4512 0           TC      MAGSUB             SEE IF WITHIN ONE DEGREE.
 1591                          25,2305   77644 1           DEC     -.00555            SCALED IN HALF-REVS.

 1592    REF  11  LAST  538    25,2306  10 061 1           CCS     ITEMP1             NO.  IF RR OUT OF AUTO MODE, EXIT.
 1593    REF   5  LAST  537    25,2307  0 1312 0           TC      RRRET              RETURN TO CALLER.

 1594    REF   3  LAST  538    25,2310  11'314 1           CCS     RRINDEX            COMMAND FOR OTHER AXIS IS ZERO.
 1595                          25,2311  1 2313 0           TCF     +2                 SETTING A TO 0.
 1596    REF  73  LAST  538    25,2312  56 001 0           XCH     L
 1597    REF   1               25,2313  53'355 1           DXCH    TRUNNCMD
 1598    REF   1               25,2314  0 2317 0           TC      RROUT

 1599    REF   1               25,2315  1 2263 0           TCF     NXTRR1AX           COME BACK IN .5 SECONDS.

 1600                          25,2316   22715 1  RRSPGAIN DEC     .59062             NULL .7 ERROR IN .5 SEC.
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L       P20-P25                                                                        USER'S PAGE NO.  44      E7 S3

P1601   PROGRAM NAME_  RROUT                                                   RROR COUNTER SCALING. RROUT LIMITS THEM

R1603   FUNCTIONAL DESCRIPTION_
R1604   RROUT RECEIVES RR GYRO COMMANDS IN TANG, TANG +1 IN RR
R1605   ERROR COUNTER SCALING. RROUT THEN LIMITS THEM AND
R1606   GENERATES COMMANDS TO THE CDU TO ADJUST THE ERROR COUNTERS
R1607   TO THE DESIRED VALUES. INITIALLY MAGSUB CHECKS THE MAGNITUDE OF
R1608   THE COMMAND (SHAFT ON 1ST PASS) TO SEE IF IT IS GREATER THAN
R1609   384 PULSES. IF NOT, CONTROL IS TRANSFERRED TO RROUTLIM TO
R1610   LIMIT THE COMMAND TO +384 OR -384 PULSES. THE DIFFERENCE IS
R1611   THEN CALCULATED BETWEEN THE DESIRED STATE AND THE PRESENT STATE OF
R1612   THE ERROR COUNTER AS RECORDED IN LASTYCMD AND LASTXCMD.
R1613   THE RESULT IS STORED IN OPTXCMD (1ST PASS) AND OPTYCMD (2ND
R1614   PASS). FOLLOWING THE SECOND PASS, FOR THE TRUNNION COMMAND, THE
R1615   DCDUT AND DCDUS ERROR COUNTER DRIVE BITS (CHAN 14 BITS 12, 11)
R1616   ARE SET. THIS PROGRAM THEN EXITS TO THE CALLING PROGRAM.

R1617   CALLING SEQUENCE:
R1618   L TC RROUT (WITH RUPT INHIBITED) RROUT IS CALLED BY
R1619   RRTONLY, RRSONLY, AND DODES

R1620   ERASABLE INITIALIZATION REQUIRED:
R1621   TANG, TANG +1 (DESIRED COMMANDS), LASTYCMD, LASTXCMD
R1622   (1ST PASS = 0), RR ERROR COUNTER ENABLE SET (CHAN 12 BIT 2).

R1623   SUBROUTINES CALLED_
R1624   MAGSUB

R1625   JOBS OR TASKS INITIATED_
R1626   NONE

R1627   ALARMS_  NONE

R1628   EXIT_  L+1 (ALWAYS)                                                    SIRED VALUES. RUPT MUST BE INHIBITED.

 1630   REF 161  LAST  536    25,2317  22 002 0  RROUT     LXCH    Q           SAVE RETURN.
 1631   REF  66  LAST  537    25,2320  3 4753 1            CAF     ONE         LOOP TWICE.
 1632   REF   5  LAST  527    25,2321  54 062 1  RROUT2    TS      ITEMP2
 1633   REF 182  LAST  536    25,2322  50 000 1            INDEX   A
 1634   REF   2  LAST  538    25,2323  3 1354 1            CA      TRUNNCMD
 1635   REF  12  LAST  538    25,2324  54 061 1            TS      ITEMP1      SAVE SIGN OF COMMAND FOR LIMITING.

 1636   REF   7  LAST  538    25,2325  0 4512 0            TC      MAGSUB      SEE IF WITHIN LIMITS.
 1637                         25,2326   77177 0  -RRLIMIT  DEC     -384
 1638   REF   1               25,2327  1 2346 0            TCF     RROUTLIM    LIMIT COMMAND TO MAG OF 384.

 1639   REF  13  LAST  539    25,2330  3 0061 0  SETRRCTR  CA      ITEMP1      COUNT OUT DIFFERENCE BETWEEN DESIRED
 1640   REF   6  LAST  539    25,2331  50 062 0            INDEX   ITEMP2      STATE AND PRESENT STATE AS RECORDED IN
 1641   REF   8  LAST  534    25,2332  56 112 0            XCH     LASTYCMD    LASTYCMD AND LASTXCMD
 1642                         25,2333  4 0000 0            COM
 1643   REF   14  LAST  539    25,2334   6 0061 0             AD       ITEMP1
 1644   REF    9  LAST  233    25,2335   6 4754 0             AD       NEG0             PREVENT +0 IN OUTCOUNTER
 1645   REF    7  LAST  539    25,2336  50 062 0              INDEX    ITEMP2
 1646   REF    1               25,2337  54 053 0              TS       CDUTCMD

 1647   REF    8  LAST  540    25,2340  10 062 1              CCS      ITEMP2           PROCESS BOTH INPUTS.
 1648   REF    1               25,2341   1 2321 1             TCF      RROUT2

 1649   REF    1               25,2342   3 5020 0             CAF      PRIO6            ENABLE COUNTERS.
 1650                          25,2343   0 0006 1             EXTEND
 1651   REF    7  LAST  284    25,2344  05 014 1              WOR      CHAN14           PUT ON CDU DRIVES S AND T
 1652   REF   74  LAST  538    25,2345   0 0001 0             TC       L                RETURN.

 1653   REF   15  LAST  540    25,2346  10 061 1    RROUTLIM  CCS      ITEMP1           LIMIT COMMAND TO ABS VAL OF 384.
 1654   REF    1               25,2347   4 2326 0             CS       -RRLIMIT
 1655                          25,2350   1 2352 0             TCF      +2
 1656   REF    2  LAST  540    25,2351   3 2326 1             CA       -RRLIMIT
 1657   REF   16  LAST  540    25,2352  54 061 1              TS       ITEMP1
 1658   REF    1               25,2353   1 2331 0             TCF      SETRRCTR +1
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R1659           ROUTINE TO ZERO THE RR CDUS AND DETERMINE THE ANTENNA MODE.

 1660   REF   1                25,2354  3 2403 1  RRZERO   CAF     BIT11+1          SEE IF MONITOR REPOSITION OR NOT IN AUTO
 1661   REF  62   LAST  538    25,2355  7 0110 0           MASK    RADMODES         IF SO, DONT RE-ZERO CDUS.
 1662   REF 183   LAST  539    25,2356  10 000 0           CCS     A
 1663   REF   1                25,2357  1 3513 1           TCF     RADNOOP          (IMMEDIATE TASK TO RGOODEND).

 1664                          25,2360  0 0004 0           INHINT
 1665   REF   4   LAST  531    25,2361  4 4737 1           CS      RCDU0BIT         SET FLAG TO SHOW ZEROING IN PROGRESS.
 1666   REF  63   LAST  541    25,2362  7 0110 0           MASK    RADMODES
 1667   REF   5   LAST  541    25,2363  6 4737 0           AD      RCDU0BIT
 1668   REF  64   LAST  541    25,2364  54 110 0           TS      RADMODES

 1669   REF  67   LAST  539    25,2365  3 4753 1           CAF     ONE
 1670   REF  20   LAST  494    25,2366  0 5203 0           TC      WAITLIST
 1671   REF  22   LAST  530    E7,1456                     EBANK=  LOSCOUNT
 1672   REF   1                25,2367    02401 0          2CADR   RRZ2
 1672   REF   1                25,2370    52067 1

 1673   REF  65   LAST  541    25,2371  4 0110 0           CS      RADMODES         SEE IF IN AUTO MODE.
 1674   REF   5   LAST  538    25,2372  7 4752 1           MASK    AUTOMBIT
 1675   REF 184   LAST  541    25,2373  10 000 0           CCS     A
 1676   REF   1                25,2374  1 2377 1           TCF     ROADBACK
 1677   REF  21   LAST  495    25,2375  0 5567 0           TC      ALARM            AUTO DISCRETE NOT PRESENT - TRYING
 1678                          25,2376    00510 0          OCT     510
 1679                          25,2377  0 0003 1  ROADBACK RELINT
 1680   REF   3   LAST  330    25,2400  1 4631 0           TCF     SWRETURN

 1681   REF   2   LAST  530    25,2401  0 2102 0  RRZ2     TC      RRZEROSB         COMMON TO TURNON AND RRZERO.
 1682   REF   1                25,2402  1 3551 1           TCF     ENDRADAR

 1683                          25,2403    02001 1 BIT11+1  OCT     02001
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P1684    PROGRAM NAME_  RRDESSM                                     P (HALF-UNIT) IN RRTARGET. REMODES IF

R1686    FUNCTIONAL DESCRIPTION_
R1687    THIS INTERPRETIVE ROUTINE WILL DESIGNATE, IF DESIRED ANGLES ARE
R1688    WITHIN THE LIMITS OF EITHER MODE, TO A LINE-OF SIGHT (LOS) VECTOR
R1689    (HALF-UNIT) KNOWN WITH RESPECT TO THE STABLE MEMBER PRESENT
R1690    ORIENTATION. INITIALLY THE IMU CDU:S ARE READ AND CONTROL
R1691    TRANSFERRED TO SMNB TO TRANSFORM THE LOS VECTOR FROM STABLE
R1692    MEMBER TO NAVIGATION BASE COORDINATES (SEE STG MEMO ¬699)
R1693    RRANGLES IS THEN CALLED TO CALCULATE THE RR GIMBAL ANGLES,
R1694    TRUNNION AND SHAFT, FOR BOTH THE PRESENT AND ALTERNATE MODE.
R1695    RRLIMCHK IS CALLED TO SEE IF THE ANGLES CALCULATED FOR THE
R1696    PRESENT MODE ARE WITHIN LIMITS. IF WITHIN LIMITS, THE RETURN
R1697    LOCATION IS INCREMENTED, INASMUCH AS NO VEHICLE MANEUVER IS
R1698    REQUIRED, BEFORE EXITING TO STARTDES. IF NOT WITHIN LIMITS OF THE
R1699    CURRENT MODE, TRYSWS IS CALLED. FOLLOWING INVERTING OF THE RR
R1700    ANTENNA MODE FLAG (RADMODES BIT 12), RRLIMCHK IS CALLED
R1701    TO SEE IF THE ANGLES CALCULATED FOR THE ALTERNATE MODE ARE WITHIN
R1702    LIMITS. IF YES, THE RR ANTENNA MODE FLAG IS AGAIN INVERTED,
R1703    THE REMODE FLAG (RADMODES BIT 14) SET, AND THE RETURN LOCATION
R1704    INCREMENTED, TO INDICATE NO VEHICLE MANEUVER IS REQUIRED, BEFORE
R1705    EXITING TO STARTDES. IF THESE ANGLES ARE NOT WITHIN LIMITS
R1706    OF THE ALTERNATE MODE, THE RR ANTENNA MODE FLAG (RADMODES
R1707    BIT 12) IS INVERTED BEFORE RETURNING DIRECTLY TO THE CALLING PROGRAM
R1708    TO INDICATE THAT A VEHICLE MANEUVER IS REQUIRED.

R1709    CALLING SEQUENCE:
R1710    L  STCALL  RRTARGET  (LOS HALF-UNIT VECTOR IN SM COORDINATES)
R1711    L+1  RRDESSM
R1712    L+2  BASIC  (VEHICLE MANEUVER REQUIRED)
R1713    L+3  BASIC  (NO VEHICLE MANEUVER REQUIRED)

R1714    ERASABLE INITIALIZATION REQUIRED:
R1715    RRTARGET, RADMODES

R1716    SUBROUTINES CALLED_
R1717    READCDUS, SMNB, RRANGLES, RRLIMCHK, TRYSWS (ACTUALLY
R1718    PART OF), RMODINV

R1719    JOBS OR TASKS INITIATED_
R1720    NONE

R1721    ALARMS_  NONE

R1722    EXIT_  L+2 (NEITHER SET OF ANGLES ARE WITHIN LIMITS OF RELATED MODE)
R1723    STARTDES (DESIGNATE POSSIBLE AT PRESENT VEHICLE ATTITUDE-RETURNS
R1724    TO L+3 FROM STARTDES)                                       CAN BE DONE IN PRESENT VEH ATTITUDE:

 1726                           25,2404    43020 1  RRDESSM  STO     CLEAR
 1727    REF    4  LAST   272   25,2405    01112 1                   DESPET
 1728   REF   1                  25,2406   00271 0                      RRNBSW
 1729                            25,2407   77624 1             CALL                  COMPUTES SINES AND COSINES, ORDER Y Z X
 1730   REF   2  LAST   491      25,2410   47541 1                      CDUTRIG
 1731                            25,2411   45175 0             VLOAD    CALL         LOAD VECTOR AND CALL TRANSFORMATION
 1732   REF   4  LAST   522      25,2412   01101 0                      RRTARGET
 1733   REF   2  LAST   491      25,2413   47673 0                      *SMNB*

 1734                            25,2414   77624 1             CALL                  GET RR GIMBAL ANGLES IN PRESENT AND
 1735   REF   1                  25,2415   26133 1                      RRANGLES     ALTERNATE MODE.
 1736                            25,2416   77776 1             EXIT

 1737                            25,2417  0 0004 0             INHINT
 1738   REF   3  LAST   517      25,2420  0 4523 1             TC       RRLIMCHK
 1739   REF   4  LAST   325      25,2421   01106 1             ADRES    MODEA        CONFIGURATION FOR CURRENT MODE.
 1740                            25,2422  0 2425 0             TC       +3           NOT IN CURRENT MODE
 1741   REF   5  LAST   542      25,2423  2 5112 1  CKDESSM    INCR     DESRET       INCREMENT SAYS NO VEHICLE MANEUVER REQ.
 1742   REF   1                  25,2424  0 2443 0             TC       STARTDES     SHOW DESIGNATE REQUIRED
 1743   REF   6  LAST   511      25,2425  4 0104 0             CS       FLAGWRD8
 1744   REF   5  LAST   511      25,2426  7 4744 0             MASK     SURFFBIT     CHECK IF ON LUNAR SURFACE (SURFFLAG=P22F
 1745                            25,2427  0 0006 1             EXTEND
 1746   REF   1                  25,2430  1 2467 1             BZF      NORDSTAL     BRANCH-YES-CANNOT DESIGNATE IN MODE 2
 1747   REF   1                  25,2431  0 2472 1             TC       TRYSWS


 1748   REF   7  LAST   543      25,2432  4 0104 0  LUNDESCH   CS       FLAGWRD8     OVERFLOW RETURN FROM RRANGLES
 1749   REF   6  LAST   543      25,2433  7 4744 0             MASK     SURFFBIT     CHECK IF ON LUNAR SURFACE
 1750                            25,2434  0 0006 1             EXTEND
 1751   REF   2  LAST   543      25,2435  1 2467 1             BZF      NORDSTAL     BRANCH-YES-RETURN TO CALLER - ALARM 527
 1752   REF  37  LAST   524      25,2436  3 0074 1             CA       STATE
 1753   REF   7  LAST   508      25,2437  7 4745 1             MASK     RNOVZBIT
 1754   REF 185  LAST   541      25,2440  1 0000 0             CCS      A            TEST RNOVZFLG;
 1755   REF   1                  25,2441  0 2502 1             TC       NODESSM      NOT ON MOON-CALL FOR ATTITUDE MANEUVER
 1756   REF  89  LAST   524      25,2442  1 5155 1             TCF      ENDOFJOB     ...BUT NOT IN R29.
```

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P1757   PROGRAM NAME_  STARTDES                                                   STORED AS A HALF-UNIT VECTOR IN RRTARGET

R1759   FUNCTIONAL DESCRIPTION_                                                   CKON IS DESIRED. BIT14 OF RADMODES IS
R1761   STARTDES IS ENTERED WHEN WE ARE READY TO BEGIN DESIGNATION.               CR REPOSITION OPERATION. IN THIS
R1763   BIT 14 OF RADMODES IS ALREADY SET IF A REMODE IS REQUIRED.                THE REPOSITION WILL BE INTERRUPTED.
R1765   AT THIS TIME, THE RR ANTENNA MAY BE IN A REPOSITION                       GINS.
R1767   OPERATION. IN THIS CASE, IF A REMODE IS REQUIRED IT MAY HAVE
R1768   ALREADY BEGUN BUT IN ANY CASE THE REPOSITION WILL BE INTERRUPTED.
R1769   OTHERWISE, THE REPOSITION WILL BE COMPLETED BEFORE 2-AXIS
R1770   DESIGNATION BEGINS. INITIALLY DESCOUNT IS SET = 60 TO INDICATE
R1771   THAT 30 SECONDS WILL BE ALLOWED FOR THE RR DATA GOOD INBIT
R1772   (CHAN 33 BIT 4) IF LOCK-ON IS DESIRED (STATE BIT 5). BIT 10
R1773   OF RADMODES IS SET TO SHOW THAT A DESIGNATE IS REQUIRED.
R1774   THE REPOSITION FLAG (RADMODES BIT 11) IS CHECKED. IF SET,
R1775   THE PROGRAM EXITS TO L+3 OF THE CALLING PROGRAM (SEE RRDESSM
R1776   AND RRDESNB). THE PROGRAM WILL BEGIN DESIGNATING TO THE DESIRED
R1777   ANGLES FOLLOWING THE REPOSITION OR REMODE IF ONE WAS
R1778   REQUESTED. IF THE REPOSITION FLAG IS NOT SET, SETRRECR IS CALLED
R1779   WHICH SETS THE RR ERROR COUNTER ENABLE BIT (CHAN 12 BIT 2)
R1780   AND SETS LASTYCMD AND LASTXCMD = 0 TO INDICATE THE
R1781   DIFFERENCE BETWEEN THE PRESENT AND DESIRED STATE OF THE ERROR
R1782   COUNTERS. A 20 MILLISECOND WAITLIST CALL IS SET FOR BEGDES
R1783   AFTER WHICH THE PROGRAM EXITS TO L+3 OF THE CALLING PROGRAM.

R1784   CALLING SEQUENCE:
R1785   FROM RRDESSM AND RRDESNB WHEN ANGLES WITHIN LIMITS.

P1786   ERASABLE INITIALIZATION REQUIRED:
R1787   RADMODES, (SEE DODES)

R1788   SUBROUTINES CALLED_
R1789   SETRRECR, WAITLIST

R1790   JOBS OR TASKS INITIATED_
R1791   BEGDES

R1792   ALARMS_  NONE

R1793   EXIT_  L+3 OF CALLING PROGRAM (SEE RRDESSM)
R1794   L+2 OF CALLING PROGRAM (SEE RRDESNB)

 1795   REF   6  LAST  543    25,2443  25'112 1  STARTDES INCR    DESRET
 1796   REF  66  LAST  541    25,2444  4 0110 0           CS      RADMODES
 1797   REF   3  LAST  536    25,2445  7 4742 0           MASK    DESIGBIT
 1798   REF  67  LAST  544    25,2446  26 110 0           ADS     RADMODES
 1799   REF   3  LAST  534    25,2447  7 4741 0           MASK    REPOSBIT         SEE IF REPOSITIONING IN PROGRESS.
 1800   REF 186  LAST  543    25,2450  10 000 0           CCS     A
 1801   REF   1               25,2451  1 2457 1           TCF     DESRETRN         ECTR ALREADY SET UP.

 1802   REF   2  LAST  533    25,2452  0 2167 0           TC      SETRRECR         SET UP ERROR COUNTERS.
 1803    REF  36  LAST  511    25,2453  3 4752 0                CAF      TWO
 1804    REF  21  LAST  541    25,2454  0 5203 0                TC       WAITLIST
 1805    REF  23  LAST  541    E7,1456                          EBANK=   LOSCOUNT
 1806    REF   3  LAST  534    25,2455   02604 1                2CADR    BEGDES
 1806                          25,2456   52067 1

 1807    REF   3  LAST  520    25,2457  3 1303 0  DESRETRN CA       RADCADR         FIRST PASS THRU DESIGNATE
 1808                          25,2460  0 0006 1                EXTEND
 1809    REF   1               25,2461  1 2463 0                BZF      DESRTRN         YES   SET EXIT
 1810    REF  90  LAST  543    25,2462  0 5155 0                TC       ENDOFJOB        NO
 1811                          25,2463  0 0003 1  DESRTRN  RELINT
 1812    REF   7  LAST  544    25,2464  25'112 1                INCR     DESRET
 1813    REF   8  LAST  545    25,2465  3 1112 1                CA       DESRET
 1814.   REF   9  LAST  524    25,2466  1 4640 0                TCF      BANKJUMP


 1815    REF 114  LAST  537    25,2467  3 4755 1  NORDSTAL CAF      ZERO            ZERO RADCADR TO WIPE  OUT ANYONE
 1816    REF   4  LAST  545    25,2470  55'303 1                TS       RADCADR         WAITING IN RADSTALL SINCE WE ARE NOW
 1817    REF   2  LAST  545    25,2471  1 2463 0                TCF      DESRTRN         RETURNING TO P20 AND MAY DO NEW RADSTALL
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P1818              SEE IF RRDESSM CAN BE ACCOMPLISHED AFTER A REMODE.

 1819    REF   2  LAST  536    25,2472  0 2244 1  TRYSWS    TC       RMODINV          (NOTE RUPT INHIBIT)
 1820    REF   4  LAST  543    25,2473  0 4523 1            TC       RRLIMCHK         TRY DIFFERENT MODE.
 1821    REF   4  LAST  325    25,2474   C1110 0            ADRES    MODEB
 1822    REF   2  LAST  543    25,2475  1 2502 0            TCF      NODESSM          VEHICLE MANEUVER REQUIRED.

 1823    REF   3  LAST  546    25,2476  0 2244 1            TC       RMODINV          RESET BIT12
 1824    REF   2  LAST  536    25,2477  3 4736 1            CAF      REMODBIT         SET FLAG FOR REMODE.
 1825    REF  68  LAST  544    25,2500 26 110 0             ADS      RADMODES

 1826    REF   1               25,2501  1 2423 1            TCF      OKDESSM

 1827    REF   4  LAST  546    25,2502  0 2244 1  NODESSM   TC       RMODINV          RE-INVERT MODE AND RETURN
 1828    REF   9  LAST  545    25,2503 25 112 1             INCR     DESRET           TO CALLER +2
 1829    REF   3  LAST  543    25,2504  1 2467 1            TCF      NORDSTAL

 1830                          25,2505   00074 1  MAXTRYS   DEC      60
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P1831             DESIGNATE TO SPECIFIC RR GIMBAL ANGLES (INDEPENDENT OF VEHICLE MOTION). ENTER WITH DESIRED ANGLES IN
R1833     TANG AND TANG +1.

 1834     REF   6  LAST  521   25,2506  0 4645 1  RRDESNB   TC      MAKECADR
 1835     REF  10  LAST  546   25,2507  55'112 0            TS      DESRET

 1836     REF  58  LAST  523   25,2510  0 5516 0            TC      DOWNFLAG          RESET FLAG TO PREVENT DODES FROM GOING
 1837     REF   6  LAST  519   25,2511   00041 1            ADRES   LOSCMFLG          BACK TO R21
 1838     REF   1              25,2512  3 2505 0            CA      MAXTRYS           SET TIME LIMIT COUNTER
 1839     REF   2  LAST  513   25,2513  55'113 1            TS      DESCOUNT          FOR DESIGNATE
 1840                          25,2514  0 0004 0            INHINT                    SEE IF CURRENT MODE OK.
 1841     REF   1              25,2515  0 2551 1            TC      RRLIMNB           DO SPECIAL V41 LIMIT CHECK
 1842     REF   8  LAST  512   25,2516   01106 1            ADRES   TANG
 1843     REF   1              25,2517  1 2534 0            TCF     TRYSWN            SEE IF IN OTHER MODE.

 1844                          25,2520  0 0003 1  OKDESNB   RELINT
 1845                          25,2521  0 0006 1            EXTEND
 1846     REF   9  LAST  547   25,2522  3 1107 0            DCA     TANG
 1847     REF   6  LAST  326   25,2523  53'753 0            DXCH    TANGNB
 1848     REF  46  LAST  522   25,2524  0 6042 1            TC      INTPRET

 1849                          25,2525   77624 1            CALL                      GET LOS IN NB COORDS.
 1850     REF   1              25,2526   46041 0                    RRNB
 1851     REF   5  LAST  543   25,2527   01101 0            STORE   RRTARGET

 1852                          25,2530   77414 0            SET     EXIT
 1853     REF   2  LAST  543   25,2531   00071 1                    RRNBSW

 1854                          25,2532  0 0004 0            INHINT
 1855     REF   2  LAST  543   25,2533  1 2444 0            TCF     STARTDES +1
 1856     REF   5  LAST  546   25,2534  0 2244 1  TRYSWN    TC      RMODINV           SEE IF OTHER MODE WILL DO.
 1857     REF   2  LAST  547   25,2535  0 2551 1            TC      RRLIMNB           DO SPECIAL V41 LIMIT CHECK
 1858     REF  10  LAST  547   25,2536   01106 1            ADRES   TANG
 1859     REF   1              25,2537  1 2544 1            TCF     NODESNB           NOT POSSIBLE.

 1860     REF   6  LAST  547   25,2540  0 2244 1            TC      RMODINV
 1861     REF   3  LAST  546   25,2541  3 4736 1            CAF     REMODBIT          CALL FOR REMODE.
 1862     REF  69  LAST  546   25,2542  26 110 0            ADS     RADMODES
 1863     REF   1              25,2543  1 2520 0            TCF     OKDESNB

 1864     REF   7  LAST  547   25,2544  0 2244 1  NODESNB   TC      RMODINV           REINVERT MODE BIT.
 1865     REF  22  LAST  541   25,2545  0 5567 0            TC      ALARM             BAD INPUT ANGLES.
 1866                          25,2546   00502 0            OCT     502
 1867     REF   9  LAST  520   25,2547  0 6011 1            TC      CLRADMOD
 1868     REF  91  LAST  545   25,2550  0 5155 0            TC      ENDOFJOB          AVOID 503 ALARM.

 1869     REF 162  LAST  539   25,2551  50 002 0  RRLIMNB   INDEX   Q                 THIS ROUTINE IS IDENTICAL TO RRLIMCHK
 1870                          25,2552  3 0000 1            CAF     0                 EXCEPT THAT THE MODE 1 SHAFT LOWER
 1871     REF 163  LAST  547   25,2553  24 002 0            INCR    Q                 LIMIT IS -85 INSTEAD OF -70 DEGREES
 1872                          25,2554  0 0006 1            EXTEND
 1873    REF 187  LAST  544    25,2555  5 0000 1              INDEX  A              READ GIMBAL ANGLES INTO ITEMP STORAGE
 1874                          25,2556  3 0001 0              DCA    0
 1875    REF  17  LAST  540    25,2557  52 062 1              DXCH   ITEMP1
 1876    REF 164  LAST  547    25,2560  22 002 0              LXCH   Q              L(CALLER +2) TO L

 1877    REF  11  LAST  536    25,2561  3 4740 0              CAF    ANTENBIT       SEE WHICH MODE RR IS IN.
 1878    REF  70  LAST  547    25,2562  7 0110 0              MASK   RADMODES
 1879    REF 188  LAST  548    25,2563  10 000 0              CCS    A
 1880    REF   2  LAST  526    25,2564  1 4550 1              TCF    MODE2CHK       MODE 2 CAN USE RRLIMCHK CODING
 1881    REF  18  LAST  548    25,2565  3 0061 0              CA     ITEMP1
 1882    REF   8  LAST  539    25,2566  0 4512 0              TC     MAGSUB         MODE 1 IS DEFINED AS
 1883                          25,2567   66161 1              DEC    -.30555          1. ABS(T) L 55 DEGS
 1884    REF  75  LAST  540    25,2570  0 0001 0              TC     L                2  SHAFT LIMITS AT +59, -85 DEGS

 1885    REF   9  LAST  540    25,2571  3 0062 0              CA     ITEMP2         LOAD SHAFT ANGLE
 1886                          25,2572  0 0006 1              EXTEND
 1887    REF   1               25,2573  6 2601 1              BZMF   NEGSHAFT       IF NEGATIVE SHAFT ANGLE, ADD 20.5 DEGS
 1888    REF   2  LAST  527    25,2574  6 4562 1              AD     5.5DEGS
 1889    REF   9  LAST  548    25,2575  0 4512 0    SHAFTLIM  TC     MAGSUB
 1890                          25,2576   64420 0              DEC    -.35833        64.5 DEGREES
 1891    REF  76  LAST  548    25,2577  0 0001 0              TC     L              NOT IN LIMITS
 1892    REF   2  LAST  527    25,2600  0 4560 0              TC     RRLIMOK        IN LIMITS
 1893    REF   1               25,2601  6 2603 0    NEGSHAFT  AD     20.5DEGS       MAKE NEGATIVE SHAFT LIMIT -85 DEGREES
 1894    REF   1               25,2602  1 2575 0              TCF    SHAFTLIM


 1895                          25,2603   03512 1    20.5DEGS  DEC    .11389
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P1896    PROGRAM NAME_  BEGDES

R1897    FUNCTIONAL DESCRIPTION_
R1898    BEGDES CHECKS VARIOUS DESIGNATE REQUESTS AND REQUESTS THE
R1899    ACTUAL RR DESIGNATION. INITIALLY A CHECK IS MADE TO SEE IF A
R1900    REMODE (RADMODES BIT 14) IS REQUESTED OR IN PROGRESS. IF SO,
R1901    CONTROL IS TRANSFERRED TO STDESIG AFTER ROUTINE REMODE IS
R1902    EXECUTED. IF NO REMODE, STDESIG IS IMMEDIATELY CALLED WHERE
R1903    FIRST THE REPOSITION FLAG (RADMODES BIT 11) IS CHECKED. IF
R1904    PRESENT, THE DESIGNATE FLAG (RADMODES BIT 10) IS REMOVED
R1905    AFTER WHICH THE PROGRAM EXITS TO RDBADEND. IF THE REPOSITION
R1906    FLAG IS NOT PRESENT, THE CONTINUOUS DESIGNATE FLAG (RADMODES
R1907    BIT 15) IS CHECKED. IF PRESENT, AN EXECUTIVE CALL IS IMMEDIATELY
R1908    MADE FOR DODES AFTER WHICH A .5 SECOND WAIT IS INITIATED BEFORE
R1909    REPEATING AT STDESIG. IF THE RR SEARCH ROUTINE (LRS24.1) IS DESIGNATING
R1910    TO A NEW POINT (NEWPTFLG SET) THE CURRENT DESIGNATE TASK IS TERMINATED.
R1911    IF CONTINUOUS DESIGNATE IS NOT WANTED, THE DESIGNATE FLAG (RADMODES
R1912    BIT 10) IS CHECKED. IF NOT PRESENT, THE PROGRAM EXITS TO ENDRADAR TO
R1913    CHECK RR CDU FAIL BEFORE RETURNING TO THE CALLING PROGRAM. IF DESIGNATE
R1914    IS STILL REQUIRED, DESCOUNT IS CHECKED TO SEE IF THE 30 SECONDS HAS
R1915    EXPIRED BEFORE RECEIVING THE RR DATA GOOD (CHAN 33 BIT 4)
R1916    SIGNAL. IF OUT OF TIME, PROGRAM ALARM 00503 IS REQUESTED, THE
R1917    RR AUTO TRACKER ENABLE AND RR ERROR COUNTER ENABLE
R1918    (CHAN 12 BITS 14,2) BITS REMOVED, AND THE DESIGNATE FLAG
R1919    (RADMODES BIT 10) REMOVED BEFORE EXITING TO RDBADEND. IF
R1920    TIME HAS NOT EXPIRED, DESCOUNT IS DECREMENTED, THE
R1921    EXECUTIVE CALL MADE FOR DODES, AND A .5 SECOND WAIT INITIATED
R1922    BEFORE REPEATING THIS PROCEDURE AT STDESIG.

R1923    CALLING SEQUENCE:
R1924    WAITLIST CALL FROM STARTDES
R1925    TCF BEGDES FROM DORREPOS
R1926    TC STDESIG RETURNING, FROM REMODE

R1927    ERASABLE INITIALIZATION REQUIRED:
R1928    DESCOUNT, RADMODES

R1929    SUBROUTINES CALLED_
R1930    ENDRADAR, FINDVAC

R1931    JOBS OR TASKS INITIATED_  DODES

R1932    ALARMS_  PROGRAM ALARM 00503 (30 SECONDS HAVE EXPIRED) WITH NO RR DATA
R1933    GOOD (CHAN 33 BIT 4) RECEIVED WHEN LOCK-ON (STATE BIT 5) WAS REQUESTED.

R1934    EXIT_  TASKOVER (SEARCH PATTERN DESIGNATING TO NEW POINT)
R1935    ENDRADAR (NO DESIGNATE - RADMODES BIT 10)
R1936    RDBADEND (REPOSITION OR 30 SECONDS EXPIRED)

 1937    REF  71  LAST  548   25,2604  4 0110 0  BEGDES   CS     RADMODES
 1938   REF   4  LAST  547   25,2605   7 4736 0              MASK    REMODBIT
 1939   REF 189  LAST  548   25,2606  10 000 0               CCS     A
 1940   REF   3  LAST  536   25,2607   0 2613 1              TC      STDESIG
 1941   REF   1              25,2610   0 2202 0              TC      REMODE
 1942   REF   8  LAST  538   25,2611   0 5221 0   DESLOOP    TC      FIXDELAY        2 SAMPLES PER SECOND.
 1943                        25,2612    00062 0              DEC     50

 1944   REF   4  LAST  544   25,2613   3 4741 1   STDESIG    CAF     REPOSBIT
 1945   REF  72  LAST  549   25,2614   7 0110 0              MASK    RADMODES        SEE IF GIMBAL LIMIT MONITOR HAS FOUND US
 1946   REF 190  LAST  550   25,2615  10 000 0               CCS     A               OUT OF BOUNDS. IF SO, THIS BIT SHOWS A
 1947   REF   1              25,2616   1 2634 0              TCF     BADDES          REPOSITION TO BE IN PROGRESS.

 1948   REF  73  LAST  550   25,2617  10 110 0               CCS     RADMODES        SEE IF CONTINUOUS DESIGNATE WANTED.
 1949                        25,2620   1 2623 0              TCF     +3              IF SO, DONT CHECK BIT 10 TO SEE IF IN
 1950                        25,2621   1 2623 0              TCF     +2              LIMITS BUT GO RIGHT TO FINDVAC ENTRY.
 1951   REF   1              25,2622   1 2640 0              TCF     MOREDES +1

 1952   REF  74  LAST  550   25,2623   4 0110 0              CS      RADMODES        IF NON-CONTINUOUS, SEE IF END OF
 1953   REF   4  LAST  544   25,2624   7 4742 0              MASK    DESIGBIT        PROBLEM (DATA GOOD IF LOCK-ON WANTED OR
 1954   REF 191  LAST  550   25,2625  10 000 0               CCS     A               WITHIN LIMITS IF NOT). IF SO, EXIT AFTER
 1955   REF   2  LAST  541   25,2626   1 3551 1              TCF     ENDRADAR        CHECKING RR CDU FAIL.

 1956   REF   3  LAST  547   25,2627  11'113 1    STDESIG1   CCS     DESCOUNT        SEE IF THE TIME LIMIT HAS EXPIRED
 1957   REF   2  LAST  550   25,2630   1 2637 0              TCF     MOREDES

 1958   REF   1              25,2631   4 2645 0              CS      B14+B2          IF OUT OF TIME, REMOVE ECR ENABLE + TRKR
 1959                        25,2632   0 0006 1              EXTEND
 1960   REF  33  LAST  534   25,2633  03 012 1               WAND    CHAN12
 1961   REF  59  LAST  547   25,2634   0 5516 0   BADDES     TC      DOWNFLAG
 1962   REF   1              25,2635    00271 0              ADRES   DESIGFLG
 1964   REF   1              25,2636   1 3565 0              TCF     RDBADEND

 1965   REF   4  LAST  550   25,2637  55'113 1    MOREDES    TS      DESCOUNT
 1966   REF   9  LAST  523   25,2640   3 7717 1              CAF     PRIO26          UPDATE GYRO TORQUE COMMANDS.
 1967   REF  22  LAST  523   25,2641   0 5105 0              TC      FINDVAC
 1968   REF  24  LAST  545   E7,1456                         EBANK=  LOSCOUNT
 1969   REF   1              25,2642    02646 1              2CADR   DODES
 1969   REF   1              25,2643    52067 1

 1970   REF   1              25,2644   1 2611 1              TCF     DESLOOP

 1971                        25,2645    20002 1   B14+B2     OCT     20002
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P1972    PROGRAM NAME_  DODES

R1973    FUNCTIONAL DESCRIPTION_
R1974    DODES CALCULATES AND REQUESTS ISSUANCE OF RR GYRO TORQUE
R1975    COMMANDS. INITIALLY THE CURRENT RR CDU ANGLES ARE STORED AND
R1976    THE LOS HALF-UNIT VECTOR TRANSFORMED FROM STABLE MEMBER TO
R1977    NAVIGATION BASE COORDINATES VIA SMNB IF NECESSARY, THE
R1978    SHAFT AND TRUNNION COMMANDS ARE THEN CALCULATED AS FOLLOWS_
R1979    + SHAFT = LOS  . (COS(S), 0, -SIN (S)) (DOT PRODUCT)
R1980    -TRUNNION = LOS  . (SIN (T) SIN (S), COS (T), SIN (T) COS (S) )
R1981    THE SIGN OF THE SHAFT COMMAND IS THEN REVERSED IF IN MODE 2
R1982    (RADMODES BIT 12) BECAUSE A RELAY IN THE RR REVERSES THE
R1983    POLARITY OF THE COMMAND. AT RRSCALUP EACH COMMAND IS
R1984    SCALED AND IF EITHER, OR BOTH, OF THE COMMANDS IS GREATER THAN
R1985    .5 DEGREES, MPAC +1 IS SET POSITIVE. IF A CONTINUOUS DESIGNATE
R1986    (RADMODES BIT 15) IS DESIRED AND THE SEARCH ROUTINE IS NOT OPERATING,
R1987    THE RR AUTO TRACKER ENABLE BIT (CHAN 12 BIT 14) IS CLEARED AND RROUT
R1988    CALLED TO PUT OUT THE COMMANDS PROVIDED NO REPOSITION (RADMODES BIT 11)
R1989    IS IN PROGRESS. IF A CONTINUOUS DESIGNATE AND THE SEARCH ROUTINE IS
R1990    OPERATING (SRCHOPT FLAG SET) THE TRACK ENABLE IS NOT CLEARED. IF NO
R1991    CONTINUOUS DESIGNATE AND BOTH COMMANDS ARE NOT LESS THAN .5 DEGREES AS
R1992    INDICATED BY MPAC +1, THE RR AUTO TRACKER ENABLE BIT (CHAN 12 BIT 14) IS
R1993    CLEARED AND RROUT CALLED TO PUT OUT THE COMMANDS PROVIDED NO REPOSITION
R1994    (RADMODES BIT 11) IS IN PROGRESS. IF BOTH COMMANDS ARE LESS THAN .5
R1995    DEGREES AS INDICATED BY MPAC+1, THE RR AUTO TRACKER ENABLE BIT
R1996    (CHAN 12 BIT 14) IS CLEARED AND RROUT CALLED TO PUT OUT THE
R1997    COMMANDS PROVIDED NO REPOSITION (RADMODES BIT 11) IS IN
R1998    PROGRESS. IF BOTH COMMANDS ARE LESS THAN .5 DEGREES, THE
R1999    LOCK-ON FLAG (STATE BIT 5) IS CHECKED. IF NOT PRESENT, THE
R2000    DESIGNATE FLAG (RADMODES BIT 10) IS CLEARED, THE RR ERROR
R2001    COUNTER ENABLE BIT (CHAN 12 BIT 2) IS CLEARED, AND ENDOFJOB
R2002    CALLED. IF LOCK-ON IS DESIRED, THE RR AUTO TRACKER (CHAN 12
R2003    BIT 14) IS ENABLED FOLLOWED BY A CHECK OF THE RECEIPT OF THE
R2004    RR DATA GOOD (CHAN 33 BIT 4) SIGNAL. IF RR DATA GOOD
R2005    PRESENT, THE DESIGNATE FLAG (RADMODES BIT 10) IS CLEARED,
R2006    THE RR ERROR COUNTER ENABLE BIT (CHAN 12 BIT 2) IS CLEARED,
R2007    AND ENDOFJOB CALLED. IF RR DATA GOOD IS NOT PRESENT, RROUT
R2008    IS CALLED TO PUT OUT THE COMMANDS PROVIDED NO REPOSITION
R2009    (RADMODES BIT 11) IS IN PROGRESS AFTER WHICH THE JOB IS TERMINATED
R2010    VIA ENDOFJOB.

R2011    CALLING SEQUENCE:
R2012    EXECUTIVE CALL EVERY ,5 SECONDS FROM BEGDES.

R2013    ERASABLE INITIALIZATION REQUIRED:
R2014    RRTARGET (HALF-UNIT LOS VECTOR IN EITHER SM OR NB COORDINATES),
R2015    LOKONSW (STATE BIT 5), RRNBSW (STATE BIT 6), RADMODES

R2016    SUBROUTINES CALLED_
R2017    READCDUS, SMNB, CDULOGIC, MAGSUB, RROUT
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R2018   JOBS OR TASKS INITIATED_
R2019   NONE

R2020   ALARMS_  NONE

R2021   EXIT_  ENDOFJOB (ALWAYS)

 2022                           25,2646  0 0006 1  DODES    EXTEND
 2023   REF   8  LAST  538      25,2647  3 0036 1           DCA     CDUT
 2024   REF  11  LAST  547      25,2650  5 3107 1           DXCH    TANG

 2025   REF  47  LAST  547      25,2651  0 6042 1           TC      INTPRET

 2026                           25,2652   77201 1           SETPD   VLOAD
 2027                           25,2653   00001 0                   0
 2028   REF   6  LAST  547      25,2654   01101 0                   RRTARGET
 2029                           25,2655   74214 0           BON     VXSC
 2030   REF   3  LAST  547      25,2656   00311 1                   RRNBSW
 2031   REF   1                 25,2657   52671 0                   DONBRD           TARGET IN NAV-BASE COORDINATES
 2032   REF   1                 25,2660   01767 0                   MLOSV            MULTIPLY UNIT LOS BY MAGNITUDE
 2033                           25,2661   63372 1           VSL1    PDVL
 2034   REF   2  LAST  113      25,2662   01761 0                   LOSVEL
 2035                           25,2663   53361 0           VXSC    VAD              ADD ONE SECOND RELATIVE VELOCITY TO LOS
 2036   REF   1                 25,2664   13101 0                   MCTOMS
 2037                           25,2665   45056 0           UNIT    CALL
 2038   REF   3  LAST  543      25,2666   47541 1                   CDUTRIG
 2039                           25,2667   77624 1           CALL
 2040   REF   3  LAST  543      25,2670   47673 0                   *SMNB*

 2041                           25,2671   14041 1  DONBRD   STODL   32D
 2042   REF  12  LAST  552      25,2672   01110 0                   TANG +1
 2043                           25,2673   41434 1           RTB     PUSH             SHAFT COMMAND = V(32D).(COS(S), 0,
 2044   REF  11  LAST  376      25,2674   21577 1                   CDULOGIC              (-SIN(S)).
 2045                           25,2675   65356 1           SIN     PDDL             SIN(S) TO 0 AND COS(S) TO 2.
 2046                           25,2676   41546 0           COS     PUSH
 2047                           25,2677   65205 0           DMP     PDDL
 2048                           25,2700   00041 1                   32D
 2049                           25,2701   00045 0                   36D
 2050                           25,2702   44205 0           DMP     BDSU
 2051                           25,2703   00001 0                   0
 2052                           25,2704   77626 0           STADR
 2053   REF  13  LAST  552      25,2705   76667 1           STORE   TANG +1          SHAFT COMMAND

 2054                           25,2706   47135 0           SLOAD   RTB
 2055   REF  14  LAST  552      25,2707   01107 0                   TANG
 2056   REF  12  LAST  552      25,2710   21577 1                   CDULOGIC
 2057                           25,2711   71406 0           PUSH    COS              COS(T) TO 4.
 2058                           25,2712   73525 1           PDDL    SIN
 2059                           25,2713   41206 0           PUSH    DMP              SIN(T) TO 6.
 2060                           25,2714   00003 1                   2
 2061                          25,2715   65352 0        SL1      PDDL         DEFINE VECTOR U = (SIN(T)SIN(S))
 2062                          25,2716   00005 1                 4                              (COS(T)       )
 2063                          25,2717   41325 0        PDDL     DMP                            (SIN(T)COS(S))
 2064                          25,2720   00007 0                 6
 2065                          25,2721   00001 0                 0
 2066                          25,2722   55552 0        SL1      VDEF
 2067                          25,2723   77441 0        DOT      EXIT         DOT U WITH LOS TO GET TRUNNION COMMAND.
 2068                          25,2724   00041 1                 32D
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P2069          AT THIS POINT WE HAVE A ROTATION VECTOR IN DISH AXES LYING IN THE TS PLANE. CONVERT THIS TO A
R2071    COMMANDED RATE AND ENABLE THE TRACKER IF WE ARE WITHIN .5 DEGREES OF  THE  TARGET.

 2073    REF 242   LAST   524     25,2725   4 0154 0              CS       MPAC                DOT WAS NEGATIVE OF DESIRED ANGLE.
 2074                             25,2726   0 0006 1              EXTEND
 2075    REF   1                  25,2727   7 3075 1              MP       RDESGAIN            SCALING ON INPUT ANGLE WAS 4 RADIANS.
 2076    REF   3   LAST   539     25,2730   55'354 0              TS       TRUNNCMD            TRUNNION COMMAND FOR RROUT
 2077    REF  75   LAST   550     25,2731   4 0110 0              CS       RADMODES            A RELAY IN THE RR REVERSES POLARITY OF
 2078    REF  22   LAST   512     25,2732   7 4740 1              MASK     BIT12               THE SHAFT COMMANDS IN MODE 2 SO THAT A
 2079                             25,2733   0 0006 1              EXTEND                       POSITIVE TORQUE APPLIED TO THE SHAFT
 2080                             25,2734   1 2737 1              BZF      +3                  GYRO CAUSES A POSITIVE CHANGE IN THE
 2081    REF  15   LAST   552     25,2735   3 1107 0              CA       TANG +1             SHAFT ANGLE. COMPENSATE FOR THIS SWITCH
 2082                             25,2736   1 2740 1              TCF      +2                  BY CHANGING THE POLARITY OF OUR COMMAND.
 2083    REF  16   LAST   554     25,2737   4 1107 1        +3    CS       TANG +1
 2084                             25,2740   0 0006 1              EXTEND
 2085    REF   2   LAST   554     25,2741   7 3075 1              MP       RDESGAIN            SCALING ON INPUT ANGLE WAS 4 RADIANS.
 2086    REF   1                  25,2742   55'355 1              TS       SHAFTCMD            SHAFT COMMAND FOR RROUT
 2087    REF  48   LAST   552     25,2743   0 6042 1              TC       INTPRET

 2088                             25,2744    41345 0              DLOAD    DMP
 2089                             25,2745    00003 1                       2                   COS(S).
 2090                             25,2746    00005 1                       4                   COS(T).
 2091                             25,2747    65352 0              SL1      PDDL                Z COMPONENT OF URR.
 2092                             25,2750    65276 1              DCOMP    PDDL                Y COMPONENT = -SIN(T).
 2093                             25,2751    00001 0                       0                   SIN(S).
 2094                             25,2752    72405 0              DMP      SL1
 2095                             25,2753    00005 1                       4                   COS(T).
 2096                             25,2754    43066 0              VDEF     BON                 FORM URR IN NB AXES.
 2097    REF   4   LAST   552     25,2755    00311 1                       PRNBSW              BYPASS NBSM CONVERSION IN VERB 41.
 2098                             25,2756    52761 0                       +3
 2099                             25,2757    77624 1              CALL
 2100    REF   1                  25,2760    47675 0                       *NBSM*              GET URR IN SM AXES.
 2101                             25,2761    77441 0              DOT      EXIT
 2102    REF   7   LAST   552     25,2762    01101 0                       RRTARGET            GET COSINE OF ANGLE BETWEEN RR AND LOS.

 2103                             25,2763   0 0006 1              EXTEND
 2104    REF   1                  25,2764   4 3077 0              DCS      COS1/2DG
 2105    REF 243   LAST   554     25,2765   20 155 1              DAS      MPAC                DIFFERENCE OF COSINES, SCALED 8-2.
 2106    REF 244   LAST   554     25,2766   10 154 0              CCS      MPAC
 2107    REF 115   LAST   545     25,2767   3 4755 1              CA       ZERO                IF COS ERROR BIGGER, ERROR IS SMALLER.
 2108                             25,2770   1 2772 0              TCF      +2
 2109    REF  68   LAST   541     25,2771   3 4753 1              CA       ONE
 2110    REF 245   LAST   554     25,2772   54 155 1              TS       MPAC +1             ZERO IF RR IS POINTED OK, ONE IF NOT.
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P2111               SEE IF TRACKER SHOULD BE ENABLED OR DISABLED.

 2112   REF  76  LAST  554    25,2773   10 110 0               CCS     RADMODES          IF CONTINUOUS DESIGNATE WANTED, PUT OUT
 2113   REF   1               25,2774   1 2777 0               TCF     SIGNLCHK          COMMANDS WITHOUT CHECKING MAGNITUDE OF
 2114   REF   2  LAST  555    25,2775   1 2777 0               TCF     SIGNLCHK          ERROR SIGNALS
 2115   REF   1               25,2776   1 3027 0               TCF     DORROUT
 2116   REF 246  LAST  554    25,2777   10 155 1   SIGNLCHK    CCS     MPAC +1           SEE IF BOTH AXES WERE WITHIN .5 DEGS.
 2117   REF   1               25,3000   1 3010 1               TCF     DGOODCHK
 2118   REF  38  LAST  543    25,3001   4 0074 0               CS      STATE             IF WITHIN LIMITS AND NO LOCK-ON WANTED,
 2119   REF   1               25,3002   7 4747 0               MASK    LOKONBIT          PROBLEM IS FINISHED.
 2120   REF 192  LAST  550    25,3003   10 000 0               CCS     A
 2121   REF   1               25,3004   1 3015 1               TCF     RRDESDUN

 2122   REF  51  LAST  517    25,3005   3 4736 1               CAF     BIT14             ENABLE THE TRACKER.
 2123                         25,3006   0 0006 1               EXTEND
 2124   REF  34  LAST  550    25,3007   05 012 1               WOR     CHAN12 -

 2125   REF  23  LAST  521    25,3010   3 4750 1   DGOODCHK    CAF     BIT4              SEE IF DATA GOOD RECEIVED YET
 2126                         25,3011   0 0006 1               EXTEND
 2127   REF  11  LAST  521    25,3012   02 033 0               RAND    CHAN33
 2128   REF 193  LAST  555    25,3013   10 000 0               CCS     A
 2129   REF   2  LAST  555    25,3014   1 3027 0               TCF     DORROUT

 2130   REF  28  LAST  480    25,3015   4 4742 0   RRDESDUN    CS      BIT10             WHEN PROBLEM DONE, REMOVE BIT 10 SO NEXT
 2131   REF  77  LAST  555    25,3016   7 0110 0               MASK    RADMODES          WAITLIST TASK WE WILL GO TO RGOODEND.
 2132                         25,3017   0 0004 0               INHINT
 2133   REF  78  LAST  555    25,3020   54 110 0               TS      RADMODES

 2134   REF  60  LAST  550    25,3021   0 5516 0               TC      DOWNFLAG          RESET LOSCMFLG TO PREVENT A
 2135   REF   7  LAST  547    25,3022    00041 1               ADRES   LOSCMFLG          RECOMPUTATION OF LOS AFTER DATA GOOD
 2136   REF  32  LAST  534    25,3023   4 4752 1               CS      BIT2              TURN OFF ENABLE RR ERROR COUNTER
 2137                         25,3024   0 0006 1               EXTEND
 2138   REF  35  LAST  555    25,3025   03 012 1               WAND    CHAN12 -
 2139   REF  92  LAST  547    25,3026   1 5155 1               TCF     ENDOFJOB          WITH ECTR DISABLED.

 2140   REF   8  LAST  501    25,3027   3 0076 0   DORROUT     CA      FLAGWRD2          IF BOTH LOSCMFLAG AND SEARCH FLAG ARE
 2141   REF   1               25,3030   7 7715 1               MASK    BIT12,14          ZERO, BYPASS VELOCITY ADJUSTMENT TO LOS
 2142                         25,3031   0 0006 1               EXTEND
 2143   REF   1               25,3032   1 3051 1               BZF     NOTP20
 2144   REF  49  LAST  554    25,3033   0 6042 1               TC      INTPRET
 2145                         25,3034    74375 0               VLOAD   VXSC              MULTIPLY UNIT LOS BY MAGNITUDE
 2146   REF   8  LAST  554    25,3035    01101 0                       RRTARGET
 2147   REF   2  LAST  552    25,3036    01767 0                       MLOSV
 2148                         25,3037    41572 1               VSL1    PUSH
 2149                         25,3040    74375 0               VLOAD   VXSC              ADD .5 SEC. OF VELOCITY
 2150   REF   3  LAST  552    25,3041    01761 0                       LOSVEL            TO LOS VECTOR
 2151   REF   2  LAST  552    25,3042    13101 0                       MCTOMS
 2152                         25,3043    53362 0               VSR1    VAD
 2153                         25,3044    77656 1               UNIT
 2154   REF   9  LAST  555    25,3045    15101 0               STODL   RRTARGET          STORE VELOCITY-CORRECTED LOS (UNIT)
 2155                            25,3046   00045 0                     360
 2156   REF   3  LAST  555       25,3047   01767 0            STORE    MLOSV            AND STORE MAGNITUDE
 2157                            25,3050   77776 1            EXIT
 2158                            25,3051  0 0004 0  NOTP20    INHINT
 2159   REF  79  LAST  555       25,3052  4 0110 0            CS       RADMODES         PUT OUT COMMAND UNLESS MONITOR
 2160   REF   5  LAST  550       25,3053  7 4741 0            MASK     REPOSBIT         REPOSITION HAS TAKEN OVER.
 2161   REF 194  LAST  555       25,3054  10 000 0            CCS      A
 2162   REF   2  LAST  538       25,3055  0 2317 0            TC       RROUT

 2163   REF   9  LAST  555       25,3056  3 0076 0            CA       FLAGWRD2
 2164   REF   1                  25,3057  7 4740 1            MASK     LOSCMBIT         IF LOSCMFLG NOT SET, DON'T TEST
 2165                            25,3060  0 0006 1            EXTEND                    LOS COUNTER
 2166   REF  93  LAST  555       25,3061  1 5155 1            BZF      ENDOFJOB
 2167   REF  25  LAST  550       25,3062  11'456 0            CCS      LOSCOUNT         TEST LOS COUNTER TO SEE IF TIME TO GET
 2168   REF   1                  25,3063  0 3073 0            TC       DODESEND         A NEW LOS
 2170   REF   5  LAST  520       25,3064  0 6032 0            TC       KILLTASK         YES - KILL TASK WHICH SCHEDULES DODES
 2171   REF   2  LAST  550       25,3065   52613 1            CADR     DESLOOP +2
 2172                            25,3066  0 0003 1            RELINT
 2173   REF   4  LAST  380       25,3067  10 067 1            CCS      NEWJOB
 2174   REF   3  LAST  380       25,3070  0 5122 0            TC       CHANG1
 2175   REF 148  LAST  524       25,3071  0 4616 1            TC       BANKCALL
 2176   REF   1                  25,3072   50732 1            CADR     R21LEM2


 2177   REF  26  LAST  556       25,3073  55'456 0  DODESEND  TS       LOSCOUNT
 2178   REF  94  LAST  556       25,3074  0 5155 0            TC       ENDOFJOB


 2179                            25,3075   21122 0  RDESGAIN DEC       .53624           TRIES TO NULL .5 ERROR IN .5 SEC.
 21795  REF   1                     7715            BIT12,14 EQUALS    PRIO24           OCT 24000
 2180                            25,3076   07777 1  COS1/2DG 2DEC      .999961923 B-2   COSINE OF 0.5 DEGREES.
 2180                            25,3077   33005 1
 2181                            25,3100   00310 0  MCTOMS   2DEC      100 B-13
 2181                            25,3101   00000 1
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P2182    RACAR READ INITIALIZATION

R2183    RACAR OATA ARE REAO BY A BANKCALL FOR THE APPROPRIATE LEAO-IN BELCW.

 2184    REF   1                 25,3102  0 3122 0  LRALT      TC      INITREAD -1      ONE SAMPLE PER REAOING.
 2185                            25,3103   00017 1  ALLREAC    OCT     17

 2186    REF   2  LAST   557     25,3104  0 3123 1  LRVELZ     TC      INITREAO
 2187                            25,3105   00016 0             OCT     16

 2188    REF   3  LAST   557     25,3106  0 3123 1  LRVELY     TC      INITREAC
 2189                            25,3107   00015 0             OCT     15

 2190    REF   4  LAST   557     25,3110  0 3123 1  LRVELX     TC      INITREAO
 2191                            25,3111   00014 1             OCT     14

 2192    REF   5  LAST   557     25,3112  0 3122 0  RRRODT     TC      INITREAD -1
 2193                            25,3113   COD12 1             OCT     12

 2194    REF   6  LAST   557     25,3114  0 3122 0  RRRANGE    TC      INITREAD -1
 2195                            25,3115   00011 1             OCT     11

R2196    LRVEL IS THE ENTRY TO THE LR VELOCITY REAO ROUTINE WHEN 5 SAMPLES ARE
R2197    WANTEO. ENTER WITH C(A)= 0,2,4 FCR LRVELZ,LRVELY,LRVELX RESP.

 2198    REF   1                 25,3116  55'104 1  LRVEL      TS      TIMEHOLD         STORE VBEAM INDEX HERE MOMEMTARILY
 2199    REF  11  LAST   511     25,3117  3 4756 1             CAF     FIVE             SPECIFY FIVE SAMPLES
 2200    REF   2  LAST   557     25,3120  51'104 0             INDEX   TIMEHOLD
 2201    REF   2  LAST   495     25,3121  1 3104 0             TCF     LRVELZ
 2202   REF  69  LAST  554   25,3122  3 4753 1   -1     CAF     ONE           ENTRY TO TAKE ONLY 1 SAMPLE.
 2203                        25,3123  0 0004 0  INITREAD INHINT

 2204   REF   3  LAST  557   25,3124  55'104 1          TS      TIMEHOLD      GET DT OF MIDPOINT OF NOMINAL SAMPLING
 2205                        25,3125  0 0006 1          EXTEND                INTERVAL (ASSUMES NO BAD SAMPLES WILL BE
 2206   REF  25  LAST  493   25,3126  7 4751 1          MP      BIT3          ENCOUNTERED).
 2207   REF   4  LAST  558   25,3127  53'105 0          DXCH    TIMEHOLD

 2208   REF 195  LAST  556   25,3130  10 000 0          CCS     A
 2209   REF   1              25,3131  55'110 1          TS      NSAMP
 2210   REF  70  LAST  558   25,3132  6 4753 1          AD      ONE
R2211          INSERT FOLLOWING INSTRUCTION TO GET 2N TRIES FOR N SAMPLES.
A2212                                                   DOUBLE
 2213   REF   2  LAST  224   25,3133  55'077 1          TS      SAMPLIM

 2214   REF   1              25,3134  3 3156 0          CAF     DGBITS        READ CURRENT VALUE OF DATA GOOD BITS.
 2215                        25,3135  0 0006 1          EXTEND
 2216   REF  12  LAST  555   25,3136  02 033 0          RAND    CHAN33
 2217   REF   1              25,3137  55'112 0          TS      OLDATAGD

 2218   REF   1              25,3140  4 3103 1          CS      ALLREAD
 2219                        25,3141  0 0006 1          EXTEND
 2220   REF   8  LAST  474   25,3142  03 013 0          WAND    CHAN13        REMOVE ALL RADAR BITS

 2221   REF 165  LAST  548   25,3143  50 002 0          INDEX   Q
 2222                        25,3144  3 0000 1          CAF     0
 2223   REF  22  LAST  523   25,3145  0 4674 0          TC      IBNKCALL
 2224   REF   1              25,3146   36000 1          CADR    RADSTART

 2225                        25,3147  0 0006 1          EXTEND
 2226   REF  14  LAST  466   25,3150  3 0025 0          DCA     TIME2
 2227   REF   5  LAST  558   25,3151  21'105 0          DAS     TIMEHOLD      TIME OF NOMINAL MIDPOINT.

 2228   REF 116  LAST  554   25,3152  3 4755 1          CAF     ZERO
 2229   REF  77  LAST  548   25,3153  54 001 1          TS      L
 2230   REF   3  LAST  494   25,3154  53'101 1          DXCH    SAMPLSUM
 2231   REF   2  LAST  541   25,3155  1 2377 1          TCF     ROADBACK

 2232                        25,3156   00230 0  DGBITS  OCT     230
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P2233    RADAR RUPT READER

R2234    THIS ROUTINE STARTS FROM A RADARUPT. IT READS THE DATA & LOTS MORE.

 2235    REF   2  LAST   41     25,2000                            SETLOC RADARUPT
 2236                            25,3157                            BANK

 2237    REF   2 LAST   41  TO   41:      3       3*               COUNT* $$/RRUPT
 2238                           25,3157  C 0006 1  RADAREAD EXTEND                    MUST SAVE SBANK BECAUSE OF RUPT EXITS
 2239    REF  10  LAST  460     25,3160  C4 007 1           ROR    SUPERBNK          VIA TASKOVER (BADEND OR GOODEND.
 2240    REF   3  LAST  255     25,3161  54 016 1           TS     BANKRUPT
 2241                           25,3162  C 0006 1           EXTEND
 2242    REF   3  LAST  255     25,3163  22 012 1           QXCH   QRUPT

 22421                          25,3164  0 0006 1           EXTEND
 22422   REF  16  LAST  318     25,3165  3 1454 0           DCA    TTOGO             LOAD TIME TO TIG
 22423   REF   2  LAST  318     25,3166  53'272 0           DXCH   TTOTIG            FOR R65 RADAR READING.

 2243    REF   8  LAST  507     25,3167  3 4757 0           CAF    SEVEN
 2244                           25,3170  C 0006 1           EXTEND
 2245    REF   9  LAST  558     25,3171  02 013 1           RAND   CHAN13
 2246    REF   2  LAST  107     25,3172  55'332 0           TS     DNINDEX
 2247                           25,3173  C 0006 1           EXTEND                   IF RADAR SELECT BITS ZERO,DO NOT STORE
 2248    REF   1                25,3174  1 3200 1           BZF    TRYCOUNT          DATA FOR DOWNLIST (ERASABLE PROBLEMS)
 2249    REF   1                25,3175  3 0046 0           CA     RNRAD
 2250    REF   3  LAST  559     25,3176  51'332 1           INDEX  DNINDEX
 2251    REF   5  LAST  318     25,3177  55'327 1           TS     DNRRANGE -1
 2252    REF   3  LAST  558     25,3200  11'077 1  TRYCOUNT CCS    SAMPLIM
 2253    REF   1                25,3201  1 3223 0           TCF    PLENTY
 2254    REF   1                25,3202  1 3206 1           TCF    NOMORE
 2255    REF  23  LAST  547     25,3203  0 5567 0           TC     ALARM
 2256                           25,3204   00520 0           OCT    520
 2257    REF  16  LAST  261     25,3205  0 5270 1           TC     RESUME

 2258    REF   4  LAST  282     25,3206  3 0107 1  NOMORE   CA     FLGWRD11          IS LRBYPASS SET?
 2259    REF   4  LAST  282     25,3207  7 4735 0           MASK   LRBYBIT
 2260                           25,3210  C 0006 1           EXTEND
 2261    REF   1                25,3211  1 3220 0           BZF    BADRAD            NO.  R12 IS ON -- BYPASS 521 ALARM.

 2262    REF  10  LAST  376     25,3212  4 0077 0           CS     FLAGWRD3          CHECK R04FLAG.
 2263    REF   4  LAST  279     25,3213  7 4743 1           MASK   R04FLBIT          IF 1,R04 IS RUNNING. DO NOT ALARM.
 2264                           25,3214  0 0006 1           EXTEND
 2265    REF   2  LAST  559     25,3215  1 3220 0           BZF    BADRAD

 2266    REF  24  LAST  559     25,3216  0 5567 0           TC     ALARM             P20 WANTS THE ALARM.
 2267                           25,3217   00521 1           OCT    521
 2268    REF  71  LAST  558     25,3220  4 4753 0  BADRAD   CS     ONE
 2269    REF   4  LAST  559     25,3221  55'077 1           TS     SAMPLIM
 2270    REF   2  LAST  550     25,3222  0 3563 1           TC     RDBADEND -2
 2271    REF   5  LAST  559     25,3223  55'077 1  PLENTY   TS     SAMPLIM
 2272   REF  26  LAST  558    25,3224  3 4751 0             CAF    BIT3
 2273                         25,3225  0 0006 1             EXTEND
 2274   REF  10  LAST  559    25,3226  02 013 1             RAND   CHAN13            TO FIND OUT WHICH RADAR
 2275                         25,3227  0 0006 1             EXTEND
 2276   REF   1               25,3230  1 3277 1             BZF    RENDRAD

 2277   REF   1               25,3231  0 3365 1             TC     R77CHECK          R77 QUITS HERE.
 2287   REF   1               25,3232  3 6250 0  VELCHK     CAF    BIN3              = 00003 OCT
 2288                         25,3233  0 0006 1             EXTEND
 2289   REF  11  LAST  560    25,3234  06 013 0             RXOR   CHAN13            RESET ACTIVITY BIT
 2290   REF   2  LAST  560    25,3235  7 6250 1             MASK   BIN3
 2291                         25,3236  0 0006 1             EXTEND
 2292   REF   1               25,3237  1 3273 0             BZF    LRHEIGHT          TAKE A LR RANGE READING

 2293   REF  12  LAST  529    25,3240  3 4733 1             CAF    POSMAX
 2294   REF   2  LAST  559    25,3241  7 0046 1             MASK   RNRAD
 2295   REF   1               25,3242  6 2000 0             AD     LVELBIAS
 2296   REF  78  LAST  558    25,3243  54 001 1             TS     L
 2297   REF   3  LAST  560    25,3244  30 046 0             CAE    RNRAD
 2298                         25,3245  6 0000 1             DOUBLE
 2299   REF  28  LAST  531    25,3246  7 4753 0             MASK   BIT1
 2300   REF   7  LAST  559    25,3247  52 064 1             DXCH   ITEMP3

 2301   REF  26  LAST  528    25,3250  3 4744 1             CAF    BIT8              DATA GOOD ISNT CHECKED UNTIL AFTER READ-
 2302   REF   1               25,3251  0 3425 1             TC     DGCHECK           ING DATA SO SOME RADAR TESTS WILL WORK
A2303                                                                                INDEPENDENT OF DATA GOOD.

 2304   REF   2  LAST  558    25,3252  11'110 1             CCS    NSAMP
 2305   REF   1               25,3253  0 3263 0             TC     NOEND
 2306   REF  72  LAST  559    25,3254  4 4753 0  GOODRAD    CS     ONE
 2307   REF   6  LAST  559    25,3255  55'077 1             TS     SAMPLIM
 2308   REF  19  LAST  548    25,3256  4 0061 1             CS     ITEMP1            WHEN ENOUGH GOOD DATA HAS BEEN GATHERED,
 2309   REF  80  LAST  556    25,3257  7 0110 0             MASK   RADMODES          RESET DATA FAIL FLAGS FOR SETTRKF.
 2310   REF  81  LAST  560    25,3260  54 110 0             TS     RADMODES
 2311   REF   1               25,3261  0 3612 1             TC     RADLITES          LAMPS MAY GO OFF IF DATA JUST GOOD.
 2312   REF   2  LAST  536    25,3262  0 3556 1             TC     RGOODEND -2

 2313   REF   3  LAST  560    25,3263  55'110 1  NOEND      TS     NSAMP
 2314   REF   7  LAST  560    25,3264  11'077 1  RESAMPLE   CCS    SAMPLIM           SEE IF ANY MORE TRIES SHOULD BE MADE.
 2315                         25,3265  1 3267 0             TCF    +2
 2316   REF   1               25,3266  1 3444 1             TCF    DATAFAIL          N SAMPLES NOT AVAILABLE.
 2317   REF  24  LAST  555    25,3267  3 4750 1             CAF    BIT4              RESET ACTIVITY BIT.
 2318   REF  23  LAST  558    25,3270  0 4674 0             TC     BANKCALL
 2319   REF   2  LAST  558    25,3271   36000 1             CADR   RADSTART

 2320   REF  17  LAST  559    25,3272  0 5270 1             TC     RESUME


 2321   REF  27  LAST  492    25,3273  3 4747 1  LRHEIGHT   CAF    BIT5
 2322   REF  20  LAST  560    25,3274  54 061 1             TS     ITEMP1            (POSITION OF DATA GOOD BIT IN CHAN 33)
 2323   REF  18  LAST  333    25,3275  3 4743 0               CAF    BIT9
 2324   REF   1               25,3276  0 3321 1               TC     SCALECHK -1

 2325   REF   6  LAST  556    25,3277  3 4741 1   RENDRAD     CAF    REPOSBIT        MAKE SURE ANTENNA HAS NOT GONE OUT OF
 2326   REF  82  LAST  560    25,3300  7 0110 0               MASK   RADMODES        LIMITS.
 2327   REF 196  LAST  558    25,3301  10 000 0               CCS    A
 2328   REF   3  LAST  559    25,3302  1 3220 0               TCF    BADRAD

 2329   REF  83  LAST  561    25,3303  4 0110 0               CS     RADMODES        BE SURE RR CDU HASNT FAILED.
 2330   REF   5  LAST  474    25,3304  7 4745 1               MASK   RCDUFBIT
 2331   REF 197  LAST  561    25,3305  10 000 0               CCS    A
 2332   REF   4  LAST  561    25,3306  1 3220 0               TCF    BADRAD

 2333   REF  25  LAST  560    25,3307  3 4750 1               CAF    BIT4            SEE IF DATA HAS BEEN GOOD.
 2334   REF  21  LAST  560    25,3310  54 061 1               TS     ITEMP1          (POSITION OF DATA GOOD BIT IN CHAN 33)

 2335   REF  29  LAST  560    25,3311  3 4753 1               CAF    BIT1            SEE IF RR RDOT.
 2336                         25,3312  0 0006 1               EXTEND
 2337   REF  12  LAST  560    25,3313  02 013 1               RAND   CHAN13
 2338   REF 166  LAST  558    25,3314  54 002 1               TS     Q               FOR LATER TESTING.
 2339   REF 198  LAST  561    25,3315  10 000 0               CCS    A
 2340                         25,3316  1 3320 1               TCF    +2
 2341   REF   1               25,3317  1 3332 1               TCF    RADIN           NO SCALE CHECK FOR RR RDOT.
 2342   REF  27  LAST  560    25,3320  3 4751 0               CAF    BIT3
 2343   REF  79  LAST  560    25,3321  54 001 1               TS     L

 2344                         25,3322  0 0006 1   SCALECHK    EXTEND
 2345   REF  13  LAST  558    25,3323  02 033 0               RAND   CHAN33          SCALE STATUS NOW
 2346   REF  80  LAST  561    25,3324  56 001 0               XCH    L
 2347   REF  84  LAST  561    25,3325  7 0110 0               MASK   RADMODES        SCALE STATUS BEFORE
 2348                         25,3326  0 0006 1               EXTEND
 2349   REF  12  LAST  536    25,3327  06 001 0               RXOR   LCHAN           SEE IF THEY DIFFER
 2350   REF 199  LAST  561    25,3330  10 000 0               CCS    A
 2351   REF   1               25,3331  0 3351 0               TC     SCALCHNG        THEY DIFFER

 2352   REF  13  LAST  560    25,3332  3 4733 1   RADIN       CAF    POSMAX
 2353   REF   4  LAST  560    25,3333  7 0046 1               MASK   RNRAD
 2354   REF   5  LAST  259    25,3334  54 064 1               TS     ITEMP4

 2355   REF   5  LAST  561    25,3335  30 046 0               CAE    RNRAD
 2356                         25,3336  6 0000 1               DOUBLE
 2357   REF  30  LAST  561    25,3337  7 4753 0               MASK   BIT1
 2358   REF   8  LAST  560    25,3340  54 063 0               TS     ITEMP3

 2359   REF 167  LAST  561    25,3341  10 002 1               CCS    Q               SEE IF RR RDOT.
 2360   REF   1               25,3342  1 3403 1               TCF    SCALADJ         NO, BUT SCALE CHANGING MAY BE NEEDED.

 2361                         25,3343  0 0006 1               EXTEND                 IF RR RANGE RATE, THROW OUT BIAS.
 2362   REF   1               25,3344  4 2002 0               DCS    RDOTBIAS
 2363   REF   9  LAST  561    25,3345  20 064 1   DASAMPL     DAS    ITEMP3
 2364   REF   22   LAST  561    25,3346   3 0061 0   DGCHECK2 CA       ITEMP1          SEE THAT DATA HAS BEEN GOOD BEFORE AND
 2365   REF    2   LAST  560    25,3347   0 3426 1            TC       DGCHECK +1      AFTER TAKING SAMPLE.
 2366   REF    1                25,3350   0 3254 1            TC       GOODRAD

 2367   REF   85   LAST  561    25,3351   22 110 1   SCALCHNG LXCH     RADMODES
 2368   REF   31   LAST  561    25,3352   6 4753 1            AD       BIT1
 2369                           25,3353   0 0006 1            EXTEND
 2370   REF   13   LAST  561    25,3354   06 001 0            RXOR     LCHAN
 2371   REF   86   LAST  562    25,3355   54 110 0            TS       RADMODES
 2372   REF    2   LAST  558    25,3356   3 3156 0            CAF      DGBITS          UPDATE LAST VALUE OF DATA GOOD BITS.
 2373                           25,3357   0 0006 1            EXTEND
 2374   REF   14   LAST  561    25,3360   02 033 0            RAND     CHAN33
 2375   REF    2   LAST  558    25,3361   55 112 0            TS       OLDATAGD
 2376   REF   34   LAST  523    25,3362   0 5504 0            TC       UPFLAG          SET RNGSCFLG
 2377   REF    1                25,3363    00120 1            ADRES    RNGSCFLG        FOR LRS24.1
 2378   REF    5   LAST  561    25,3364   1 3220 0            TCF      BADRAD

R2379   R77 MUST IGNORE DATA FAILS SO AS NOT TO DISTURB THE ASTRONAUT.

 2380   REF   16   LAST  494    25,3365   4 0101 0   R77CHECK CS       FLAGWRD5
 2381   REF    4   LAST  494    25,3366   7 4741 0            MASK     R77FLBIT
 2382   REF  200   LAST  561    25,3367   10 000 0            CCS      A
 2383   REF  168   LAST  561    25,3370   0 0002 0            TC         Q             NOT R77
 2384   REF    1                25,3371   4 3402 0            CS       BITS5,8         UPDATE LR DATA GOOD BITS IN RADMODES
 2385   REF   87   LAST  562    25,3372   7 0110 0            MASK     RADMODES
 2386   REF   81   LAST  561    25,3373   54 001 1            TS       L
 2387   REF    2   LAST  562    25,3374   3 3402 1            CA       BITS5,8
 2388                           25,3375   0 0006 1            EXTEND
 2389   REF   15   LAST  562    25,3376   02 033 0            RAND     CHAN33
 2390   REF   82   LAST  562    25,3377   6 0001 0            AD       L
 2391   REF   88   LAST  562    25,3400   54 110 0            TS       RADMODES
 2392   REF    3   LAST  560    25,3401   0 3556 1            TC       RGOODEND -2
 2393                           25,3402    00220 1   BITS5,8  OCT      220
```

```
P2394              THE FOLLOWING ROUTINE INCORPORATES RR RANGE AND LR ALT SCALE INFORMATION AND LEAVES DATA AT LO SCALE.

 2396  REF  B3  LAST  562   25,3403  10 001 1  SCALADJ  CCS     L                   L HAS SCALE INBIT FOR THIS RADAR.
 2397                       25,3404  1 3406 1           TCF     +2                  ON HIGH SCALE.
 2398  REF   1              25,3405  1 3346 1           TCF     DGCHECK2

 2399  REF   4  LAST  559   25,3406  3 1332 1           CA      DNINDEX
 2400  REF  28  LAST  561   25,3407  7 4751 1           MASK    BIT3
 2401  REF 201  LAST  562   25,3410  10 000 0           CCS     A
 2402  REF   1              25,3411  1 3420 0           TCF     LRSCK

 2403  REF  10  LAST  561   25,3412  52 064 1           DXCH    ITEMP3
 2404                       25,3413  20 001 1           DDDUBL
 2405                       25,3414  20 001 1           DDDUBL
 2406                       25,3415  20 001 1           DDDUBL
 2407  REE  11  LAST  563   25,3416  52 064 1           DXCH    ITEMP3

 2408  REF   2  LAST  563   25,3417  1 3346 1           TCF     DGCHECK2

 2422                       25,3420  0 0006 1  LRSCK    EXTEND
 2423  REF  12  LAST  563   25,3421  3 0064 0           DCA     ITEMP3
 2424                       25,3422  20 001 1           DDDUBL
 2425                       25,3423  20 001 1           DDDUBL
 2426  REF   1              25,3424  1 3345 1           TCF     DASAMPL


 2428  REF  23  LAST  562   25,3425  54 061 1  DGCHECK  TS      ITEMP1              UPDATE DATA GOOD BIT IN OLDATAGD AND
 2429                       25,3426  0 0006 1           EXTEND                      MAKE SURE IT WAS ON BEFORE AND AFTER THE
 2430  REF  16  LAST  562   25,3427  02 033 0           RAND    CHAN33              SAMPLE WAS TAKEN BEFORE RETURNING. IF
 2431  REF  84  LAST  563   25,3430  54 001 1           TS      L                   NOT, GOES TO RESAMPLE TO TRY AGAIN. IF
 2432  REF  24  LAST  563   25,3431  4 0061 1           CS      ITEMP1              MAX NUMBER OF TRIES HAS BEEN REACHED,
 2433  REF   3  LAST  562   25,3432  7 1112 0           MASK    OLDATAGD            THE BIT CORRESPONDING TO THE DATA GOOD
 2434  REF  85  LAST  563   25,3433  6 0001 0           AD      L                   WHICH FAILED TO APPEAR IS IN ITEMP1 AND
 2435  REF   4  LAST  563   25,3434  57'112 1           XCH     OLDATAGD            CAN BE USED TO SET RADMODES WHICH VIA
 2436  REF  25  LAST  563   25,3435  7 0061 1           MASK    ITEMP1              SETTRKF SETS THE TRACKER FAIL LAMP.
 2437  REF  86  LAST  563   25,3436  6 0001 0           AD      L
 2438  REF 202  LAST  563   25,3437  10 000 0           CCS     A                   SHOULD BOTH BE ZERO.
 2439  REF   1              25,3440  0 3264 1           TC      RESAMPLE
 2440  REF  13  LAST  563   25,3441  52 064 1           DXCH    ITEMP3              IF DATA GOOD BEFORE AND AFTER, ADD TO
 2441  REF   4  LAST  558   25,3442  21'101 1           DAS     SAMPLSUM            ACCUMULATION.
 2442  REF 169  LAST  562   25,3443  0 0002 0           TC      Q

 2443  REF  26  LAST  563   25,3444  4 0061 1  DATAFAIL CS      ITEMP1              IN THE ABOVE CASE, SET RADMODES BIT
 2444  REF  89  LAST  562   25,3445  7 0110 0           MASK    RADMODES            SHOWING SOME RADAR DATA FAILED.
 2445  REF  27  LAST  563   25,3446  6 0061 0           AD      ITEMP1
 2446  REF  90  LAST  563   25,3447  54 110 0           TS      RADMODES

 2447  REF  14  LAST  563   25,3450  52 064 1           DXCH    ITEMP3              IF WE HAVE BEEN UNABLE TO GATHER N
 2448  REF   5  LAST  563   25,3451  53'101 1           DXCH    SAMPLSUM            SAMPLES, USE LAST ONE ONLY.
 2449      REF    2  LAST  560    25,3452  0 3612 1            TC      RADLITES
 2450      REF    2  LAST  559    25,3453  1 3206 1            TCF     NOMORE
```

```
P2451           CODING TO PROTECT CHANNEL 13 WILL RADAR READ IS IN CRITICAL PERIOD


 2453   REF   1                17,2000                          SETLOC C13BANK
 2454                          17,2000                          BANK

 2455   REF 170  LAST  563     17,2000  54 002 1  RADSTART TS     Q
 2456                          17,2001  0 0006 1      +1   EXTEND
 2457   REF   4  LAST  383     17,2002  00 004 0           READ   LOSCALAR       READ PRESENT TIME
 2458   REF  87  LAST  563     17,2003  54 001 1           TS     L

 2459   REF   8  LAST  448     17,2004  7 4346 0           MASK   LOW5           ONLY THE LOW 5 BITS MATTER
 2460                          17,2005  4 0000 0           COM
 2461   REF  39  LAST  495     17,2006  6 4746 0           AD     BIT6           COMPUTE DELTA TIME TO NEXT T5 TICK
 2462   REF   9  LAST  565     17,2007  7 4346 0           MASK   LOW5
 2463   REF   1                17,2010  55'270 1           TS     RADDEL

 2464   REF   4  LAST  501     17,2011  6 7751 0           AD     NEG2           IF A TICKING OF T5 IS NEAR, WAIT UNTIL
 2465                          17,2012  0 0006 1           EXTEND                IT HAS TICKED.  THE MAX DELAY HERE WILL
 2466   REF   3  LAST  560     17,2013  6 2001 1           BZMF   RADSTART +1    BE 937.5 MICROSECONDS

 2467   REF 171  LAST  565     17,2014  3 0002 0           CA     Q
 2468                          17,2015  0 0006 1           EXTEND                IT IS SAFE TO SET THE ACTIVITY BIT NOW
 2469   REF  13  LAST  561     17,2016  05 013 0           WOR    CHAN13         BECAUSE OF THE ABOVE LOOP

 2470   REF  88  LAST  565     17,2017  4 0001 1           CS     L
 2471   REF   1                17,2020  55'267 1           TS     RADTIME        SAVE NEGATIVE TIME OF READ
 2472   REF   1                17,2021  0 4707 0           TC     ISWRETRN


 2473   REF   1                17,2022  55'266 0  C13STALL TS     C13FSAV

 2477   REF  26  LAST  561     17,2023  3 4750 1           CA     BIT4
 2478                          17,2024  0 0006 1           EXTEND
 2479   REF  14  LAST  565     17,2025  02 013 1           RAND   CHAN13
 2480                          17,2026  0 0006 1           EXTEND
 2481   REF   1                17,2027  1 2050 1           BZF    TCQSTAL        IF NO RADAR ACTIVITY, RETURN

 24815                         17,2030  12 031 0  C13SLOOP NOOP                  *** NECESSARY TO PREVENT A TC TRAP ***
 2482                          17,2031  0 0006 1           EXTEND
 2483   REF   5  LAST  565     17,2032  00 004 0           READ   LOSCALAR
 2484   REF   2  LAST  565     17,2033  6 1267 0           AD     RADTIME        COMPUTE DELTA T SINCE LAST RADAR READ
 2485   REF   7  LAST  536     17,2034  6 4736 1           AD     HALF
 2486   REF   8  LAST  565     17,2035  6 4736 1           AD     HALF           CORRECT FOR TIME OVERFLOW
 2487   REF  89  LAST  565     17,2036  56 001 0           XCH    L

 2488   REF   1                17,2037  3 2053 0           CA     90MSCALR
 2489   REF   2  LAST  565     17,2040  6 1270 0           AD     RADDEL
 2490                          17,2041  0 0006 1           EXTEND
 2491   REF  90  LAST  565     17,2042  60 001 0           SU     L
 2492                          17,2043   0 0006 1              EXTEND
 2493     REF    2  LAST  565  17,2044   6 2050 0              BZMF    TCQSTAL          FORBIDDEN  ZONE IS PAST, RETURN

 2494     REF    1             17,2045   6 2054 1              AD      -DTSCALR
 2495                          17,2046   0 0006 1              EXTEND
 2496     REF    1             17,2047   6 2030 0              BZMF    C13SLOOP         IN THE FORBIDDEN PERIOD, LOOP UNTIL O.K.

 2497     REF  172  LAST  565  17,2050  22 002 0    TCQSTAL    LXCH    Q                ALL IS WELL, RETURN
 2498     REF    2  LAST  565  17,2051   3 1266 1              CA      C13FSAV
 2499                          17,2052  52 005 0               DTCF

 2500                          17,2053    00440 1   90MSCALR   OCT     440              90 MILLISEC IN SCALAR
 2501                          17,2054    77754 1   -DTSCALR   OCT     77754            -5.9375 MS IN SCALAR

 2502     REF    2  LAST  520     6000                         SETLOC  FFTAG6
 2503                             6022                         BANK

 2504     REF    1                6022   3 7727 1   C13STALL   CAF     PRIO36           PRIO36 = 36000 = FCADR (17,2000)
 2505     REF    3  LAST  468     6023  56 004 0               XCH     FBANK
 2506     REF    1                6024   1 2022 1              TCF     C13STALL
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P2507   THIS ROUTINE CHANGES THE LR POSITION, AND CHECKS THAT IT GOT THERE.

 2508   REF   2  LAST  530   25,2000                         SETLOC P20S1
 2509                        25,3454                         BANK

 2510   REF   2 LAST  530 TO  559:    564   564*             COUNT* $$/RSUB
 2511                        25,3454  0 0004 0  LRPOS2       INHINT

 2512   REF  91  LAST  563   25,3455  4 0110 0               CS     RADMODES
 2513   REF   1              25,3456  7 4746 1               MASK   LRPOSBIT          SHOW DESIRED LR POSITION IS 2
 2514   REF  92  LAST  567   25,3457  26 110 0               ADS    RADMODES

 2515   REF  24  LAST  515   25,3460  3 4745 0               CAF    BIT7
 2516                        25,3461  0 0006 1               EXTEND
 2517   REF  17  LAST  563   25,3462  02 033 0               RAND   CHAN33            SEE IF ALREADY THERE.
 2518                        25,3463  0 0006 1               EXTEND
 2519   REF   2  LAST  541   25,3464  1 3513 1               BZF    RADNOOP

 2520   REF  24  LAST  426   25,3465  3 4737 0               CAF    BIT13
 2521                        25,3466  0 0006 1               EXTEND
 2522   REF  36  LAST  555   25,3467  05 012 1               WOR    CHAN12 -          COMMAND TO POSITION 2
 2523   REF   1              25,3470  3 3530 1               CAF    6SECS             START SCANNING FOR INBIT AFTER 7 SECS.
 2524   REF  22  LAST  545   25,3471  0 5203 0               TC     WAITLIST
 2525   REF  27  LAST  556   E7,1456                         EBANK= LOSCOUNT
 2526   REF   1              25,3472   03526 0               2CADR  LRPOSCAN
 2526   REF   1              25,3473   52067 1
 2527   REF   3  LAST  558   25,3474  0 2377 0               TC     ROADBACK

 2528   REF   8  LAST  560   25,3475  55'077 1  LRPOSNXT     TS     SAMPLIM
 2529   REF   9  LAST  550   25,3476  0 5221 0               TC     FIXDELAY          SCAN ONCE PER SECOND 15 TIMES MAX AFTER
 2530                        25,3477   00144 0               DEC    100               INITIAL DELAY OF 7 SECONDS.

 2531   REF  25  LAST  567   25,3500  3 4745 0               CAF    BIT7              SEE IF LR POS2 IS ON
 2532                        25,3501  0 0006 1               EXTEND
 2533   REF  18  LAST  567   25,3502  02 033 0               RAND   CHAN33
 2534                        25,3503  0 0006 1               EXTEND
 2535   REF   1              25,3504  1 3520 1               BZF    LASTLPOS          IF THERE, WAIT FINAL SECOND FOR BOUNCE.

 2536   REF   9  LAST  567   25,3505  11'077 1               CCS    SAMPLIM           SEE IF MAX TIME UP.
 2537   REF   1              25,3506  1 3475 0               TCF    LRPOSNXT

 2538   REF  25  LAST  567   25,3507  4 4737 1               CS     BIT13             IF TIME UP, DISABLE COMMAND AND ALARM.
 2539                        25,3510  0 0006 1               EXTEND
 2540   REF  37  LAST  567   25,3511  03 012 1               WAND   CHAN12 -
 2541   REF   3  LAST  559   25,3512  1 3565 0               TCF    RDBADEND

 2542   REF  73  LAST  560   25,3513  3 4753 1  RADNOOP      CAF    ONE               NO FURTHER ACTION REQUESTED.
 2543   REF  23  LAST  567   25,3514  0 5203 0               TC     WAITLIST
 2544   REF  28  LAST  567   E7,1456                         EBANK= LOSCOUNT
 2545   REF   4  LAST  562   25,3515   03560 1               2CADR  RGOODEND
 2545                        25,3516   52067 1
 2546  REF   4  LAST  567    25,3517  0 2377 0           TC       RCADBACK

 2547  REF   1               25,3520  3 5000 1  LASTLRDT CA       2SECS              WAIT TWO SECONDS AFTER RECEIPT OF INBIT
 2548  REF   3  LAST  167    25,3521  0 5224 0           TC       VARDELAY           TO WAIT FOR ANTENNA BOUNCE TO DIE OUT.

 2549  REF  26  LAST  567    25,3522  4 4737 1           CS       BIT13              REMOVE COMMAND
 2550                        25,3523  C 0006 1           EXTEND
 2551  REF  38  LAST  567    25,3524  C3 012 1           WAND     CHAN12
 2552  REF   5  LAST  567    25,3525  1 3560 0           TCF      RGOODEND

 2553  REF   1               25,3526  3 4317 0  LRPCSCAN CAF      FOURTEEN           SET UP FOR 15 SAMPLES.
 25532 REF   2  LAST  567    25,3527  1 3475 0           TCF      LRPOSNXT
 25534                       25,3530   01130 1  6SECS    DEC      600

 25538 REF   1               25,3531  C 3454 1  LRP2COMM TC       LRPCS2
 25539 REF 149  LAST  556    25,3532  0 4616 1           TC       BANKCALL
 2554  REF   9  LAST  522    25,3533   17705 0           CADR     RADSTALL
 25541 REF   1               25,3534  0 3536 1           TC       LP2ALM
 25542 REF   1               25,3535  1 3547 0           TCF      GOPINNER

 25543 REF  25  LAST  559    25,3536  0 5567 0  LP2ALM   TC       ALARM
 25544                       25,3537   00523 0           OCT      523
 25545 REF   2  LAST  568    25,3540  1 3547 0           TCF      GOPINNER

 25546 REF   3  LAST  523    25,3541  3 5016 0  V59GP63  CA       EBANK7
 25547 REF  19  LAST  524    25,3542  54 003 0           TS       EBANK
 25548 REF   1               E7,1427                     EBANK=   RPCRTIME
 25549 REF  14  LAST  561    25,3543  3 4733 1           CA       POSMAX
 2555  REF   2  LAST  568    25,3544  55'427 0           TS       RPCRTIME
 25551 REF  52  LAST  555    25,3545  4 4736 0           CS       BIT14
 25552 REF   1               25,3546  55'430 0           TS       RPCRTQSW
 25555 REF  37  LAST  524    25,3547  0 4635 0  GOPINNER TC       POSTJUMP
 25556 REF   5  LAST  454    25,3550   21051 0           CADR     PINBRNCH
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P2556              SEQUENCES TO TERMINATE RR OPERATIONS.

 2557   REF   6  LAST  561    25,3551  3 4745 0  ENDRADAR CAF     RCDUFBIT          PROLOG TO CHECK RR CDU FAIL BEFORE END.
 2558   REF  93  LAST  567    25,3552  7 0110 0           MASK    RADMODES
 2559   REF 203  LAST  563    25,3553  10 000 0           CCS     A
 2560   REF   6  LAST  568    25,3554  1 3560 0           TCF     RGOODEND
 2561   REF   4  LAST  567    25,3555  1 3565 0           TCF     RDBADEND
 2562   REF 117  LAST  558    25,3556  4 4755 0   -2      CS      ZERO              RGOODEND WHEN NOT UNDER WAITLIST CONTROL
 2563   REF   2  LAST   99    25,3557  54 332 1           TS      RUPTAGN

 2564   REF  37  LAST  545    25,3560  3 4752 0  RGOODEND CAF     TWC
 2565   REF  38  LAST  568    25,3561  0 4635 0           TC      POSTJUMP
 2566   REF   2  LAST  246    25,3562   17656 1           CADR    GOODEND

 2567   REF 118  LAST  569    25,3563  4 4755 0   -2      CS      ZERO              RDBADEND WHEN NOT UNDER WAITLIST.
 2568   REF   3  LAST  569    25,3564  54 332 1           TS      RUPTAGN
 2569   REF  38  LAST  569    25,3565  3 4752 0  RDBADEND CAF     TWC
 2570   REF  39  LAST  569    25,3566  0 4635 0           TC      POSTJUMP
 2571   REF   1               25,3567   17653 1           CADR    BADEND

 2572   REF  18  LAST  513       6250            BIN3     EQUALS  THREE
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R2573    PROGRAM NAME_ LPS20.1 VECTOR EXTRAPOLATION AND LOS COMPUTATION
R2574    MOD. NO.  2       BY  J.D. COYNE     SDC     DATE   12-7-66

R2575    FUNCTIONAL DESCRIPTION_

R2576    1) EXTRAPOLATE THE LEM AND CSM VECTORS IN ACCORDANCE WITH THE TIME REFERED TO IN CALLER + 1.
R2578    2) COMPUTES THE LOS VECTOR TO THE CSM, CONVERTS IT TO STABLE MEMBER COORDINATES AND STORES IT IN RRTARGET.
R2580    3) COMPUTES THE MAGNITUDE OF THE LOS VECTOR AND STORES IT IN MLOSV

R2581    CALLING SEQUENCE        CALL
R2582                                    LPS20.1

R2583    SUBROUTINES CALLED_

R2584    LEMPREC,CSMPREC

R2585    NORMAL EXIT_ RETURN TO CALLER + 2

R2586    ERROR EXITS_ NONE

R2587    ALARMS_ NONE

R2588    OUTPUT_

R2589    LOS VECTOR (HALF UNIT) IN SM COORDINATES STORED IN RRTARGET
R2590    MAGNITUDE OF THE LOS VECTOR (METERS SCALED B-29) STORED IN MLOSV
R2591    RRNBSW CLEARED

R2592    INITIALIZED ERASEABLE

R2593    TDEC1 MUST CONTAIN THE TIME FOR EXTRAPOLATION
R2594    SEE ORBITAL INTEGRATION ROUTINE

R2595    DEBRIS_

R2596    MPAC DESTROYED BY THIS ROUTINE

 2597                               23,2337                          BANK    23
 2598    REF    4  LAST   520       24,2000                          SETLOC  P20S
 2599                               24,3256                          BANK
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L        P20-R25                                                                                   USER'S PAGE NO.  76      E7 S3

 2600   REF   1                                          COUNT* $$/LPS20

 2601                      24,3256   43020 1  LPS20.1   STQ     BOFF
 2602   REF   3  LAST  504  24,3257   01757 0                    LS21X
 2603   REF   8  LAST  555  24,3260   01343 1                    LOSCMFLG        LOSCMFLG = 0 MEANS NOT CALLED BY R21
 2604   REF   1             24,3261   51265 1                    LMINT           SO CALL LEMCONIC TO GET LM STATE
 2605                       24,3262   77614 1           BON                      IF IN R21 AND ON LUNAR SURFACE
 2606   REF   6  LAST  504  24,3263   04307 1                    SURFFLAG        DON'T CALL LEMCONIC
 2607   REF   1             24,3264   51275 0                    CSMINT
 2608                       24,3265   77624 1  LMINT    CALL
 2609   REF   3  LAST  491  24,3266   27077 1                    LEMCONIC        EXTRAPOLATE LEM
 2610                       24,3267   77775 1           VLOAD
 2611   REF   5  LAST  491  24,3270   00001 0                    RATT
 2612   REF   2  LAST  504  24,3271   26352 1           STCVL    LMPOS           SAVE LM POSITION B-29
 2613   REF   1             24,3272   00007 0                    VATT
 2614   REF   2  LAST  504  24,3273   16360 0           STODL    LMVEL           SAVE LM VELOCITY B-7
 2615   REF   5  LAST  497  24,3274   00015 0                    TAT
 2616   REF  16  LAST  522  24,3275   34041 0  CSMINT   STCALL   TDEC1
 2617   REF   2  LAST  341  24,3276   27065 1                    CSMCONIC         EXTRAPOLATE CSM
 2618                       24,3277   52375 1           VLOAD    VSU             COMPUTE RELATIVE VELOCITY V(CSM) - V(LM)
 2619   REF   2  LAST  571  24,3300   00007 0                    VATT
 2620   REF   3  LAST  571  24,3301   02360 0                    LMVEL
 2621                       24,3302   76521 0           MXV      VSL1
 2622   REF   8  LAST  491  24,3303   01734 0                    REFSMMAT
 2623                       24,3304   77776 1           EXIT
 2624   REF   6  LAST  556  24,3305   0 6032 0          TC       KILLTASK        KILL THE TASK WHICH CALLS DODES SINCE
 2625   REF   3  LAST  556  24,3306   52613 1           CADR     DESLOOP +2      STORING INTO ERASEABLES DODES USES
 2626   REF  50  LAST  555  24,3307   0 6042 1          TC       INTPRET
 2627   REF   4  LAST  555  24,3310   25761 0           STOVL    LOSVEL
 2628   REF   6  LAST  571  24,3311   00001 0                    RATT
 2629                       24,3312   43051 1           VSU      BOFF
 2630   REF   3  LAST  571  24,3313   02352 1                    LMPOS
 2631   REF   4  LAST  506  24,3314   00350 1                    RNDVZFLG
 2632   REF   1             24,3315   51322 0                    NOTSHIFT
 2633                       24,3316   77604 0           BOVB
 2634   REF   1             24,3317   57754 0                    TCDANZIG
 2635                       24,3320   77661 0           VSL
 2636                       24,3321   20212 1                    9D
 2637                       24,3322   41056 1  NOTSHIFT UNIT     BOVB            IF OVERFLOW , RANGE MUST BE GREATER
 2638   REF   1             24,3323   50102 1                    526ALARM        THAN 400 N. M.
 2639                       24,3324   76521 0           MXV      VSL1
 2640   REF   9  LAST  571  24,3325   01734 0                    REFSMMAT        CONVERT TO STABLE MEMBER
 2641   REF  10  LAST  555  24,3326   15101 0           STODL    RRTARGET
 2642                       24,3327   00045 0                    36D             SAVE MAGNITUDE OF LOS VECTOR FOR
 2643   REF   4  LAST  556  24,3330   01767 0           STORE    MLOSV           VELOCITY CORRECTION IN DESIGNATE
 2644                       24,3331   77614 1           CLRGO
 2645   REF   5  LAST  554  24,3332   00231 1                    RRNBSW
 2646   REF   4  LAST  571  24,3333   01757 0                    LS21X
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P2647    PROGRAM NAME_ LPS20.2  400 NM RANGE CHECK
R2648    MOD. NO. 2    BY J.D. COYNE    SDC     DATE  12-7-66


R2649    FUNCTIONAL DESCRIPTION_

R2650    COMPARES THE MAGNITUDE OF THE LOS VECTOR TO 400 NM


R2651    CALLING SEQUENCE        CALL
R2652                                    LPS20.2


R2653    SUBROUTINES CALLED_ NONE


R2654    NORMAL EXIT _ RETURN TO CALLER +1, MPAC EQ 0 (RANGE 400NM OR LESS.)


R2655    ERROR EXITS _ RETURN TO CALLER +1, MPAC EQ 1 (RANGE GREATER THAN 400NM)


R2656    ALARMS_ NONE


R2657    OUTPUT_ NONE


R2658    INITIALIZED ERASEABLE_

R2659    PDL 36D MUST CONTAIN THE MAGNITUDE OF THE VECTOR
R2660    DEBRIS

R2661    MPAC DESTROYED BY THIS ROUTINE

 2662    REF   3  LAST  567     25,2000                         SETLOC P20S1
 2663                           25,3570                         BANK
 2664    REF   1                                                COUNT* $$/LPS20

 2665                           25,3570   45345 1  LPS20.2  DLOAD   DSU
 2666    REF   5  LAST  571     25,3571   01767 0                    MLOSV             MAGNITUDE OF LOS
 2667    REF   1                25,3572   13603 0                    FHNM              OVER 400NM  _
 2668                           25,3573   77644 1           BPL
 2669    REF   1                25,3574   53577 1                    TOFAR
 2670                           25,3575   43535 0           SLOAD   RVQ
 2671    REF   1                25,3576   06524 1                    ZERO/SP
 2672                           25,3577   43535 0  TOFAR    SLOAD   RVQ
 2673    REF   1                25,3600   13602 1                    ONE/SP
 2674                           25,3601   00001 0  ONE/SP   DEC     1
 2675                          25,3602   26467 0  FHNM      2DEC    740800 B-20     400 NAUTICAL MILES IN METERS B-20
 2675                          25,3603   00000 1
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R2676    PROGRAM NAME: LRS22.1 (DATA READ SUBROUTINE 1)
R2677    MOD. NO.: 1         BY:  P. VOLANTE  SDC             DATE: 11-15-66


R2678    FUNCTIONAL DESCRIPTION

R2679    1) READS RENDEZVOUS RADAR RANGE AND RANGE-RATE,TRUNION AND SHAFT ANGLES,THREE CDU VALUES AND TIME. CONVERTS THIS
R2681    DATA AND LEAVES IT FOR THE MEASUREMENT INCORPORATION ROUTINE (LSR22.3). CHECKS FOR THE RR DATA GOOD DISCRETE,FOR
R2683    RR REPOSITION AND RR CDU FAIL

R2684    2) COMPARES RADAR LOS WITH LOS COMPUTED FROM STATE VECTORS TO SEE IF THEY ARE WITHIN THREE DEGREES


R2686    CALLING SEQUENCE: BANKCALL FOR LRS22.1


R2687    SUBROUTINES CALLED:

R2688            RRRDOT    LPS20.1
R2689            RRRANGE   BANKCALL
R2690            RADSTALL  CDULOGIC
R2691            RRNB      SMNB
R2692    NORMAL EXIT: RETURN TO CALLER+1 WITH MPAC SET TO +0


R2693    ERROR EXITS: RETURN TO CALLER+1 WITH ERROR CODE STORED IN MPAC AS FOLLOWS:

R2695                     00001-ERROR EXIT 1-RR DATA NO GOOD (NO RR DATA GOOD DISCRETE OR RR CDU FAIL OR RR REPOSITION)
R2697                     00002-ERROR EXIT 2-RR LOS NOT WITHIN THREE DEGREES OF LOS COMPUTED FROM STATE VECTORS


R2699    ALARMS:  521-COULD NOT READ RADAR DATA (RR DATA GOOD DISCRETE NOT PRESENT BEFORE AND AFTER READING THE RADAR)
R2701     (THIS ALARM IS ISSUED BY THE RADAREAD SUBROUTINE WHICH IS ENTERED FROM A RADARUPT)


R2703    OUTPUT: RRLOSVEC- THE RR LINE-OF-SIGHT VECTOR(USED BY LRS22.2)-A HALF-UNIT VECTOR
R2705            RM- THE RR RANGE READING(TO THE CSM) DP, IN METERS SCALED B-29(USED BY LRS22.2 AND LRS22.3)

R2707       ALL OF THE FOLLOWING OUTPUTS ARE USED BY LRS22.3:

R2708            RDOTM- THE RR RANGE-RATE READING,DP, IN METERS PER CENTISECOND, SCALED B-7
R2710            RRTRUN-RR TRUNION ANGLE,DP,IN REVOLUTIONS,SCALED B0
R2711            RRSHAFT-RR SHAFT ANGLE,DP,IN REVOLUTIONS,SCALED B0
R2712            AIG,AMG,AOG-THE CDU ANGLES,THREE SP WORDS
R2713            MKTIME-THE TIME OF THE RR READING,DP,IN CENTISECONDS


R2714    ERASABLE INITIALIZATION REQUIRED:

R2715       RNRAD,THE RADAR READ COUNTER FROM WHICH IS OBTAINED:
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R2716        1)RR RANGE SCALED 9.38 FT. PER BIT ON THE LOW SCALE AND 75.04 FT. PER BIT ON THE HIGH SCALE
R2718        2)RR RANGE RATE,SCALED .6278 FT./SEC. PER BIT

R2719       THE CDU ANGLES FROM CDUX,CDUY,CDUZ AND TIME1 AND TIME2


R2720    DEBRIS:  LRS22.1X,A,L,Q,PUSHLIST


 2721                           32,2366                           BANK    32
 2722    REF    2  LAST    41   32,2000                           SETLOC  LRS22
 2723                           32,2366                           BANK
 2724    REF    2 LAST    41  TO   41:      4      4*             COUNT*  $$/LRS22

 2725    REF    7  LAST   547   32,2366  0 4645 1   LRS22.1   TC      MAKECADR
 2726    REF    3  LAST   508   32,2367  55'737 1             TS      LRS22.1X
 2727    REF   61  LAST   555   32,2370  0 5516 0             TC      DOWNFLAG
 2728    REF    2  LAST   562   32,2371   00120 1             ADRES   RNGSCFLG
 2729                           32,2372  0 0004 0             INHINT
 2730    REF   29  LAST   563   32,2373  3 4751 0             CAF     BIT3
 2731                           32,2374  0 0006 1             EXTEND                  GET RR RANGE SCALE
 2732    REF   19  LAST   567   32,2375  02 033 0             RAND    CHAN33          FROM CHANNEL 33 BIT 3
 2733    REF   91  LAST   565   32,2376  54 001 1             TS      L
 2734    REF    1               32,2377  4 4751 1             CS      RRRSBIT
 2735    REF   94  LAST   569   32,2400  7 0110 0             MASK    RADMODES
 2736    REF   92  LAST   575   32,2401  6 0001 0             AD      L
 2737    REF   95  LAST   575   32,2402  54 110 0             TS      RADMODES
 2738                           32,2403  0 0003 1             RELINT
 2739    REF 150   LAST   568   32,2404  0 4616 1  READRDOT TC      BANKCALL
 2740    REF    4  LAST   522   32,2405   53112 0             CADR    RRRDOT          READ RANGE-RATE (ONE SAMPLE)
 2741    REF 151   LAST   575   32,2406  0 4616 1             TC      BANKCALL
 2742    REF   10  LAST   568   32,2407   17705 0             CADR    RADSTALL        WAIT FOR DATA READ COMPLETION
 2743    REF    1               32,2410  1 2543 0             TCF     EREXIT1         COULD NOT READ RADAR-ERROR EXIT 1

 2744                           32,2411  0 0004 0             INHINT                  NO INTERRUPTS WHILE READING TIME AND CDU
 2745    REF    6  LAST   558   32,2412  53'105 0             DXCH    TIMEHOLD        SET MARK TIME EQUAL TO THE MID-POINT
 2746    REF 247   LAST   555   32,2413  52 162 0             DXCH    MPAC +5         TEMP BUFFER FOR DOWNLINK
 2747    REF    6  LAST   563   32,2414  53'101 1             DXCH    SAMPLSUM        SAVE RANGE-RATE READING
 2748    REF    3  LAST   148   32,2415  53'747 0             DXCH    RDOTMSAV
 2749                           32,2416  0 0006 1             EXTEND
 2750    REF    2  LAST   255   32,2417  3 0034 0             DCA     CDUY            SAVE ICDU ANGLES
 2751    REF 248   LAST   575   32,2420  52 160 1             DXCH    MPAC +3         TEMP BUFFER FOR DOWNLINK
 2752    REF   10  LAST   389   32,2421  3 0032 0             CA      CDUX
 2753    REF 249   LAST   575   32,2422  54 156 1             TS      MPAC +2         TEMP BUFFER FOR DOWNLINK
 2754                           32,2423  0 0006 1             EXTEND
 2755    REF   15  LAST   558   32,2424  3 0025 0             DCA     TIME2            SAVE TIME
 2756    REF 250   LAST   575   32,2425  52 155 1             DXCH    MPAC            SAVE TIME OF CDU READINGS IN MPAC
 2757                           32,2426  0 0006 1             EXTEND
 2758    REF    9  LAST   552   32,2427  3 0036 1             DCA     CDUT            SAVE TRUNION AND SHAFT ANGLES FOR RRNB
 2759    REF   17  LAST   554   32,2430  53'107 1             DXCH    TANG
 2760                          32,2431  0 0003 1          RELINT
 2761   REF 152  LAST  575     32,2432  0 4616 1          TC       BANKCALL
 2762   REF   3  LAST  522     32,2433   53114 0          CADR     RRRANGE          READ RR RANGE (ONE SAMPLE)
 2763   REF 153  LAST  576     32,2434  0 4616 1          TC       BANKCALL
 2764   REF  11  LAST  575     32,2435   17705 0          CADR     RADSTALL         WAIT FOR READ COMPLETE
 2765   REF   1                32,2436  0 2537 1          TC       CHEXERR          CHECK FOR ERRORS DURING READ
 2766                          32,2437  0 0004 0          INHINT                    COPY CYCLE FOR MARK DATA ON DOWNLINK
 27665                         32,2440  0 0006 1          EXTEND
 2767   REF   6  LAST  559     32,2441  3 1331 1          DCA      ONRRANGE         RANGE,RANGE RATE (RAW DATA)
 2768   REF   3  LAST  201     32,2442  53'761 1          DXCH     RANGRDOT
 2769   REF 251  LAST  575     32,2443  52 162 0          DXCH     MPAC +5
 2770   REF   5  LAST  203     32,2444  53'755 0          DXCH     MKTIME           MARK TIME
 2771   REF 252  LAST  576     32,2445  52 160 1          DXCH     MPAC +3
 2772   REF   3  LAST  203     32,2446  53'460 0          DXCH     AIG              CDUY, CDUZ
 2773                          32,2447  0 0006 1          EXTEND
 2774   REF  18  LAST  575     32,2450  3 1107 0          DCA      TANG             PRESERVE TANG
 2775   REF   7  LAST  547     32,2451  53'753 0          DXCH     TANGNB           TRUNNION AND SHAFT ANGLES
 2776   REF 253  LAST  576     32,2452  3 0156 0          CA       MPAC +2
 2777   REF   3  LAST  203     32,2453  55'461 1          TS       AOG              CDUX
 2778   REF  51  LAST  571     32,2454  0 6042 1          TC       INTPRET
 2779                          32,2455   14025 0          STODL    20D              SAVE TIME OF CDU READINGS IN 20D
 2780   REF   4  LAST  575     32,2456   03747 0                   RDOTMSAV         CONVERT RDOT UNITS AND SCALING
 2781                          32,2457   57261 0          SL       DMPR             START WITH READING SCALED 8-28, -.6278
 2782                          32,2460   20217 1                   1 4D             FT./SECOND PER BIT
 2783   REF   1                32,2461   24002 0                   RDOTCONV         END WITH METERS/CENTISECOND, 8-7
 2784   REF   3  LAST  148     32,2462   03751 1          STORE    RDOTM
 2785                          32,2463   47135 0          SLOAD    RT8
 2786   REF  19  LAST  576     32,2464   01107 0                   TANG             GET TRUNION ANGLE
 2787   REF  13  LAST  552     32,2465   21577 1                   CDULOGIC         CONVERT TO DP ONES COMP. IN REVOLUTIONS
 2788   REF   2  LAST  148     32,2466   03734 1          STORE    RRTRUN           AND SAVE FOR TMI ROUTINE (LSR22.3)
 2789                          32,2467   47135 0          SLOAD    RT8
 2790   REF  20  LAST  576     32,2470   01110 0                   TANG +1          DITTO FOR SHAFT ANGLE
 2791   REF  14  LAST  576     32,2471   21577 1                   CDULOGIC
 2792   REF   2  LAST  148     32,2472   17736 0          STODL    RRSHAFT
 2793   REF   7  LAST  575     32,2473   01101 0                   SAMPLSUM
 2794                          32,2474   66405 0          DMP      SL2R             CONVERT UNITS AND SCALING OF RANGE
 2795   REF   1                32,2475   24004 0                   RANGCONV         PER BIT, END WITH METERS,SCALED -29
 2797   REF   4  LAST  203     32,2476   37757 0          STCALL   RM
 2798   REF   2  LAST  547     32,2477   46041 0                   RRNB             COMPUTE RADAR LOS USING RRNB
 2799   REF   3  LAST  148     32,2500   17741 0          STODL    RRBORSIT         AND SAVE
 2800                          32,2501   00025 0                   20D
 2801   REF  17  LAST  571     32,2502   34041 0          STCALL   TDEC1            GET STATE VECTOR LOS AT TIME OF CDU READ
 2802   REF   5  LAST  522     32,2503   51256 1                   LPS20.1
 2803                          32,2504   77776 1          EXIT
 2804   REF   4  LAST  576     32,2505  3 1457 0          CA       AIG              STORE IMU CDU ANGLES AT MARKTIME
 2805   REF  10  LAST  482     32,2506  54 765 1          TS       CDUSPOT          IN CDUSPOT FOR TRG*SMNB
 2806   REF   1                32,2507  3 1460 1          CA       AMG
 2807   REF  11  LAST  576     32,2510  54 767 0          TS       CDUSPOT +2
 2808   REF   4  LAST  576     32,2511  3 1461 0          CA       AOG
 2809   REF  12  LAST  576     32,2512  54 771 1          TS       CDUSPOT +4
 2810   REF  52  LAST  576   32,2513  0 6042 1              TC      INTPRET
 2811                        32,2514   45175 0              VLOAD   CALL              LOAD VECTOR AND CALL TRANSFORMATION
 2812   REF  11  LAST  571   32,2515   01101 0                      RRTARGET
 2813   REF   1              32,2516   47653 1                      TRG*SMNB          ROTATE LOS AT MARKTIME FROM SM TO NB.
 2814                        32,2517   77641 1              DOT                       DOT WITH RADAR LOS TO GET ANGLE
 2815   REF   4  LAST  576   32,2520   03741 0                      RRBORSIT
 2816                        32,2521   65552 0              SL1     ACOS              BETWEEN THEM
 2817   REF  22  LAST  452   32,2522   01045 1              STORE   DSPTEM1           STORE FOR POSSIBLE DISPLAY
 2818                        32,2523   50025 0              BDSU    BMN               IS IT LESS THAN 3 DEGREES
 2819   REF   1              32,2524   24547 1                      THREEDEG
 2820   REF   1              32,2525   64532 1                      NORMEXIT          YES-NORMAL EXIT

 2821                        32,2526   77776 1              EXIT                      ERROR EXIT 2
 2822   REF  33  LAST  555   32,2527  3 4752 0              CAF     BIT2              SET ERROR CODE
 2823   REF 254  LAST  576   32,2530  54 154 0              TS      MPAC
 2824   REF   1              32,2531  1 2535 1              TCF     OUT22.1

 2825                        32,2532   77776 1   NORMEXIT   EXIT                      NORMAL EXIT-SET MPAC EQUAL ZERO
 2826   REF 119  LAST  569   32,2533  3 4755 1              CAF     ZERO
 2827   REF 255  LAST  577   32,2534  54 154 0              TS      MPAC
 2828   REF   4  LAST  575   32,2535  31 737 0   OUT22.1    CAE     LRS22.1X          EXIT FROM LRS22.1
 2829   REF  10  LAST  545   32,2536  0 4640 1              TC      BANKJUMP
 2830   REF  17  LAST  562   32,2537  30 101 1   CHEXERR    CAE     FLAGWRD5
 2831   REF   1              32,2540  7 4742 0              MASK    RNGSCBIT
 2832   REF 204  LAST  569   32,2541  10 000 0              CCS     A                 CHECK IF RANGE SCALE CHANGED
 2833   REF   1              32,2542  1 2404 1              TCF     READRDCT          YES-TAKE ANOTHER READING

 2834   REF  32  LAST  562   32,2543  3 4753 1   EREXIT1    CA      BIT1              SET ERROR CODE
 2835   REF 256  LAST  577   32,2544  54 154 0              TS      MPAC
 2836   REF   2  LAST  577   32,2545  0 2535 0              TC      OUT22.1
 2837                        32,2546   00210 1   THREEDEG   2DEC    .008333333        THREE DEGREES,SCALED  REVS,B0
 2837                        32,2547   21042 1
 2838   REF  12  LAST  577      1100             RRLOSVEC   EQUALS  RRTARGET
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P2839    PROGRAM NAME - LRS22.2 (DATA READ SUBROUTINE 2)

R2840    MCO. NO. : 1          BY: P VOLANTE  SDC            DATE    4-11-67

R2841    FUNCTIONAL DESCRIPTION-

R2842       2) CHECKS IF THE RR LOS (I.E. THE RADAR BORESIGHT VECTOR) IS WITHIN 30 DEGREES OF THE LM +Z AXIS

R2844    CALLING SEQUENCE- BANKCALL FOR LRS22.2

R2845    SUBROUTINES CALLED: G+N,AUTO    SETMAXDB
R2846    NORMAL EXIT - RETURN TO CALLER WITH MPAC SET TO +0 (VIA SWRETURN)

R2847    ERROR EXIT - RETURN TO CALLER WITH MPAC SET TO 00001 -RADAR LOS NOT WITHIN 30 DEGREES OF LM +Z AXIS

R2849    ALARMS - NONE                                                       IN THE AUTO MODE

R2851    ERASABLE INITIALIZATION REQUIRED -
R2852          RRLOSVEC - THE RR LINE-OF-SIGHT VECTOR-A HALF UNIT VECTOR COMPUTED BY LRS22.1
R2854          RM - RR RANGE, METERS B-29, FROM LRS22.1
R2855          BIT 14 CHANNEL 31 -INDICATES AUTOPILOT IS IN AUTO MODE

R2856    DEBRIS -  A,L,C MPAC -PUSHLIST AND PUSHLOC ARE NOT CHANGED BY THIS ROUTINE

 2858    REF   5  LAST  570    24,2000                         SETLOC P20S
 2859                          24,3334                         BANK
 2860    REF   8  LAST  575    24,3334  0 4645 1  LRS22.2      TC      MAKECADR
 2861    REF   5  LAST  577    24,3335  55'737 1               TS      LRS22.1X
 2862    REF  53  LAST  577    24,3336  0 6042 1               TC      INTPRET
A2863                                                                               CHECK IF RR LOS IS WITHIN 30 DEG OF
 2864                          24,3337   65545 0  30DEGCHK     DLOAD   ACOS         THE SPACECRAFT +Z AXIS
 2865    REF   5  LAST  577    24,3340   03745 1                       RRBORSIT +4  BY TAKING ARCCOS OF Z-COMP. OF THE RR
A2866                                                                               LOS VECTOR,A HALF UNIT VECTOR
A2867                                                                               IN NAV BASE AXES)
 2868                          24,3341   50025 0               DSU     BMN
 2869    REF   1               24,3342   11356 1                       30DEG
 2870    REF   1               24,3343   51350 0                       OKEXIT       NORMAL EXIT-WITHIN 30 DEG.
 2871                        ' 24,3344   77776 1               EXIT                 ERROR EXIT-NOT WITHIN 30 DEG.
 2872    REF  33  LAST  577    24,3345  3 4753 1               CAF     BIT1         SET ERROR CODE IN MPAC
 2873    REF 257  LAST  577    24,3346  54 154 0               TS      MPAC
 2874    REF   1               24,3347  1 3353 0               TCF     OUT22.2
 2875                          24,3350   77776 1  OKEXIT       EXIT                 NORMAL EXIT-SET MPAC = ZERO
 2876    REF 120  LAST  577    24,3351   3 4755 1             CAF      ZERO
 2877    REF 258  LAST  578    24,3352  54 154 0             TS       MPAC
 2878    REF   6  LAST  578    24,3353  31'737 0  OUT22.2    CAE      LRS22.1X
 2879    REF  11  LAST  577    24,3354   C 4640 1             TC       BANKJUMP


 2880                          24,3355   02525 1  30DEG      2DEC     .083333333       THIRTY DEGREES,SCALED REVS,B0
 2880                          24,3356   12525 0
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P2881    PROGRAM NAME - LSR22.3                                                 DATE - 29 MAY 1967
R2883    MOD. NO 3                                                              LOG SECTION - P20-25
R2885    MOD. BY - DANFORTH                                                     ASSEMBLY LEMP20S REV 10
R2887
R2888    FUNCTIONAL DESCRIPTION

R2889    THIS ROUTINE COMPUTES THE B-VECTORS AND DELTA Q FOR EACH OF THE QUANTITIES MEASURED BY THE RENDEZVOUS
R2891    RADAR.(RANGE,RANGE RATE,SHAFT AND TRUNNION ANGLES). THE ROUTINE CALLS THE INCORP1 AND INCORP2 ROUTINES
R2893    WHICH COMPUTE THE DEVIATIONS AND CORRECT THE STATE VECTOR.

R2894    CALLING SEQUENCE
R2895    THIS ROUTINE IS PART OF P20 RENDEZVOUS NAVIGATION FOR THE LM COMPUTER O NLY. THE ROUTINE IS ENTERED FROM
R2897    R22LEM  ONLY AND RETURNS DIRECTLY TO R22LEM  FOLLOWING SUCCESSFUL INCORPORATION OF MEASURED DATA. IF THE
R2899    COMPUTED STATE VECTOR DEVIATIONS EXCEED THE MAXIMUM PERMITTED. THE ROUTINE RETURNS TO R22LEM  TO DISPLAY
R2901    THE DEVIATIONS. IF THE ASTRONAUT ACCEPTS THE DATA R22LEM  RETURNS TO    LSR22.3 TO INCORPORATE THE
R2903    DEVIATIONS INTO THE STATE VECTOR. IF THE ASTRONAUT REJECTS THE DEVIATIONS, NO MORE MEASUREMENTS ARE
R2905    PROCESSED FOR THIS MARK,I.E.,R22LEM  GETS THE NEXT MARK.

R2906
R2907    SUBROUTINES CALLED
R2908     WLINIT       LGCUPDTE      INTEGRV      INCORP1      ARCTAN
R2909     GETULC       RARARANG      INCORP2      NBSM         INTSTALL
R2910
R2911    OUTPUT
R2912     CORRECTED LM OR CSM STATE VECTOR (PERMANENT)
R2913     NUMBER OF MARKS INCORPORATED IN MARKCTR
R2914     MAGNITUDE OF POSITION DEVIATION (FOR DISPLAY) IN R22DISP METERS B-29
R2915     MAGNITUDE OF VELOCITY DEVIATION (FOR DISPLAY) IN R22DISP +2 M/CSEC B-7
R2916     UPDATED W-MATRIX
R2917

R2918    ERASABLE INITIALIZATION REQUIRED
R2919     LM AND CSM STATE VECTORS
R2920     W-MATRIX
R2921     MARK TIME IN MKTIME
R2922     RADAR RANGE IN RM METERS B-29
R2923            RANGE RATE IN RDOTM METERS/CSES B-7
R2924            SHAFT ANGLE IN RRSHAFT REVS.B0
R2925            TRUNNION ANGLE IN RRTRUN REVS. B0
R2926     GIMBAL ANGLES  INNER IN AIG
R2927                    MIDDLE IN AMG
R2928                    OUTER IN AOG
R2929     REFSMMAT
R2930     RENDWFLG
R2931     NOANGFLG
R2932     VEHUPFLG

R2933    DEBRIS
R2934     PUSHLIST--ALL
R2935     MX, MY, MZ  (VECTORS)
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R2936     LLC,RXZ,SINTHETA,LGRET,RDRET,BVECTOR,W.IND,X78T


 2937                          13,2207                          BANK    13
 2938   REF   1                26,2000                          SETLOC  P20S3
 2939                          26,2416                          BANK

 2940   REF  29  LAST  567     E7,1456                          EBANK=  LOSCOUNT
 2941   REF   1                                                 COUNT*  $$/LSR22
 2942                          26,2416   77624 1   LSR22.3      CALL
 2943   REF   7  LAST  510     26,2417   11210 1                        GRP2PC
 2944                          26,2420   43014 0                BON     SET
 2945   REF   7  LAST  571     26,2421   04307 1                        SURFFLAG        ARE WE ON LUNAR SURFACE
 2946   REF   1                26,2422   55200 0                        LSR22.4         YES
 2947   REF   1                26,2423   02466 1                        DMENFLG
 2948                          26,2424   45014 0                BOFF    CALL
 2949   REF   6  LAST  504     26,2425   00747 0                        VEHUPFLG
 2950   REF   1                26,2426   54460 1                        DOLEM
 2951   REF  11  LAST  504     26,2427   27410 1                        INTSTALL
 2952                          26,2430   45014 0                CLEAR   CALL            LM PRECISION INTEGRATION
 2953   REF  10  LAST  504     26,2431   01674 0                        VINTFLAG
 2954   REF   4  LAST  504     26,2432   26643 1                        SETIFLGS
 2955                          26,2433   77624 1                CALL
 2956   REF   1                26,2434   55242 0                        INTGRCAL
 2957                          26,2435   77624 1                CALL
 2958   REF   8  LAST  581     26,2436   11210 1                        GRP2PC
 2959                          26,2437   77624 1                CALL
 2960   REF  12  LAST  581     26,2440   27410 1                        INTSTALL
 2961                          26,2441   43014 0                CLEAR   BOFF
 2962   REF   7  LAST  504     26,2442   01676 1                        DIMOFLAG
 2963   REF   5  LAST  504     26,2443   02756 1                        RENDWFLG
 2964   REF   1                26,2444   54450 1                        NOTWCSM
 2965                          26,2445   43014 0                SET     SET             CSM WITH W-MATRIX INTEGRATION
 2966   REF   8  LAST  581     26,2446   01476 0                        DIMOFLAG
 2967   REF   5  LAST  504     26,2447   01475 0                        D6OR9FLG
 2968                          26,2450   43014 0   NOTWCSM      SET     CLEAR
 2969   REF  11  LAST  581     26,2451   01474 1                        VINTFLAG
 2970   REF   3  LAST  498     26,2452   01673 1                        INTYPFLG
 2971                          26,2453   45014 0                SET     CALL
 2972   REF   1                26,2454   01472 1                        STATEFLG
 2973   REF   2  LAST  581     26,2455   55242 0                        INTGRCAL
 2974                          26,2456   77650 1                GOTO
 2975   REF   1                26,2457   54510 1                        MARKTEST
 2976                          26,2460   77624 1   DOLEM        CALL
 2977   REF  13  LAST  581     26,2461   27410 1                        INTSTALL
 2978                          26,2462   45014 0                SET     CALL
 2979   REF  12  LAST  581     26,2463   01474 1                        VINTFLAG
 2980   REF   5  LAST  581     26,2464   26643 1                        SETIFLGS
 2981                          26,2465   77624 1                CALL
 2982   REF   3  LAST  581     26,2466   55242 0                        INTGRCAL
 2983                       26,2467   77624 1              CALL
 2984  REF   9  LAST  581   26,2470   11210 1                       GRP2PC
 2985                       26,2471   77624 1              CALL
 2986  REF  14  LAST  581   26,2472   27410 1                       INTSTALL
 2987                       26,2473   43014 0              CLEAR    BOFF
 2988  REF   9  LAST  581   26,2474   01676 1                       OIMOFLAG
 2989  REF   6  LAST  581   26,2475   02756 1                       RENDWFLG
 2990  REF   1              26,2476   54502 1                       NOTWLEM
 2991                       26,2477   43014 0              SET      SET          LM WITH W-MATRIX INTEGRATION
 2992  REE  10  LAST  582   26,2500   01476 0                       OIMOFLAG
 2993  REF   6  LAST  581   26,2501   01475 0                       060R9FLG
 2994                       26,2502   43014 0   NOTWLEM    CLEAR    CLEAR
 2995  REF   4  LAST  581   26,2503   01673 1                       INTYPFLG
 2996  REF  13  LAST  581   26,2504   01674 0                       VINTFLAG
 2997                       26,2505   45014 0              SET      CALL
 2998  REF   2  LAST  581   26,2506   01472 1                       STATEFLG
 2999  REF   4  LAST  581   26,2507   55242 0                       INTGRCAL
 3000                       26,2510   45014 0   MARKTEST   BCN      CALL         HAS W-MATRIX 8EEN INVALIOATEO
 3001  REF   7  LAST  582   26,2511   02716 0                       RENDWFLG     HAS W-MATRIX 8EEN INVALIOATEO
 3002  REF   1              26,2512   54514 0                       RANGE8Q
 3003  REF   1              26,2513   55251 1                       WLINIT       YES-REINITIALIZE
 3004                       26,2514   77414 0   RANGE8Q    8ON      EXIT         OON'T CALL R65 IF CN SURFACE
 3005  REF   8  LAST  581   26,2515   04307 1                       SURFFLAG
 3006  PEF   1              26,2516   54524 0                       RANGE8Q1
 3007  REF 121  LAST  579   26,2517   3 4755 1             CA       ZERO
 3008  REF   5  LAST  523   26,2520   55'745 1             TS       R65CNTR
 3009  REF 154  LAST  576   26,2521   0 4616 1             TC       BANKCALL
 3010  REF   3  LAST  511   26,2522   46123 0              CACR     R65LFM
 3011  REF  54  LAST  578   26,2523   C 6042 1             TC       INTPRET
 3012                       26,2524   43174 1   RANGE8Q1   AXT,2    8ON           CLEAR X2
 3013                       26,2525   00000 1                       0
 3014  REF   2  LAST   37   26,2526   04304 1                       LMOONFLG     IS MOON SPHERE OF INFLUENCE
 3015  REF   1              26,2527   54532 1                       SETX2        YES. STORE ZERO IN SCALSHFT REGISTER
 3016                       26,2530   77714 0              INCR,2
 3017                       26,2531   00002 0                       2
 3018                       26,2532   45134 0   SETX2      SXA,2    CALL
 3019  REF   2  LAST  147   26,2533   03720 1                       SCALSHFT     0-MOON. 2-EARTH
 3020  REF  10  LAST  582   26,2534   11210 1                       GPP2PC
 3021                       26,2535   66170 1              AXT,1    SXA,1        STORE RANGE COOE (1) FOR R3 IN NOUN 49
 3022                       26,2536   00001 0                       1
 3023  REE   3  LAST  316   26,2537   01356 0                       WHCHREAO
 3024                       26,2540   54335 0              SLOAD    SR           GET SINGLE PRECISION RVARMIN (8-32)
 3025  REF   1              26,2541   01775 0                       RVARMIN      SHIFT TO TRIPLE PRECISION    (8-40)
 3026                       26,2542   20635 0                       280
 3027                       26,2543   77634 0              RT8
 3028  REF   1              26,2544   21634 0                       TPMOOE       ANO SAVE  IN 200
 3029                       26,2545   00025 0              STORE    200
 3030                       26,2546   77624 1              CALL                  BEGIN COMPUTING THE 8-VECTORS,OELTAQ
 3031  REF   1              26,2547   55333 1                       GETULC       8-VECTORS FOR RANGE
 3032                       26,2550   57414 1              8ON      VCOMP        8O, COMP. IF LM 8EING CORRECTEO
 3D33   REF   7  LAST  581   26,2551   007D7 1                  VEHUPFLG
 3034                        26,2552   54553 0                  +1
 3035   REF   2  LAST  147   26,2553   27525 0          STCVL   BVECTOR
 3036   REF   2  LAST   37   26,2554   06524 1                  ZEROVECS
 3037   REF   3  LAST  583   26,2555   03533 1          STCRE   BVECTOR +6       B1
 3D38   REF   4  LAST  583   26,2556   17541 1          STDOL   8VECTDR +120     82
 3039                        26,2557   00045 D                  360
 3040                        26,2560   44257 1          SRR*    BDSU
 3041                        26,2561   56174 D                  2,2              SHIFT FROM EARTH/MCON SPHERE TO B-29
 3D42   REF   5  LAST  576   26,2562   03757 1                  RM               RM - (MAGNITUOE RCSM-RLM)
 3D43                        26,2563   77657 0          SLR*
 3044                        26,2564   56574 1                  2,2              SHIFT TD EARTH/MCON SPHERE
 3045   REF   2  LAST  147   26,2565   17547 1          STCOL   DELTAO           EARTH 8-29. MOON B-27
 3046                        26,2566   00045 0                  360              RLC  8-29/B-27
 3047                        26,2567   63501 0          NORM    DS0              NDRMALIZE ANO SQUARE
 3048   REF   3  LAST  389   26,2570   00047 1                  X1
 3049                        26,2571   53605 1          OMP     SR*
 3D50   REF   1              26,2572   01771 1                  RANGEVAR         MULTIPLY BY RANGEVAR(B12) THEN
 3051                        26,2573   20577 0                  0 -2,1           UNNORMALIZE
 3052                        26,2574   53657 D          SR*     SR*
 3053                        26,2575   20601 1                  0,1
 3054                        26,2576   57176 0                  0,2
 3055                        26,2577   47057 D          SR*     RT8
 3056                        26,26D0   57176 0                  0,2
 3057   REF   2  LAST  582   26,2601   21634 0                  TPMOOE
 3058   REF   2  LAST  127   26,26D2   02707 0          STCRE   VARIANCE         B-40
 3059                        26,2603   76276 0          DCDMP   TAD
 3060                        26,2604   00025 0                  200                B-4D
 3061                        26,2605   7224D 1          BMN     TLCAO
 3062   REF   1              26,2606   54611 0                  QDK
 3063                        26,2607   00D25 0                  200                B-40
 3064   REF   3  LAST  583   26,2610   02707 0          STORE   VARIANCE
 3065                        26,2611   77624 1  QOK     CALL
 3066   REF   1              26,2612   55401 1                  LGCUPOTF

 3D67                        26,2613   45131 0          SSP     CALL
 3068   REF   4  LAST  582   26,2614   01357 1                  WHCHREAD
 3069                        26,2615   000D2 0          DEC     2                STORE R-RATF COOE (2) FDR R3 IN NOUN 49
 307D   REF  11  LAST  582   26,2616   11210 1                  GRP2PC
 3071                        26,2617   77624 1          CALL                     8-VECTDR,DELTAQ FDR RANGE RATE
 3072   REF   2  LAST  582   26,2620   55333 1                  GETULC
 3073                        26,2621   53725 1          POOL    SR*              GET RLC SCALEO 8-29/8-27
 3074                        26,2622   00045 0                  360              ANO SHIFT TO B-23
 3075                        26,2623   57202 0                  0 -4,2
 3076                        26,2624   24045 0          STOVL   360              THEN STORE BACK IN 36D
 3D77                        26,2625   57414 1          8DN     VCOMP            B1, CDMP. IF LM 8EING CORRECTED
 3078   REF   8  LAST  583   26,2626   00707 1                  VEHUPFLG
 3079                        26,2627   5463D D                  +1
 3080                        26,2630   77761 1          VXSC
 3081                        26,2631   00045 0                  36D              B1 = RLC  (B-24/8-22)
 3082  REF   5  LAST  583   26,2632   27533 1          STCVL  BVECTOR +6
 3083  REF   1              26,2633   01653 0                 NUVLEM
 3084                       26,2634   53257 1          VSR*   VAD
 3085                       26,2635   57170 0                 6,2              SHIFT FOR EARTH/MOON SPHERE
 3086  REF   2  LAST  584   26,2636   01667 1                 VCVLEM           EARTH B-7, MOON B-5
 3087                       26,2637   53715 1          PDVL   VSR*             VL TO PD6
 3088  REF   1              26,2640   01601 1                 NUVCSM
 3089                       26,2641   57170 0                 6,2              SHIFT FOR EARTH/MOON SPHERE
 3090                       26,2642   52255 1          VAD    VSU
 3091  REF   1              26,2643   01615 1                 VCVCSM
 3092                       26,2644   50315 0          PDVL   DOT              VC - VL = VLC TO PD6
 3093                       26,2645   00001 0                 0
 3094                       26,2646   00007 0                 6
 3095                       26,2647   53606 1          PUSH   SRR*             ROOT B-8/B-6 TO PD12
 3096                       26,2650   56174 0                 2,2              SHIFT FROM EARTH/MOON SPHERE TO B-8
 3097                       26,2651   57316 1          DSQ    DMPR             ROOT**2 B-16 X RATEVAR B12
 3098  REF   1              26,2652   01773 0                 RATEVAR
 3099  REF   4  LAST  583   26,2653   02707 0          STORE  VARIANCE
 3100                       26,2654   54335 0          SLOAD  SR
 3101  REF   1              26,2655   01776 0                 VVARMIN          GET SINGLE PRECISION VVARMIN (B+12)
 3102                       26,2656   20621 0                 16D              SHIFT TO DP (B -4)
 3103                       26,2657   00031 0          STORE  24D              AND SAVE IN 24D
 3104                       26,2660   50025 0          DSU    BMN              IS MIN. VARIANCE > COMPUTED VARIANCE
 3105  REF   5  LAST  584   26,2661   02707 0                 VARIANCE
 3106  REF   1              26,2662   54666 0                 VOK              BRANCH - NO
 3107                       26,2663   77745 1          DLOAD                   YES - USE MINIMUM VARIANCE
 3108                       26,2664   00031 0                 24D
 3109  REF   6  LAST  584   26,2665   02707 0          STORE  VARIANCE
 3110                       26,2666   60545 0  VOK     DLOAD  SR2              ROOT(PD12) FROM B-8/B-6
 3111                       26,2667   53725 1          PDDL   SLR*             TO B-10/B-8
 3112  REF   4  LAST  576   26,2670   03751 1                 ROOTM            SHIFT TO EARTH/MOON SPHERE
 3113                       26,2671   56577 1                 0 -1,2           B-7 TO B-10/B-8
 3114                       26,2672   77625 0          DSU
 3115                       26,2673   77675 0          DMPR
 3116                       26,2674   00045 0                 36D
 3117  REF   3  LAST  583   26,2675   27547 1          STCVL  DELTAQ             B-33
 3118                       26,2676   00001 0                 0                NOW GET B0
 3119                       26,2677   47235 0          VXV    VXV              (ULC X VLC) X ULC
 3120                       26,2700   57414 1          BON    VCOMP            B0, COMP. IF LM BEING CORRECTED
 3121  REF   9  LAST  583   26,2701   00707 1                 VEHUPFLG
 3122                       26,2702   54703 1                 +1
 3123                       26,2703   77657 0          VSR*
 3124                       26,2704   57200 1                 0 -2,2           SCALED B-5
 3125  REF   6  LAST  584   26,2705   27525 0          STCVL  BVECTOR
 3126  REF   3  LAST  583   26,2706   06524 1                 ZEROVECS
 3127                       26,2707   00025 0          STORE  20D              ZERO OUT 20 TO 25 IN PUSHLIST
 3128  REF   7  LAST  584   26,2710   27541 1          STOVL  BVECTOR +12D
 3129  REF   8  LAST  584   26,2711   03525 0                 BVECTOR
 3130                       26,2712   60246 1          ABVAL  NORM             LOAD B0, GET MAGNITUDE AND NORMALIZE
 3131                       26,2713   00025 0                 20D              SHIFT COUNT IN 20D
 3132                          26,2714    51575 1               VLOAD   ABVAL
 3133     REF   9  LAST  584   26,2715    03533 1                       BVECTOR +60    LOAD B1, GET MAGNITUDE AND NORMALIZE
 3134                          26,2716    71301 0               NORM    DLOAD
 3135                          26,2717    00027 1                       22D            SHIFT COUNT IN 22D
 3136                          26,2720    00027 1                       22D            FIND WHICH SHIFT IS SMALLER
 3137                          26,2721    50025 0               DSU     BMN            BRANCH- B0 HAS SMALLER SHIFT COUNT
 3138                          26,2722    00025 0                       20D
 3139     REF   1              26,2723    54727 1                       VOK1
 3140                          26,2724    52150 1               LXA,1   GOTO
 3141                          26,2725    00026 0                       22D            LOAD X2 WITH THE SMALLER SHIFT COUNT
 3142     REF   1              26,2726    54731 0                       VOK2
 3143                          26,2727    77750 0   VOK1        LXA,1
 3144                          26,2730    00024 1                       20D
 3145                          26,2731    53775 1   VOK2        VLOAD   VSL*           THEN ADJUST B0,B1,DELTAQ AND VARIANCE
 3146     REF  10  LAST  585   26,2732    03525 0                       BVECTOR        WITH THIS SHIFT COUNT
 3147                          26,2733    20201 0                       0,1
 3148     REF  11  LAST  585   26,2734    27525 0               STOVL   BVECTOR
 3149     REF  12  LAST  585   26,2735    03533 1                       BVECTOR +6
 3150                          26,2736    77657 0               VSL*
 3151                          26,2737    20201 0                       0,1
 3152     REF  13  LAST  585   26,2740    17533 1               STODL   BVECTOR +6
 3153     REF   4  LAST  584   26,2741    03547 1                       DELTAQ
 3154                          26,2742    77657 0               SL*
 3155                          26,2743    20201 0                       0,1
 3156     REF   5  LAST  585   26,2744    03547 1               STORE   DELTAQ
 3157                          26,2745    53745 1               DLOAD   SL*            GET RLC AND ADJUST FOR SCALE SHIFT
 3158                          26,2746    00045 0                       36D
 3159                          26,2747    20200 1                       0 -1,1
 3160                          26,2750    41316 0               DSQ     DMP            MULTIPLY RLC**2 BY VARIANCE
 3161     REF   7  LAST  584   26,2751    02707 0                       VARIANCE
 3162                          26,2752    47012 1               SL4     RTB            SHIFT TO CONFORM TO BVECTORS AND DELTAQ
 3163     REF   3  LAST  583   26,2753    21634 0                       TPMODE
 3164     REF   8  LAST  585   26,2754    36707 1               STCALL  VARIANCE       AND STORE TP VARIANCE
 3165     REF   2  LAST  583   26,2755    55401 1                       LGCUPDTE

 3166                          26,2756    77624 1               CALL
 3167     REF  12  LAST  583   26,2757    11210 1                       GRP2PC
 3168                          26,2760    77414 0               BON     EXIT           ARE ANGLES TO BE DONE
 3169     REF   9  LAST  582   26,2761    04307 1                       SURFFLAG
 3170     REF   1              26,2762    55176 1                       RENDEND        NO
 3171     REF   5  LAST  576   E7,1457                          EBANK=  AIG
 3172     REF   1              26,2763   3 3332 0   MXMYMZ      CAF     AIGBANK
 3173     REF  14  LAST  460   26,2764   54 0006 0              TS      BBANK
 3174     REF   6  LAST  585   26,2765   3 1457 0               CA      AIG            YES, COMPUTE  MX, MY, MZ
 3175     REF  13  LAST  576   26,2766   54 765 1               TS      CDUSPOT
 3176     REF   2  LAST  576   26,2767   3 1460 1               CA      AMG
 3177     REF  14  LAST  585   26,2770   54 767 0               TS      CDUSPOT +2
 3178     REF   5  LAST  576   26,2771   3 1461 0               CA      AOG
 3179     REF  15  LAST  585   26,2772   54 771 1               TS      CDUSPOT +4     GIMBL ANGLES NOW IN CDUSPOT FOR TRG*NBSM
 3180     REF  55  LAST  582   26,2773   0 6042 1               TC      INTPRET
 3181                           26,2774   45175 0             VLOAD   CALL
 3182   REF    5  LAST  341     26,2775   06522 1                     UNITX
 3183   REF    4  LAST  254     26,2776   47666 1                     TRG*NBSM
 3184                           26,2777   76505 0             VXM     VSL1
 3185   REF   10  LAST  571     26,3000   01734 0                     REFSMMAT
 3186   REF    5  LAST  147     26,3001   27677 1             STOVL   MX
 3187   REF    3  LAST  302     26,3002   06520 0                     UNITY
 3188                           26,3003   77624 1             CALL
 3189   REF    2  LAST  554     26,3004   47675 0                     *NBSM*
 3190                           26,3005   76505 0             VXM     VSL1
 3191   REF   11  LAST  586     26,3006   01734 0                     REFSMMAT
 3192   REF    2  LAST  147     26,3007   27705 0             STOVL   MY
 3193   REF    5  LAST  342     26,3010   06516 0                     UNITZ
 3194                           26,3011   77624 1             CALL
 3195   REF    3  LAST  586     26,3012   47675 0                     *NBSM*
 3196                           26,3013   76505 0             VXM     VSL1
 3197   REF   12  LAST  586     26,3014   01734 0                     REFSMMAT
 3198   REF    2  LAST  147     26,3015   37713 0   SHAFTBC   STCALL  MZ
 3199   REF    1                26,3016   55361 0                     RADARANG
 3200                           26,3017   77331 0             SSP     VLOAD           STORE SHAFT CODE (3) FOR R3 IN NOUN 49
 3201   REF    5  LAST  583     26,3020   01357 1                     WHCHREAD
 3202                           26,3021   00003 1             DEC     3
 3203   REF    2  LAST  147     26,3022   03724 0                     ULC
 3204                           26,3023   72441 0             DOT     SL1
 3205   REF    6  LAST  586     26,3024   03677 1                     MX
 3206   REF    6  LAST  482     26,3025   24023 0             STOVL   SINTH           18D
 3207   REF    3  LAST  586     26,3026   03724 0                     ULC
 3208                           26,3027   72441 0             DOT     SL1
 3209   REF    3  LAST  586     26,3030   03713 1                     MZ
 3210   REF    6  LAST  482     26,3031   34021 0             STCALL  COSTH           16D
 3211   REF    3  LAST  482     26,3032   26506 0                     ARCTAN
 3212                           26,3033   41221 0             BDSU    DMP
 3213   REF    3  LAST  576     26,3034   03736 0                     RRSHAFT
 3214   REF    1                26,3035   15441 1                     2PI/8
 3215                           26,3036   41472 0             SL3R    PUSH
 3216                           26,3037   52545 1             DLOAD   SL3
 3217   REF    2  LAST  198     26,3040   01701 0                     X789
 3218                           26,3041   44257 1             SRR*    BDSU            SHIFT FROM -5/-3 TO B0
 3219                           26,3042   56176 1                     0,2
 3220                           26,3043   53605 1             DMP     SRR*
 3221   REF    2  LAST  147     26,3044   03722 0                     RXZ
 3222                           26,3045   21601 0                     0,1             SHIFT TO EARTH/MOON SPHERE
 3223   REF    6  LAST  585     26,3046   27547 1             STOVL   DELTAQ          EARTH B-29. MOON B-27
 3224   REF    4  LAST  586     26,3047   03724 0                     ULC
 3225                           26,3050   76435 1             VXV     VSL1
 3226   REF    3  LAST  586     26,3051   03705 0                     MY
 3227                           26,3052   77656 1             UNIT
 3228                           26,3053   57414 1             BOFF    VCOMP           B0, COMP. IF CSM BEING CORRECTED
 3229   REF   10  LAST  584     26,3054   00747 0                     VEHUPFLG
 3230                           26,3055   55056 1                     +1
 3231   REF  14  LAST  585    26,3056   27525 0           STOVL  BVECTOR
 3232   REF   4  LAST  584    26,3057   06524 1                  ZEROVECS
 3233   REF  15  LAST  587    26,3060   03533 1           STORE  BVECTOR +6
 3234   REF  16  LAST  587    26,3061   17541 1           STODL  BVECTOR +12D
 3235   REF   3  LAST  586    26,3062   03722 0                  RXZ
 3236                         26,3063   53657 0           SR*    SRR*            SHIFT FROM EARTH/MOON SPHERE TO B-25
 3237                         26,3064   20577 0                  0 -2,1
 3238                         26,3065   56176 1                  0,2
 3239   REF  17  LAST  587    26,3066   03541 1           STORE  BVECTOR +12D
 3240                         26,3067   77735 0           SLOAD
 3241   REF   1               26,3070   02011 0                  SHAFTVAR
 3242                         26,3071   41215 1           DAD    DMP
 3243   REF   1               26,3072   15436 1                  IMUVAR          RAD**2 B12
 3244   REF   4  LAST  587    26,3073   03722 0                  RXZ
 3245                         26,3074   41257 1           SRR*   DMP
 3246                         26,3075   21601 0                  0,1             SHIFT TO EARTH/MOON SPHERE
 3247   REF   5  LAST  587    26,3076   03722 0                  RXZ
 3248                         26,3077   53657 0           SR*    SR*
 3249                         26,3100   20577 0                  0 -2,1
 3250                         26,3101   57176 0                  0,2
 3251                         26,3102   47057 0           SR*    RTB
 3252                         26,3103   57176 0                  0,2
 3253   REF   4  LAST  585    26,3104   21634 0                  TPMODE          STORE VARIANCE TRIPLE PRECISION
 3254   REF   9  LAST  585    26,3105   36707 1           STCALL VARIANCE        B-40
 3255   REF   3  LAST  585    26,3106   55401 1                  LGCUPDTE

 3256                         26,3107   77624 1           CALL
 3257   REF  13  LAST  585    26,3110   11210 1                  GRP2PC
 3258                         26,3111   77624 1  TRUNBQ   CALL
 3259   REF   2  LAST  586    26,3112   55361 0                  RADARANG
 3260                         26,3113   77331 0           SSP    VLOAD           STORE TRUNNION CODE (4) FOR R3 IN N49
 3261   REF   6  LAST  586    26,3114   01357 1                  WHCHREAD
 3262                         26,3115   00004 0           DEC    4
 3263   REF   5  LAST  586    26,3116   03724 0                  ULC
 3264                         26,3117   76435 1           VXV    VSL1
 3265   REF   4  LAST  586    26,3120   03705 0                  MY
 3266                         26,3121   76435 1           VXV    VSL1            (ULC X MY) X ULC
 3267   REF   6  LAST  587    26,3122   03724 0                  ULC
 3268                         26,3123   57414 1           BOFF   VCOMP           GO, COMP. IF CSM BEING CORRECTED
 3269   REF  11  LAST  586    26,3124   00747 0                  VEHUPFLG
 3270                         26,3125   55126 1                  +1
 3271   REF  18  LAST  587    26,3126   27525 0           STOVL  BVECTOR
 3272   REF   5  LAST  587    26,3127   06524 1                  ZEROVECS
 3273   REF  19  LAST  587    26,3130   03533 1           STORE  BVECTOR +6
 3274   REF  20  LAST  587    26,3131   17541 1           STODL  BVECTOR +12D
 3275   REF   6  LAST  587    26,3132   03722 0                  RXZ
 3276                         26,3133   53657 0           SR*    SRR*            SHIFT FROM EARTH/MOON SPHERE TO B-25
 3277                         26,3134   20577 0                  0 -2,1
 3278                         26,3135   56176 1                  0,2
 3279   REF  21  LAST  587    26,3136   03543 0           STORE  BVECTOR +14D
 3280                        26,3137   77735 0             SLOAO
 3281   REF   1              26,3140   02012 0                     TRUNVAR
 3282                        26,3141   41215 1             DAO     OMP
 3283   REF   2  LAST  587   26,3142   15436 1                     IMUVAR
 3284   REF   7  LAST  537   26,3143   03722 0                     RXZ
 3285                        26,3144   41257 1             SRR*    OMP
 3286                        26,3145   21601 0                     0,1              SHIFT TO EARTH/MOON SPHERE
 3287   REF   8  LAST  588   26,3146   03722 0                     RXZ
 3288                        26,3147   53657 0             SR*     SR*
 3289                        26,3150   20577 0                     0 -2,1
 3290                        26,3151   57176 0                     0,2
 3291                        26,3152   47057 0             SR*     RT8
 3292                        26,3153   57176 0                     0,2
 3293   REF   5  LAST  587   26,3154   21634 0                     TPMOOE           STORE VARIANCE TRIPLE PRECISION
 3294   REF  10  LAST  587   26,3155   16707 0             STOOL   VARIANCE
 3295   REF   2  LAST  148   26,3156   03732 1                     SINTHETA
 3296                        26,3157   44336 1             ASIN    8OSU             SIN  THETA IN PO6
 3297   REF   3  LAST  576   26,3160   03734 1                     FRTRUN
 3298                        26,3161   56405 0             OMP     SL3R
 3299   REF   2  LAST  586   26,3162   15441 1                     2PI/8
 3300                        26,3163   52525 1             POOL    SL3
 3301   REF   3  LAST  586   26,3164   01703 1                     X789 +2
 3302                        26,3165   44257 1             SRP*    BOSU             SHIFT FROM -5/-3 TO 80
 3303                        26,3166   56176 1                     0,2
 3304                        26,3167   53605 1             OMP     SRR*
 3305   REF   9  LAST  588   26,3170   03722 0                     RXZ
 3306                        26,3171   21601 0                     0,1
 3307   REF   7  LAST  586   26,3172   37547 0             STCALL  OELTAQ           FARTH 8-29. MOON 8-27
 3308   REF   4  LAST  587   26,3173   55401 1                     LGCUPOTE
 3309                        26,3174   77624 1             CALL
 3310   REF  14  LAST  587   26,3175   11210 1                     GRP2PC
 3311                        26,3176   77650 1   RENOEND   GOTO
 3312   REF   1              26,3177   50562 0                     P22LEM93
R3313   FUNCTIONAL OESCRIPTION

R3314   LSR22.4 IS THE ENTRY TO PERFORM LUNAR SURFACE NAVIGATION FOR THE LM
R3315   COMPUTER ONLY. THIS ROUTINE COMPUTES THE B-VECTORS AND DELTA Q FOR RANGE
R3316   AND RANGE RATE MEASUREO BY THE RENOEZVOUS RAOAR

R3317   SUBROUTINES CALLEO
R3318    INSTALL   LGCUPOTE  INCORP1   RP-TO-R
R3319    INTEGRV   GETULC    INCORP2

R3320   OUTPUT
R3321    CORRECTEO CSM STATE VECTOR (PERMANENT)
R3322    NUMBER OF MARKS INCORPORATEC IN MARKCTR
R3323    MAGNITUOE OF POSITION OEVIATION (FOR DISPLAY) IN R22OISP METERS B-29
R3324    MAGNITUDE OF VELOCITY OEVIATION (FOR OISPLAY) IN R22OISP +2 M/CSEC 8-7
R3325    UPDATEO W-MATRIX
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L       R20-R25                                                                              USER'S PAGE NO.  94      E7 S3

R3326    ERASABLE INITIALIZATION REQUIRED
R3327     LM AND CSM STATE VECTORS
R3328     W-MATRIX
R3329     MARK TIME IN MKTIME
R3330     RADAR RANGE IN RM METERS B-29
R3331           RANGE RATE IN RDOTM METERS/CSEC B-7
R3332     VEHUPFLG


 3333                               26,3200 · 77624 1  LSR22.4  CALL
 3334    REF  15  LAST  582         26,3201   27410 1                  INTSTALL
 3335                               26,3202   43014 0           SET    CLEAR
 3336    REF   3  LAST  582         26,3203   01472 1                  STATEFLG
 3337    REF  14  LAST  582         26,3204   01674 0                  VINTFLAG        CALL TO GET LM POS + VEL IN REF COORD.
 3338                               26,3205   77624 1           CALL
 3339    REF   5  LAST  582         26,3206   55242 0                  INTGRCAL
 3340                               26,3207   77624 1           CALL
 3341    REF  15  LAST  588         26,3210   11210 1                  GRP2PC
 3342                               26,3211   45014 0           CLEAR  CALL
 3343    REF   2  LAST  581         26,3212   02666 0                  OMENFLG         SET MATRIX SIZE TO 6X6 FOR INCORR
 3344    REF  16  LAST  589         26,3213   27410 1                  INTSTALL
 3345                               26,3214   46145 0           DLOAD  BHIZ            IS THIS FIRST TIME THROUGH
 3346    REF   3  LAST  510         26,3215   03463 0                  MARKCTR
 3347    REF   1                    26,3216   55231 1                  INITWMX6        YES. INITIALIZE 6X6 W-MATRIX
 3348                               26,3217   43014 0           CLEAR  SET
 3349    REF   7  LAST  582         26,3220   01675 1                  D6OR9FLG
 3350    REF  11  LAST  582         26,3221   01476 0                  DIMOFLAG
 3351                               26,3222   43014 0           SET    CLEAR
 3352    REF  15  LAST  589         26,3223   01474 1                  VINTFLAG
 3353    REF   5  LAST  582         26,3224   01673 1                  INTYPFLG
 3354                               26,3225   77624 1           CALL
 3355    REF   6  LAST  589         26,3226   55242 0                  INTGRCAL
 3356                               26,3227   77650 1            GOTO
 3357    REF   2  LAST  582         26,3230   54514 0                  RANGEBQ

 3358                               26,3231   77624 1  INITWMX6 CALL
 3359    REF   2  LAST  582         26,3232   55251 1                  WLINIT          INITIALIZE W-MATRIX
 3360                               26,3233   45014 0           SET    CALL
 3361    REF  16  LAST  589         26,3234   01474 1                  VINTFLAG
 3362    REF   6  LAST  581         26,3235   26643 1                  SETIFLGS
 3363                               26,3236   77624 1           CALL
 3364    REF   7  LAST  589         26,3237   55242 0                  INTGRCAL
 3365                               26,3240   77650 1           GOTO
 3366    REF   3  LAST  589         26,3241   54514 0                  RANGEBQ

R3367    THIS ROUTINE CLEARS RFINAL (DP) AND CALLS INTEGRV

 3368                               26,3242   71220 1  INTGRCAL STO    DLOAD
 3369    REF   1                    26,3243   03675 0                  IGRET
 3370    REF   6  LAST  576         26,3244   03755 0                  MKTIME
 3371    REF  18  LAST  576   26,3245   34041 0           STCALL  TDEC1
 3372    REF   8  LAST  504   26,3246   27133 0                   INTEGRV
 3373                         26,3247   77650 1           GOTO
 3374    REF   2  LAST  589   26,3250   03675 0                   IGRET

R3375    THIS ROUTINE INITIALIZES THE W-MATRIX BY ZEROING ALL W THEN SETTING
R3376    CIAGCNAL ELEMENTS TO INITIAL STORED VALUES.

 3377    REF   4  LAST  128   E5,1400                     EBANK=  W
 3378                         26,3251   77776 1  WLINIT   EXIT
 3379    REF   1              26,3252  3 ?331 0           CAF     WBANK
 3380    REF  15  LAST  585   26,3253  54 C06 0           TS      BBANK
 3381    PEF   1              26,3254  3 3437 1           CAE     WSIZE
 3382    REF   2  LAST  107   26,3255  55'256 0           TS      W.IND
 3383    REF 122  LAST  582   26,3256  3 4755 1           CAF     ZERC
 [illegible]                                    1           [illegible]
 UNIT NAME -00E-. TYPE ID -PN  -  MODE -NO FOLD-

1234567890XY/STUVW|:_",=JKLMNOPQR-Z(ABCDEFGHI+.)%$*#&@<;¬'?>1234567890XY/STUVW|:_",=JKLMNOPQR-Z(ABCDEFGHI+.)%$*#&@<;¬'?>
1234567890XY/STUVW|:_",=JKLMNOPQR-Z(ABCDEFGHI+.)%$*#&@<;¬'?>1234567890XY/STUVW|:_",=JKLMNOPQR-Z(ABCDEFGHI+.)%$*#&@<;¬'?>
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 2983                          26,2467   77624 1              CALL
 2984   REF   9  LAST   581    26,2470   11210 1                     GRP2PC
 2985                          26,2471   77624 1              CALL
 2986   REF  14  LAST   581    26,2472   27410 1                     INTSTALL
 2987                          26,2473   43014 0              CLEAR  BOFF
 2988   REF   9  LAST   581    26,2474   01676 1                     DIMOFLAG
 2989   REF   6  LAST   581    26,2475   02756 1                     RENOWFLG
 2990   REF   1                26,2476   54502 1                     NOTWLEM
 2991                          26,2477   43014 0              SET    SET             LM WITH W-MATRIX INTEGRATION
 2992   REF  10  LAST   582    26,2500   01476 0                     DIMOFLAG
 2993   REF   6  LAST   581    26,2501   01475 0                     D6OR9FLG
 2994                          26,2502   43014 0   NOTWLEM    CLEAR  CLEAR
 2995   REF   4  LAST   581    26,2503   01673 1                     INTYPFLG
 2996   REF  13  LAST   581    26,2504   01674 0                     VINTFLAG
 2997                          26,2505   45014 0              SET    CALL
 2998   REF   2  LAST   581    26,2506   01472 1                     STATEFLG
 2999   REF   4  LAST   581    26,2507   55242 0                     INTGRCAL
 3000                          26,2510   45014 0   MARKTEST   BON    CALL            HAS W-MATRIX BEEN INVALIDATED
 3001   REF   7  LAST   582    26,2511   02716 0                     RENOWFLG        HAS W-MATRIX BEEN INVALIDATED
 3002   REF   1                26,2512   54514 0                     RANGEBQ
 3003   REF   1                26,2513   55251 1                     WLINIT          YES-REINITIALIZE
 3004                          26,2514   77414 0   RANGEBQ    BON    EXIT            DON'T CALL R65 IF ON SURFACE
 3005   REF   8  LAST   581    26,2515   04307 1                     SURFFLAG
 3006   REF   1                26,2516   54524 0                     RANGEBQ1
 3007   REF 121  LAST   579    26,2517   3 4755 1             CA     ZERO
 3008   REF   5  LAST   523    26,2520   55'745 1             TS     R65CNTR
 3009   REF 154  LAST   576    26,2521   0 4616 1             TC     BANKCALL
 3010   REF   3  LAST   511    26,2522   46123 0              CADR   R65LEM
 3011   REF  54  LAST   578    26,2523   0 6042 1             TC     INTPRET
 3012                          26,2524   43174 1   RANGEBQ1   AXT,2  BON              CLEAR X2
 3013                          26,2525   00000 1                     0
 3014   REF   2  LAST    37    26,2526   04304 1                     LMOONFLG        IS MOON SPHERE OF INFLUENCE
 3015   REF   1                26,2527   54532 1                     SETX2           YES, STORE ZERO IN SCALSHFT REGISTER
 3016                          26,2530   77714 0              INCR,2
 3017                          26,2531   00002 0                     2
 3018                          26,2532   45134 0   SETX2      SXA,2  CALL
 3019   REF   2  LAST   147    26,2533   03720 1                     SCALSHFT        0-MOON, 2-EARTH
 3020   REF  10  LAST   582    26,2534   11210 1                     GRP2PC
 3021                          26,2535   66170 1              AXT,1  SXA,1           STORE RANGE CODE (1) FOR R3 IN NOUN 49
 3022                          26,2536   00001 0                     1
 3023   REF   3  LAST   316    26,2537   01356 0                     WHCHREAD
 3024                          26,2540   54335 0              SLOAD  SR              GET SINGLE PRECISION RVARMIN (B-12)
 3025   REF   1                26,2541   01775 0                     RVARMIN         SHIFT TO TRIPLE PRECISION    (B-40)
 3026                          26,2542   20635 0                     28D
 3027                          26,2543   77634 0              RTB
 3028   REF   1                26,2544   21634 0                     TPMODE          AND SAVE  IN 20D
 3029                          26,2545   00025 0              STORE  20D
 3030                          26,2546   77624 1              CALL                   BEGIN COMPUTING THE B-VECTORS,DELTAQ
 3031   REF   1                26,2547   55333 1                     GETULC          B-VECTORS FOR RANGE
 3032                          26,2550   57414 1              BON    VCOMP           BO, COMP. IF LM BEING CORRECTED
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  3033   REF    7  LAST   581    26,2551    00707 1                  VEHUPFLG
  3034                           26,2552    54553 0                  +1
  3035   REF    2  LAST   147    26,2553    27525 0          STOVL   BVECTOR
  3036   REF    2  LAST    37    26,2554    06524 1                  ZEROVECS
  3037   REF    3  LAST   563    26,2555    03533 1          STORE   BVECTOR +6         B1
  3038   REF    4  LAST   583    26,2556    17541 1          STODL   BVECTOR +12D       B2
  3039                           26,2557    00045 0                  36D
  3040                           26,2560    44257 1          SRR*    BDSU
  3041                           26,2561    56174 0                  2,2                SHIFT FROM EARTH/MOON SPHERE TO B-29
  3042   REF    5  LAST   576    26,2562    03757 1                  RM                 RM - (MAGNITUDE RCSM-RLM)
  3043                           26,2563    77657 0          SLR*
  3044                           26,2564    56574 1                  2,2                SHIFT TO EARTH/MOON SPHERE
  3045   REF    2  LAST   147    26,2565    17547 1          STODL   DELTAQ             EARTH B-29. MOON B-27
  3046                           26,2566    00045 0                  36D                RLC  B-29/B-27
  3047                           26,2567    63501 0          NORM    DSQ                NORMALIZE AND SQUARE
  3048   REF    3  LAST   389    26,2570    00047 1                  X1
  3049                           26,2571    53605 1          DMP     SR*
  3050   REF    1                26,2572    01771 1                  RANGEVAR           MULTIPLY BY RANGEVAR(B12) THEN
  3051                           26,2573    20577 0                  0 -2,1             UNNORMALIZE
  3052                           26,2574    53657 0          SR*     SR*
  3053                           26,2575    20601 1                  0,1
  3054                           26,2576    57176 0                  0,2
  3055                           26,2577    47057 0          SR*     RTB
  3056                           26,2600    57176 0                  0,2
  3057   REF    2  LAST   582    26,2601    21634 0                  TPMODE
  3058   REF    2  LAST   127    26,2602    02707 0          STORE   VARIANCE           B-40
  3059                           26,2603    76276 0          DCOMP   TAD
  3060                           26,2604    00025 0                  20D                  B-40
  3061                           26,2605    72240 1          BMN     TLCAD
  3062   REF    1                26,2606    54611 0                  QOK
  3063                           26,2607    00025 0                  20D                  B-40
  3064   REF    3  LAST   583    26,2610    02707 0          STORE   VARIANCE
  3065                           26,2611    77624 1   QOK    CALL
  3066   REF    1                26,2612    55401 1                  LGCUPDTE

  3067                           26,2613    45131 0          SSP     CALL
  3068   REF    4  LAST   582    26,2614    01357 1                  WHCHREAD
  3069                           26,2615    00002 0          DEC     2                  STORE R-RATE CODE (2) FOR R3 IN NOUN 49
  3070   REF   11  LAST   582    26,2616    11210 1                  GRP2PC
  3071                           26,2617    77624 1          CALL                       B-VECTOR,DELTAQ FOR RANGE RATE
  3072   REF    2  LAST   582    26,2620    55333 1                  GETULC
  3073                           26,2621    53725 1          DLOAD   SR*                GET RLC SCALED B-29/B-27
  3074                           26,2622    00045 0                  36D                AND SHIFT TO B-23
  3075                           26,2623    57202 0                  0 -4,2
  3076                           26,2624    24045 0          STOVL   36D                THEN STORE BACK IN 36D
  3077                           26,2625    57414 1          BON     VCOMP              B1, COMP. IF LM BEING CORRECTED
  3078   REF    8  LAST   583    26,2626    00707 1                  VEHUPFLG
  3079                           26,2627    54630 0                  +1
  3080                           26,2630    77761 1          VXSC
  3081                           26,2631    00045 0                  36D                B1 = RLC  (B-24/B-22)
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 3082   REF   5  LAST  583   26,2632   27533 1          STOVL   BVECTOR +6
 3083   REF   1              26,2633   01653 0                  NUVLEM
 3084                        26,2634   53257 1          VSR*    VAD
 3085                        26,2635   57170 0                  6,2             SHIFT FOR EARTH/MOON SPHERE
 3086   REF   2  LAST  504   26,2636   01667 1                  VCVLEM          EARTH B-7. MOON B-5
 3087                        26,2637   53715 1          PDVL    VSR*            VL TO PD6
 3088   REF   1              26,2640   01601 1                  NUVCSM
 3089                        26,2641   57170 0                  6,2             SHIFT FOR EARTH/MOON SPHERE
 3090                        26,2642   52255 1          VAD     VSU
 3091   REF   1              26,2643   01615 1                  VCVCSM
 3092                        26,2644   50315 0          PDVL    DOT             VC - VL = VLC TO PD6
 3093                        26,2645   00001 0                  0
 3094                        26,2646   00007 0                  6
 3095                        26,2647   53606 1          PUSH    SRR*            ROOT B-8/B-6 TO PD12
 3096                        26,2650   56174 0                  2,2             SHIFT FROM EARTH/MOON SPHERE TO B-8
 3097                        26,2651   57316 1          DSQ     DMPR            ROOT**2 B-16 X RATEVAR B12
 3098   REF   1              26,2652   01773 0                  RATEVAR
 3099   REF   4  LAST  583   26,2653   02707 0          STORE   VARIANCE
 3100                        26,2654   54335 0          SLOAD   SR
 3101   REF   1              26,2655   01776 0                  VVARMIN         GET SINGLE PRECISION VVARMIN (B+12)
 3102                        26,2656   20621 0                  16D             SHIFT TO DP (B -4)
 3103                        26,2657   00031 0          STORE   24D             AND SAVE IN 24D
 3104                        26,2660   50025 0          DSU     BMN             IS MIN. VARIANCE > COMPUTED VARIANCE
 3105   REF   5  LAST  584   26,2661   02707 0                  VARIANCE
 3106   REF   1              26,2662   54666 0                  VOK             BRANCH - NO
 3107                        26,2663   77745 1          DLOAD                   YES - USE MINIMUM VARIANCE
 3108                        26,2664   00031 0                  24D
 3109   REF   6  LAST  584   26,2665   02707 0          STORE   VARIANCE
 3110                        26,2666   60545 0  VOK     DLOAD   SR2             ROOT(PD12) FROM B-8/B-6
 3111                        26,2667   53725 1          PDDL    SLR*            TO B-10/B-8
 3112   REF   4  LAST  576   26,2670   03751 1                  ROOTM           SHIFT TO EARTH/MOON SPHERE
 3113                        26,2671   56577 1                  0 -1,2          B-7 TO B-10/B-8
 3114                        26,2672   77625 0          DSU
 3115                        26,2673   77675 0          DMPR
 3116                        26,2674   00045 0                  36D
 3117   REF   3  LAST  583   26,2675   27547 1          STOVL   DELTAQ            B-33
 3118                        26,2676   00001 0                  0               NOW GET B0
 3119                        26,2677   47235 0          VXV     VXV             (ULC X VLC) X ULC
 3120                        26,2700   57414 1          BON     VCOMP           B0, COMP. IF LM BEING CORRECTED
 3121   REF   9  LAST  583   26,2701   00707 1                  VEHUPFLG
 3122                        26,2702   54703 1                  +1
 3123                        26,2703   77657 0          VSR*
 3124                        26,2704   57200 1                  0 -2,2          SCALED B-5
 3125   REF   6  LAST  584   26,2705   27525 0          STOVL   BVECTOR
 3126   REF   3  LAST  583   26,2706   06524 1                  ZEROVECS
 3127                        26,2707   00025 0          STORE   20D             ZERO OUT 20 TO 25 IN PUSHLIST
 3128   REF   7  LAST  584   26,2710   27541 1          STOVL   BVECTOR +12D
 3129   REF   8  LAST  584   26,2711   03525 0                  BVECTOR
 3130                        26,2712   60246 1          ABVAL   NORM            LOAD B0, GET MAGNITUDE AND NORMALIZE
 3131                        26,2713   00025 0                  20D             SHIFT COUNT IN 20D
 3132                         26,2714   51575 1            VLOAD   ABVAL
 3133   REF    9  LAST  584   26,2715   03533 1                    BVECTOR +60     LOAD B1, GET MAGNITUDE AND NORMALIZE
 3134                         26,2716   71301 0            NORM    DLOAD
 3135                         26,2717   00027 1                    220             SHIFT COUNT IN 220
 3136                         26,2720   00027 1                    220             FIND WHICH SHIFT IS SMALLER
 3137                         26,2721   50025 0            DSU     BMN             BRANCH- B0 HAS SMALLER SHIFT COUNT
 3138                         26,2722   00025 0                    200
 3139   REF    1              26,2723   54727 1                    VOK1
 3140                         26,2724   52150 1            LXA,1   GOTO
 3141                         26,2725   00026 0                    220             LOAD X2 WITH THE SMALLER SHIFT COUNT
 3142   REF    1              26,2726   54731 0                    VOK2
 3143                         26,2727   77750 0   VOK1     LXA,1
 3144                         26,2730   00024 1                    200
 3145                         26,2731   53775 1   VOK2     VLOAD   VSL*            THEN ADJUST B0,B1,DELTAQ AND VARIANCE
 3146   REF   10  LAST  585   26,2732   03525 0                    BVECTOR         WITH THIS SHIFT COUNT
 3147                         26,2733   20201 0                    0,1
 3148   REF   11  LAST  585   26,2734   27525 0            STCVL   BVECTOR
 3149   REF   12  LAST  585   26,2735   03533 1                    BVECTOR +6
 3150                         26,2736   77657 0            VSL*
 3151                         26,2737   20261 0                    0,1
 3152   REF   13  LAST  585   26,2740   17533 1            STODL   BVECTOR +6
 3153   REF    4  LAST  584   26,2741   03547 1                    DELTAQ
 3154                         26,2742   77657 0            SL*
 3155                         26,2743   20201 0                    0,1
 3156   REF    5  LAST  585   26,2744   03547 1            STORE   DELTAQ
 3157                         26,2745   53745 1            DLOAD   SL*             GET RLC AND ADJUST FOR SCALE SHIFT
 3158                         26,2746   00045 0                    360
 3159                         26,2747   20260 1                    0 -1,1
 3160                         26,2750   41316 0            DSQ     DMP             MULTIPLY RLC**2 BY VARIANCE
 3161   REF    7  LAST  584   26,2751   02707 0                    VARIANCE
 3162                         26,2752   47012 1            SL4     RT8             SHIFT TO CONFORM TO BVECTORS AND DELTAQ
 3163   REF    3  LAST  583   26,2753   21634 0                    TPMODE
 3164   REF    8  LAST  585   26,2754   36707 1            STCALL  VARIANCE        AND STORE TP VARIANCE
 3165   REF    2  LAST  583   26,2755   55401 1                    LGCUPDTE

 3166                         26,2756   77624 1            CALL
 3167   REF   12  LAST  583   26,2757   11210 1                    GRP2PC
 3168                         26,2760   77414 0            BON     EXIT            ARE ANGLES TO BE DONE
 3169   REF    9  LAST  582   26,2761   04307 1                    SURFFLAG
 3170   REF    1              26,2762   55176 1                    RENDEND         NO
 3171   REF    5  LAST  576   E7,1457                      EBANK=  AIG
 3172   REF    1              26,2763   3 3332 0  MXMYMZ   CAF     AIGBANK
 3173   REF   14  LAST  460   26,2764   54 006 0           TS      EBANK
 3174   REF    6  LAST  585   26,2765   3 1457 0           CA      AIG             YES, COMPUTE  MX, MY, MZ
 3175   REF   13  LAST  576   26,2766   54 765 1           TS      CDUSPOT
 3176   REF    2  LAST  576   26,2767   3 1460 1           CA      AMG
 3177   REF   14  LAST  585   26,2770   54 767 0           TS      CDUSPOT +2
 3178   REF    5  LAST  576   26,2771   3 1461 0           CA      AOG
 3179   REF   15  LAST  585   26,2772   54 771 1           TS      CDUSPOT +4      GIMBL ANGLES NOW IN CDUSPOT FOR TRG*NBSM
 3180   REF   55  LAST  582   26,2773   0 6042 1           TC      INTPRET
 3181                              26,2774   45175 0            VLOAD  CALL
 3182   REF   5  LAST  341         26,2775   06522 1                   UNITX
 3183   REF   4  LAST  254         26,2776   47666 1                   TRG*NBSM
 3184                              26,2777   76505 0            VXM    VSL1
 3185   REF  10  LAST  571         26,3000   01734 0                   REFSMMAT
 3186   REF   5  LAST  147         26,3001   27677 1            STOVL  MX
 3187   REF   3  LAST  302         26,3002   06520 0                   UNITY
 3188                              26,3003   77624 1            CALL
 3189   REF   2  LAST  554         26,3004   47675 0                   *NBSM*
 3190                              26,3005   76505 0            VXM    VSL1
 3191   REF  11  LAST  586         26,3006   01734 0                   REFSMMAT
 3192   REF   2  LAST  147         26,3007   27705 0            STOVL  MY
 3193   REF   5  LAST  342         26,3010   06516 0                   UNITZ
 3194                              26,3011   77624 1            CALL
 3195   REF   3  LAST  586         26,3012   47675 0                   *NBSM*
 3196                              26,3013   76505 0            VXM    VSL1
 3197   REF  12  LAST  586         26,3014   01734 0                   REFSMMAT
 3198   REF   2  LAST  147         26,3015   37713 0  SHAFTBQ   STCALL MZ
 3199   REF   1                    26,3016   55361 0                   RADARANG
 3200                              26,3017   77331 0            SSP    VLOAD              STORE SHAFT CODE (3) FOR R3 IN NOUN 49
 3201   REF   5  LAST  583         26,3020   01357 1                   WHCHREAD
 3202                              26,3021   00003 1            DEC    3
 3203   REF   2  LAST  147         26,3022   03724 0                   ULC
 3204                              26,3023   72441 0            DOT    SL1
 3205   REF   6  LAST  586         26,3024   03677 1                   MX
 3206   REF   6  LAST  482         26,3025   24023 0            STOVL  SINTH              18D
 3207   REF   3  LAST  586         26,3026   03724 0                   ULC
 3208                              26,3027   72441 0            DOT    SL1
 3209   REF   3  LAST  586         26,3030   03713 1                   MZ
 3210   REF   6  LAST  482         26,3031   34021 0            STCALL COSTH              16D
 3211   REF   3  LAST  482         26,3032   26506 0                   ARCTAN
 3212                              26,3033   41221 0            BDSU   DMP
 3213   REF   3  LAST  576         26,3034   03736 0                   RRSHAFT
 3214   REF   1                    26,3035   15441 1                   2PI/8
 3215                              26,3036   41472 0            SL3R   PUSH
 3216                              26,3037   52545 1            CLOAD  SL3
 3217   REF   2  LAST  198         26,3040   01701 0                   X789
 3218                              26,3041   44257 1            SRR*   BDSU               SHIFT FROM -5/-3 TO 8D
 3219                              26,3042   56176 1                   0,2
 3220                              26,3043   53605 1            DMP    SRR*
 3221   REF   2  LAST  147         26,3044   03722 0                   RXZ
 3222                              26,3045   21601 0                   0,1                SHIFT TO EARTH/MOON SPHERE
 3223   REF   6  LAST  585         26,3046   27547 1            STOVL  DELTAD             EARTH B-29. MOON B-27
 3224   REF   4  LAST  586         26,3047   03724 0                   ULC
 3225                              26,3050   76435 1            VXV    VSL1
 3226   REF   3  LAST  586         26,3051   03705 0                   MY
 3227                              26,3052   77656 1            UNIT
 3228                              26,3053   57414 1            BOFF   VCOMP              BD, COMP. IF CSM BEING CORRECTED
 3229   REF  10  LAST  584         26,3054   00747 0                   VEHUPFLG
 3230                              26,3055   55056 1                   +1
 3231   REF  14  LAST  585   26,3056   27525 0            STCVL   BVECTOR
 3232   REF   4  LAST  584   26,3057   06524 1                    ZEROVECS
 3233   REF  15  LAST  587   26,3060   03533 1            STORE   BVECTOR +6
 3234   REF  16  LAST  587   26,3061   17541 1            STODL   BVECTOR +120
 3235   REF   3  LAST  586   26,3062   C3722 0                    RXZ
 3236                        26,3063   53657 0            SR*     SRR*             SHIFT FROM EARTH/MCON SPHERE TO B-25
 3237                        26,3064   20577 C                    0 -2,1
 3238                        26,3065   56176 1                    0,2
 3239   REF  17  LAST  587   26,3066   03541 1            STORE   BVECTOR +120
 3240                        26,3067   77735 0            SLCAD
 3241   REF   1              26,3C70   02011 0                    SHAFTVAR
 3242                        26,3071   41215 1            DAO     OMP
 3243   REF   1              26,3072   15436 1                    IMUVAR           RAO**2 812
 3244   REF   4  LAST  587   26,3073   03722 0                    PXZ
 3245                        26,3074   41257 1            SRR*    DMP
 3246                        26,3075   216C1 0                    0,1              SHIFT TO EARTH/MCON SPHEPE
 3247   REF   5  LAST  587   26,3076   03722 0                    RXZ
 3248                        26,3077   53657 0            SP*     SR*
 3249                        26,3100   20577 0                    0 -2,1
 3250                        26,3101   57176 0                    0,2
 3251                        26,3102   47057 0            SR*     RTB
 3252                        26,3103   57176 0                    0,2
 3253   REF   4  LAST  585   26,3104   21634 0                    TPMOOE           STORE VARIANCE TRIPLE PRECISION
 3254   REF   9  LAST  585   26,3105   367C7 1            STCALL  VARIANCE         8-40
 3255   REF   3  LAST  585   26,3106   55401 1                    LGCUPOTE

 3256                        26,3107   77624 1            CALL
 3257   REF  13  LAST  585   26,3110   11210 1                    GRP2PC
 3258                        26,3111   77624 1  TRUNBQ    CALL
 3259   REF   2  LAST  586   26,3112   55361 0                    FACARANG
 3260                        26,3113   77331 0            SSP     VLOAO            STORE TRUNNION COOE (4) FOR R3 IN N49
 3261   REF   6  LAST  586   26,3114   01357 1                    WHCHREAO
 3262                        26,3115   C0004 0            OEC     4
 3263   REF   5  LAST  586   26,3116   03724 0                    ULC
 3264                        26,3117   76435 1            VXV     VSL1
 3265   REF   4  LAST  586   26,3120   C37C5 0                    MY
 3266                        26,3121   76435 1            VXV     VSL1             (ULC X MY) X ULC
 3267   REF   6  LAST  587   26,3122   03724 0                    ULC
 3268                        26,3123   57414 1            BOFF    VCOMP            BO, COMP. IF CSM BEING CORRECTEO
 3269   REF  11  LAST  586   26,3124   00747 0                    VEHUPFLG
 3270                        26,3125   55126 1                    +1
 3271   REF  18  LAST  587   26,3126   27525 C            STOVL   BVECTOR
 3272   REF   5  LAST  587   26,3127   06524 1                    ZEPOVECS
 3273   REF  19  LAST  587   26,3130   C3533 1            STCRE   BVECTOR +6
 3274   REF  20  LAST  587   26,3131   17541 1            STOOL   BVECTOR +120
 3275   REF   6  LAST  587   26,3132   C3722 0                    PXZ
 3276                        26,3133   53657 0            SR*     SPP*             SHIFT FROM EARTH/MCON SPHERE TO 8-25
 3277                        26,3134   20577 0                    0 -2,1
 3278                        26,3135   56176 1                    0,2
 3279   REF  21  LAST  587   26,3136   03543 0            STORE   BVECTOR +140
 3280                         26,3137   77735 0              SLOAD
 3281    REF   1              26,3140   02012 0                      TRUNVAR
 3282                         26,3141   41215 1              DAD     DMP
 3283    REF   2  LAST  587   26,3142   15436 1                      INUVAR
 3284    REF   7  LAST  587   26,3143   03722 0                      RXZ
 3285                         26,3144   41257 1              SRR*    DMP
 3286                         26,3145   21601 0                      0,1           SHIFT TO EARTH/MOON SPHERE
 3287    REF   8  LAST  588   26,3146   03722 0                      RXZ
 3288                         26,3147   53657 0              SR*     SR*
 3289                         26,3150   20577 0                      0 -2,1
 3290                         26,3151   57176 0                      0,2
 3291                         26,3152   47057 0              SR*     RTB
 3292                         26,3153   57176 0                      0,2
 3293    REF   5  LAST  587   26,3154   21634 0                      TPMODE        STORE VARIANCE TRIPLE PRECISION
 3294    REF  10  LAST  587   26,3155   16707 0              STODL   VARIANCE
 3295    REF   2  LAST  148   26,3156   03732 1                      SINTHETA
 3296                         26,3157   44336 1              ASIN    BDSU          SIN  THETA IN PD6
 3297    REF   3  LAST  576   26,3160   03734 1                      RRTRUN
 3298                         26,3161   56405 0              DMP     SL3R
 3299    REF   2  LAST  586   26,3162   15441 1                      2PI/8
 3300                         26,3163   52525 1              PDDL    SL3
 3301    REF   3  LAST  586   26,3164   01703 1                      X789 +2
 3302                         26,3165   44257 1              SRR*    BDSU          SHIFT FROM -5/-3 TO 8D
 3303                         26,3166   56176 1                      0,2
 3304                         26,3167   53605 1              DMP     SRR*
 3305    REF   9  LAST  588   26,3170   03722 0                      RXZ
 3306                         26,3171   21601 0                      0,1
 3307    REF   7  LAST  586   26,3172   37547 0              STCALL  DELTAQ        EARTH B-29. MOON B-27
 3308    REF   4  LAST  587   26,3173   55401 1                      LGCUPDTE
 3309                         26,3174   77624 1              CALL
 3310    REF  14  LAST  587   26,3175   11210 1                      GRP2PC
 3311                         26,3176   77650 1   RENDEND    GOTO
 3312    REF   1              26,3177   50562 0                      R22LEM93
R3313    FUNCTIONAL DESCRIPTION

R3314    LSR22.4 IS THE ENTRY TO PERFORM LUNAR SURFACE NAVIGATION FOR THE LM
R3315    COMPUTER ONLY. THIS ROUTINE COMPUTES THE B-VECTORS AND DELTA Q FOR RANGE
R3316    AND RANGE RATE MEASURED BY THE RENDEZVOUS RADAR

R3317    SUBROUTINES CALLED
R3318      INSTALL    LGCUPDTE   INCORP1    RP-TO-R
R3319      INTEGRV    GETULC     INCORP2

R3320    OUTPUT
R3321      CORRECTED CSM STATE VECTOR (PERMANENT)
R3322      NUMBER OF MARKS INCORPORATED IN MARKCTR
R3323      MAGNITUDE OF POSITION DEVIATION (FOR DISPLAY) IN R22DISP METERS B-29
R3324      MAGNITUDE OF VELOCITY DEVIATION (FOR DISPLAY) IN R22DISP +2 M/CSEC B-7
R3325      UPDATED W-MATRIX
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R3326    ERASABLE INITIALIZATION REQUIRED
R3327     LM AND CSM STATE VECTORS
R3328     W-MATRIX
R3329     MARK TIME IN MKTIME
R3330     RADAR RANGE IN RM METERS B-29
R3331            RANGE RATE IN RDOTM METERS/CSEC B-7
R3332     VEHUPFLG


 3333                            26,3200   77624 1  LSR22.4  CALL
 3334    REF  15  LAST  582      26,3201   27410 1                  INTSTALL
 3335                            26,3202   43014 0           SET    CLEAR
 3336    REF   3  LAST  582      26,3203   01472 1                  STATEFLG
 3337    REF  14  LAST  582      26,3204   01674 0                  VINTFLAG        CALL TO GET LM POS + VEL IN REF COORD.
 3338                            26,3205   77624 1           CALL
 3339    REF   5  LAST  582      26,3206   55242 0                  INTGRCAL
 3340                            26,3207   77624 1           CALL
 3341    REF  15  LAST  588      26,3210   11210 1                  GRP2PC
 3342                            26,3211   45014 0           CLEAR  CALL
 3343    REF   2  LAST  581      26,3212   02666 0                  DMENFLG         SET MATRIX SIZE TO 6X6 FOR INCORP
 3344    REF  16  LAST  589      26,3213   27410 1                  INTSTALL
 3345                            26,3214   46145 0           DLOAD  BHIZ            IS THIS FIRST TIME THROUGH
 3346    REF   3  LAST  510      26,3215   03463 0                  MARKCTR
 3347    REF   1                 26,3216   55231 1                  INITWMX6        YES, INITIALIZE 6X6 W-MATRIX
 3348                            26,3217   43014 0           CLEAR  SET
 3349    REF   7  LAST  582      26,3220   01675 1                  D6OR9FLG
 3350    REF  11  LAST  582      26,3221   01476 0                  DIMOFLAG
 3351                            26,3222   43014 0           SET    CLEAR
 3352    REF  15  LAST  589      26,3223   01474 1                  VINTFLAG
 3353    REF   5  LAST  582      26,3224   01673 1                  INTYPFLG
 3354                            26,3225   77624 1           CALL
 3355    REF   6  LAST  589      26,3226   55242 0                  INTGRCAL
 3356                            26,3227   77650 1            GOTO
 3357    REF   2  LAST  582      26,3230   54514 0                  RANGEBQ

 3358                            26,3231   77624 1  INITWMX6 CALL
 3359    REF   2  LAST  582      26,3232   55251 1                  WLINIT          INITIALIZE W-MATRIX
 3360                            26,3233   45014 0           SET    CALL
 3361    REF  16  LAST  589      26,3234   01474 1                  VINTFLAG
 3362    REF   6  LAST  581      26,3235   26643 1                  SETIFLGS
 3363                            26,3236   77624 1           CALL
 3364    REF   7  LAST  589      26,3237   55242 0                  INTGRCAL
 3365                            26,3240   77650 1           GOTO
 3366    REF   3  LAST  589      26,3241   54514 0                  RANGEBQ

R3367    THIS ROUTINE CLEARS RFINAL (DP) AND CALLS INTEGRV

 3368                            26,3242   71220 1  INTGRCAL STQ    DLOAD
 3369    REF   1                 26,3243   03675 0                  IGRET
 3370    REF   6  LAST  576      26,3244   03755 0                  MKTIME
 3371   REF  18  LAST  576   26,3245   34041 0               STCALL  TDEC1
 3372   REF   8  LAST  504   26,3246   27133 0                       INTEGPV
 3373                        26,3247   77650 1               GOTO
 3374   REF   2  LAST  589   26,3250   03675 0                       IGRET

R3375   THIS ROUTINE INITIALIZES THE W-MATRIX BY ZEROING ALL W THEN SETTING
R3376   DIAGONAL ELEMENTS TO INITIAL STORED VALUES.

 3377   REF   4  LAST  128   E5,1400                         EBANK= W
 3378                        26,3251   77776 1   WLINIT      EXIT
 3379   REF   1              26,3252   3 3331 0              CAF     WBANK
 3380   REF  15  LAST  585   26,3253   54 006 0              TS      BBANK
 3381   REF   1              26,3254   3 3437 1              CAF     WSIZE
 3382   REF   2  LAST  107   26,3255   55'256 0              TS      W.IND
 3383   REF 122  LAST  582   26,3256   3 4755 1              CAF     ZERO
 3384   REF   3  LAST  590   26,3257   51'256 1              INDEX   W.IND
 3385   REF   5  LAST  590   26,3260   55'400 0              TS      W
 3386   REF   4  LAST  590   26,3261   11'256 0              CCS     W.IND
 3387                        26,3262   0 3255 0              TC      -5
 3388   REF   2  LAST  585   26,3263   3 3332 0              CAF     AIGBANK          RESTORE EBANK 7
 3389   REF  16  LAST  590   26,3264   54 006 0              TS      BBANK
 3390   REF  56  LAST  585   26,3265   0 6042 1              TC      INTPRET
 3391                        26,3266   67214 1               BON     SLOAD            IF ON LUNAR SURFACE,INITIALIZE WITH
 3392   REF  10  LAST  585   26,3267   04307 1                       SURFFLAG         WSURFPOS AND WSURFVEL INSTEAD OF
 3393   REF   1              26,3270   55274 0                       WLSRFPOS         WRENDPOS AND WRENDVEL
 3394   REF   2  LAST  118   26,3271   02001 1                       WRENDPOS
 3395                        26,3272   77650 1               GOTO
 3396   REF   1              26,3273   55276 1                       WPOSTORE
 3397                        26,3274   77735 0   WLSRFPOS    SLOAD
 3398   REF   1              26,3275   02007 1                       WSURFPOS
 3399                        26,3276   77661 0   WPOSTORE    SR                       SHIFT TO B-19 SCALE
 3400                        26,3277   20606 0                       5
 3401   REF   6  LAST  590   26,3300   02401 0               STORE   W
 3402   REF   7  LAST  590   26,3301   02411 1               STORE   W  +8D
 3403   REF   8  LAST  590   26,3302   02421 1               STORE   W  +16D
 3404                        26,3303   67214 1               BON     SLOAD
 3405   REF  11  LAST  590   26,3304   04307 1                       SURFFLAG
 3406   REF   1              26,3305   55311 1                       WLSRFVEL
 3407   REF   1              26,3306   02002 1                       WRENDVEL
 3408                        26,3307   77650 1               GOTO
 3409   REF   1              26,3310   55313 0                       WVELSTOR
 3410                        26,3311   77735 0   WLSRFVEL    SLOAD
 3411   REF   1              26,3312   02010 1                       WSURFVEL
 3412   REF   9  LAST  590   26,3313   02511 0   WVELSTOR    STORE   W  +72D
 3413   REF  10  LAST  590   26,3314   02521 0               STORE   W  +80D
 3414   REF  11  LAST  590   26,3315   02531 1               STORE   W  +88D
 3415                        26,3316   77735 0               SLOAD
 3416   REF   1              26,3317   02003 0                       WSHAFT
 3417   REF  12  LAST  590   26,3320   02621 0               STORE   W  +144D
 3418                        26,3321   77735 0               SLOAD
 3419    REF    1                 26,3322    02004 1                       WTRUN
 3420    REF   13   LAST   590    26,3323    02631 1             STORE     W +152D
 3421                             26,3324    66214 0             SET       SSP                SET RENDWFLG - W-MATRIX VALID
 3422    REF    8   LAST   582    26,3325    02476 0                       RENDWFLG
 3423    REF    4   LAST   589    26,3326    03463 0                       MARKCTP            SET MARK COUNTER EQUAL ZERO
 3424                             26,3327    00000 1                       0
 3425                             26,3330    77616 0             RVQ

 3426    REF   14   LAST   591    E5,1400                        EBANK=    W
 3427    REF    3   LAST   589    26,3331    54065 0  WBANK      BBCON     WLINIT
 3428    REF    7   LAST   585    E7,1457                        EBANK=    AIG
 3429    REF    2   LAST   510    26,3332    54067 1  AIGBANK    BBCON     LSR22.3

R3430    GETULC

R3431    THIS SUBROUTINE COMPUTES THE RELATIVE POSITION VECTOR BETWEEN THE CSM
R3432    AND THE LM, LEAVING THE UNIT VECTOR IN THE PUSHLIST AND MPAC AND THE
R3433    MAGNITUDE IN 36D.

 3434                             26,3333    77201 1  GETULC     SETPD     VLOAD
 3435                             26,3334    00001 0                       0
 3436    REF    1                 26,3335    01645 1                       DELTALEM
 3437                             26,3336    77754 1             LXA,2
 3438    REF    3   LAST   582    26,3337    03720 1                       SCALSHFT           LOAD X2 WITH SCALE SHIFT
 3439                             26,3340    53257 1             VSR*      VAD
 3440                             26,3341    57165 1                       9D,2               SHIFT FOR EARTH/MOON SPHERE
 3441    REF    2   LAST   504    26,3342    01661 1                       RCVLEM
 3442                             26,3343    53715 1             PDVL      VSR*
 3443    REF    1                 26,3344    01573 1                       DELTACSM
 3444                             26,3345    57165 1                       9D,2               SHIFT FOR EARTH/MOON SPHERE
 3445                             26,3346    52255 1             VAD       VSU
 3446    REF    1                 26,3347    01607 1                       RCVCSM
 3447                             26,3350    41434 1             RTB       PUSH               USE NORMUNIT TO PRESERVE ACCURACY
 3448    REF    1                 26,3351    21725 1                       NORMUNX1
 3449    REF    7   LAST   587    26,3352    17724 0             STODL     ULC
 3450                             26,3353    00045 0                       36D
 3451                             26,3354    77657 0             SL*                          ADJUST MAGNITUDE FROM NORMUNIT
 3452                             26,3355    20201 0                       0,1
 3453                             26,3356    24045 0             STOVL     36D                ULC IN PD0 AND MPAC,RLC IN 36D
 3454    REF    8   LAST   591    26,3357    03724 0                       ULC
 3455                             26,3360    77616 0             RVQ
R3456    RADARANG

R3457    THIS SUBROUTINE COMPUTES SINTHETA = -ULC DOT MY
R3458    RXZ = (SQRT (1-SINTHETA**2))RLC
R3459    OUTPUT
R3460     ULC IN ULC, PD0
R3461     RLC  IN PD36D
R3462     SIN THETA IN SINTHETA AND PD6
R3463     RXZ NORM IN RXZ (N IN X1)
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 3464                          26,3361    45020 1  RACARANG STQ      CALL
 3465   REF    2  LAST   147   26,3362    03675 0                    RORET
 3466   REF    3  LAST   583   26,3363    55333 1                    GFTULC
 3467                          26,3364    50276 1           VCOMP    OOT
 3468   REF    5  LAST   587   26,3365    C3705 0                    MY
 3469                          26,3366    41572 1           SL1R     RUSH              SIN THETA TO R06
 3470   REF    3  LAST   588   26,3367    03732 1           STORE    SINTHETA
 3471                          26,3370    44316 0           DSQ      80SU
 3472   REF    4  LAST   503   26,3371    06514 1                    OP1/4TH           1 - (SIN THETA)**2
 3473                          26,3372    41366 1           SQRT     OMP
 3474                          26,3373    C0045 0                    360
 3475                          26,3374    60352 0           SL1      NORM
 3476   REF    4  LAST   583   26,3375    00047 1                    X1                SET SHIFT COUNTER IN X1
 3477   REF   10  LAST   588   26,3376    03722 0           STORE    RXZ
 3478                          26,3377    77650 1           GOTO                       EXIT
 3479   REF    3  LAST   592   26,3400    C3675 0                    RORET
 3480                          26,3401    45020 1  LGCUPOTE STQ      CALL
 3481   REF    4  LAST   510   26,3402    03675 0                    LGRFT
 3482   REF    1               26,3403    46533 0                    INCORP1
 3483                          26,3404    51575 1           VLOAO    ABVAL
 3484   REF    3  LAST   127   26,3405    C2673 1                    OELTAX +6
 3485                          26,3406    53754 1           LXA,2    SRR*
 3486   REF    4  LAST   591   26,3407    C3720 1                    SCALSHFT          0-MOON. 2-EARTH
 3487                          26,3410    56174 0                    2,2               SET VEL OISPLAY TO 8-7
 3488   REF    3  LAST   316   26,3411    24317 1           STOVL    R22OISP +2
 3489   REF    4  LAST   592   26,3412    02665 0                    OELTAX
 3490                          26,3413    53646 0           A8VAL    SRR*
 3491                          26,3414    56174 0                    2,2               SET POS DISPLAY TO B-29
 3492   REF    4  LAST   592   26,3415    C0315 0           STORE    R22DISP
 3493                          26,3416    54335 0           SLOAD    SR
 3494   REF    1               26,3417    02005 0                    RMAX
 3495                          26,3420    20613 1                    100
 3496                          26,3421    50025 0           OSU      BMN
 3497   REF    5  LAST   592   26,3422    00315 0                    R22OISP
 3498   REF    1               26,3423    50566 1                    R22LEM96          GO DISPLAY
 3499                          26,3424    45335 0           SLOAO    OSU
 3500   REF    1               26,3425    C2006 0                    VMAX
 3501   REF    6  LAST   592   26,3426    00317 1                    R22OISP +2        VMAX MINUS VEL. OEVIATION
 3502                          26,3427    77640 0           BMN
 3503   REF    2  LAST   592   26,3430    50566 1                    R22LEM96          GO CISPLAY
 3504                          26,3431    77624 1  ASTOK    CALL
 3505   REF    1               26,3432    46745 0                    INCORP2
 3506                          26,3433    77650 1           GOTO
 3507   REF    5  LAST   592   26,3434    03675 0                    LGRET
 3508                          26,3435    C0103 0  IMLVAR   2OEC     E-6 B12           RAC**2
 3508                          26,3436    03370 0
 3509                          26,3437    C0241 0  WSIZE    CEC      I61
 3510                          26,3440    31103 1  2PI/8    2OEC     3.141592653 B-2
 3510                          26,3441    36652 0
 3511   REF   30  LAST   581   E7,1456                      EBANK=   LOSCCUNT
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P3512    PROGRAM NAME LRS24.1    RR SEARCH ROUTINE
R3513    MOD NO  0          BY  P VOLANTE  SDC           DATE  1-15-67


R3514    FUNCTIONAL DESCRIPTION

R3515    DRIVES THE RENDEZVOUS RADAR IN A HEXAGONAL SEARCH PATTERN ABOUT THE LOS TO THE CSM (COMPUTED FROM THE CSM AND LM
R3517    STATE VECTORS) CHECKING FOR THE DATA GOOD DISCRETE AND MONITORING THE ANGLE BETWEEN THE RADAR BORESIGHT AND THE
R3519    LM +Z AXIS. IF THIS ANGLE EXCEEDS 30 DEGREES THE PREFERRED TRACKING ATTITUDE ROUTINE IS CALLED TO PERFORM AN
R3521    ATTITUDE MANEUVER.


R3522    CALLING SEQUENCE - BANKCALL FOR LRS24.1


R3523    SUBROUTINES CALLED

R3524           LEMCONIC        R61LEM
R3525           CSMCONIC        PRDESSM
R3526           JOBDELAY        FLAGDOWN
R3527           WAITLIST        FLAGUP
R3528           RRNB            BANKCALL


R3529    EXIT   - TO ENDOFJOB WHEN THE SEARCH FLAG (SRCHOPT) IS NOT SET


R3530    OUTPUT

R3531        DATAGOOD (SP)-FOR DISPLAY IN R1- 00000 INDICATES NO LOCKON
R3532                                         11111 INDICATES LOCKON ACHIEVED
R3533        OMEGAD   (SP)-FOR DISPLAY IN R2- ANGLE BETWEEN RR BORESIGHT VECTOR AND THE SPACECRAFT +Z AXIS

R3535    ERASABLE INITIALIZATION REQUIRED
R3536       SEARCH FLAG MUST BE SET
R3537       LM AND CSM STATE VECTORS AND REFSMMAT MATRIX
R3538    DEBRIS

R3539       RLMSRCH       UXVECT
R3540       VXRLM         UYVECT
R3541       LOSDESRC      NSRCHPNT
R3542       DATAGOOD      OMEGAD
R3543       MPAC          PUSHLIST


 3544    REF   1                                                 COUNT* $$/LRS24
 3545    REF 123  LAST  590    26,3442  3 4755 1  LRS24.1  CAF     ZERO
 3546    REF   2  LAST  146    26,3443  55'736 0           TS      NSRCHPNT         SET SEARCH PATTERN POINT COUNTER TO ZERO
 3547    REF  53  LAST  568    26,3444  3 4736 1  CHKSRCH  CAF     BIT14            ISSUE AUTO TRACK ENABLE TO RADAR
 3548                          26,3445  0 0006 1           EXTEND
 3549  REF  39  LAST  568   26,3446  05 012 1            WOR     CHAN12
 3550  REF   1              26,3447  3 4736 1            CAF     SRCHCBIT       CHECK IF SEARCH STILL REQUESTED
 3551  REF  10  LAST  556   26,3450  7 0076 1            MASK    FLAGWRD2       (SRCHOPT FLAG SET)
 3552                       26,3451  0 0006 1            EXTEND
 3553  REF  95  LAST  556   26,3452  1 5155 1            BZF     ENDOFJOB       NO-TERMINATE JOB


 3554  REF   1              26,3453  3 3713 1            CAF     6SECONDS       SCHEDULE TASK TO DRIVE RADAR TO NEXT PT.
 3555                       26,3454  0 0004 0            INHINT
 3556  REF  24  LAST  567   26,3455  0 5203 0            TC      WAITLIST       IN 6 SECONDS
 3557  REF  31  LAST  592   E7,1456                      EBANK=  LOSCOUNT
 3558  REF   3  LAST  520   26,3456   03643 0            2CADR   CALLDGCH
 3558                       26,3457   54067 1
 3559                       26,3460  0 0003 1            RELINT
 3560  REF  96  LAST  575   26,3461  4 0110 0            CS      RADMODES       IS REMODE IN PROGRESS
 3561  REF   5  LAST  550   26,3462  7 4736 0            MASK    REMODBIT
 3562                       26,3463  0 0006 1            EXTEND
 3563  REF  96  LAST  594   26,3464  1 5155 1            BZF     ENDOFJOB       YES- WAIT SIX SECONDS
 3564  REF  57  LAST  590   26,3465  0 6042 1            TC      INTPRET

 3565                       26,3466   43234 0            RTB     DAD             COMPUTE LOS AT PRESENT TIME + 1.5 SEC.
 3566  REF  12  LAST  522   26,3467   21574 1                    LOADTIME
 3567  REF   1              26,3470   15715 0                    1.5SECS
 3568  REF  19  LAST  590   26,3471   34041 0  LRS24.11  STCALL  TDEC1
 3569  REF   4  LAST  571   26,3472   27077 1                    LEMCONIC       EXTRAPOLATE LM STATE VECTOR
 3570                       26,3473   77775 1            VLOAD
 3571  REF   7  LAST  571   26,3474   00001 0                    RATT
 3572  REF   4  LAST  150   26,3475   27676 0            STOVL   RLMSRCH        SAVE LEM POSITION
 3573  REF   3  LAST  571   26,3476   00007 0                    VATT
 3574  REF   1              26,3477   17740 1            STODL   SAVLEMV        SAVE LEM VELOCITY
 3575  REF   6  LAST  571   26,3500   00015 0                    TAT
 3576  REF  20  LAST  594   26,3501   34041 0            STCALL  TDEC1          EXTRAPOLATE CSM STATE VECTOR
 3577  REF   3  LAST  571   26,3502   27065 1                    CSMCONIC       EXTRAPOLATE CSM STATE VECTOR
 3578                       26,3503   52375 1            VLOAD   VSU            LOS VECTOR = R(CSM)-R(LM)
 3579  REF   8  LAST  594   26,3504   00001 0                    RATT
 3580  REF   5  LAST  594   26,3505   03676 0                    RLMSRCH
 3581                       26,3506   77656 1            UNIT
 3582  REF   2  LAST  146   26,3507   27712 0            STOVL   LOSDESRD       STORE DESIRED LOS
 3583  REF   4  LAST  594   26,3510   00007 0                    VATT           COMPUTE UNIT(V(CM) CROSS R(CM))
 3584                       26,3511   47256 0            UNIT    VXV
 3585  REF   9  LAST  594   26,3512   00001 0                    RATT
 3586                       26,3513   77656 1            UNIT
 3587  REF   2  LAST  146   26,3514   03704 1            STORE   VXRCM
 3588                       26,3515   52375 1            VLOAD   VSU
 3589  REF   5  LAST  594   26,3516   00007 0                    VATT
 3590  REF   2  LAST  594   26,3517   03740 1                    SAVLEMV
 3591                       26,3520   76521 0            MXV     VSL1           CONVERT FROM REFERENCE TO STABLE MEMBER
 3592  REF  13  LAST  586   26,3521   01734 0                    REFSMMAT
 3593  REF   3  LAST  594   26,3522   03740 1            STORE   SAVLEMV        VLC = V(CSM) - V(LM)
 3594                       26,3523   53135 0            SLOAD   BZE            CHECK IF N=0
 3595  REF   3  LAST  593   26,3524   03737 1                   NSRCHPNT
 3596  REF   1              26,3525   55636 1                   OESGLCS        YES-OESIGNATE ALONG LOS
 3597                       26,3526   53025 0            OSU    8ZE            IS N=1
 3598  REF   1              26,3527   15711 1                   ONEOCT         YES-CALCULATE X ANO Y AXES OF
 3599  REF   1              26,3530   55623 0                   CALCXY         SEARCH PATTERN COOROINATE SYSTEM
 3600                       26,3531   77775 1            VLOAO                 NO-ROTATE X-Y AXES TO NEXT SEARCH POINT
 3601  REF   2  LAST  146   26,3532   03720 1                   UXVECT
 3602  REF   1              26,3533   24015 0            STOVL  UXVECTPR       SAVE ORIGINAL X ANO Y VECTORS
 3603  REF   2  LAST  146   26,3534   03726 1                   UYVECT         UXPRIME = ORIGINAL UX
 3604  REF   1              26,3535   00023 0            STORE  UYVECTPR       UYPRIME = ORIGINAL UY
 3605                       26,3536   77761 1            VXSC
 3606  REF   1              26,3537   15705 1                   SIN60OEG       UX =(COS 60)UXPR +(SIN 60)UYPR
 3607  REF   3  LAST  595   26,3540   27720 1            STOVL  UXVECT
 3608  REF   2  LAST  595   26,3541   00015 0                   UXVECTPR
 3609                       26,3542   53361 0            VXSC   VAO
 3610  REF   1              26,3543   06522 1                   COS60OEG
 3611  REF   4  LAST  595   26,3544   03720 1                   UXVECT
 3612                       26,3545   77656 1            UNIT
 3613  REF   5  LAST  595   26,3546   27720 1            STOVL  UXVECT
 3614  REF   3  LAST  595   26,3547   00015 0                   UXVECTPR       UY=(-SIN60)UXPR +(COS 60)UYPR
 3615                       26,3550   77761 1            VXSC
 3616  REF   2  LAST  595   26,3551   15705 1                   SIN60OEG
 3617  REF   3  LAST  595   26,3552   27726 1            STOVL  UYVECT
 3618  REF   2  LAST  595   26,3553   00023 0                   UYVECTPR
 3619                       26,3554   52361 1            VXSC   VSU
 3620  REF   2  LAST  595   26,3555   06522 1                   COS60OEG
 3621  REF   4  LAST  595   26,3556   03726 1                   UYVECT
 3622                       26,3557   77656 1            UNIT
 3623  REF   5  LAST  595   26,3560   03726 1            STORE  UYVECT
 3624                       26,3561   53361 0  OFFCALC   VXSC   VAO            OFFSET VECTOR = K(UY)
 3625  REF   1              26,3562   15707 0                   OFFSTFAC       LOS VECTOR + OFFSET VECTOR OEFINES
 3626  REF   3  LAST  594   26,3563   03712 0                   LOSOESRO       OESIREO POINT IN SEARCH PATTERN
 3627                       26,3564   64256 1            UNIT   MXV
 3628  REF  14  LAST  594   26,3565   01734 0                   REFSMMAT       CONVERT TO STABLE MEMBER COOROINATES
 3629                       26,3566   77772 0            VSL1
 3630  REF  13  LAST  577   26,3567   25101 0  CONTOESG  STOVL  RPTARGET
 3631  REF   4  LAST  594   26,3570   03740 1                   SAVLEMV
 3632  REF   5  LAST  571   26,3571   01761 0            STORE  LOSVEL
 3633                       26,3572   77776 1            EXIT
 3634                       26,3573  0 0004 0            INHINT
 3635  REF   7  LAST  571   26,3574  0 6032 0            TC     KILLTASK       KILL ANY PRESENTLY WAITLISTED TASK
 3636  REF   4  LAST  571   26,3575   52613 1            CAOR   DESLOOP +2     WHICH WOULO OESIGNATE TO THE LAST
A3637                                                                          POINT IN THE PATTERN
 3638  REF   1              26,3576  4 4735 0  CONTOES2  CS     COESBIT
 3639  REF  97  LAST  594   26,3577  7 0110 0            MASK   RAOMOOES       SET BIT 15 OF RAOMOOES TO INOICATE
 3640  REF   2  LAST  595   26,3600  6 4735 1            AO     COESBIT        A CONTINUOUS OESIGNATE WANTEO.
 3641  REF  98  LAST  595   26,3601  54 110 0            TS     RAOMOOES
 3642  REF  58  LAST  594   26,3602  0 6042 1            TC     INTPRET

 3643                       26,3603   77624 1            CALL
 3644   REF   3  LAST  514   26,3604   52404 0                      RRDESSM         DESIGNATE RADAR TO RRTARGET VECTOR

 3645                        26,3605   77776 1             EXIT
 3646   REF   1              26,3606  0 3675 0             TC       LIMALARM        LOS NOT IN MODE 2 COVERAGE (P22)
 3647   REF   2  LAST  596   26,3607  0 3675 0             TC       LIMALARM        VEHICLE MANEUVER REQUIRED (P20)


A3648                                                                               COMPUTE OMEGA,ANGLE  BETWEEN RR LOS AND
A3649                                                                               SPACECRAFT +Z AXIS
 3650                        26,3610  0 0006 1  OMEGCALC   EXTEND
 3651   REF  10  LAST  575   26,3611  3 0036 1             DCA      COUT
 3652   REF   8  LAST  576   26,3612  53753 0              DXCH     TANGNB
 3653   REF  59  LAST  595   26,3613  0 6042 1             TC       INTPRET
 3654                        26,3614   77624 1             CALL
 3655   REF   3  LAST  576   26,3615   46041 0                      RRNB
 3656                        26,3616   65545 0             DLOAD    ACOS            OMEGA IS ARCCOSINE OF Z-COMPONENT OF
 3657                        26,3617   00045 0                      360             VECTOR COMPUTED BY RRNB (LEFT AT 32D)
 3658   REF   3  LAST  146   26,3620   03735 0             STORE    OMEGDISP        STORE FOR DISPLAY IN R2
 3659                        26,3621   77776 1             EXIT
 3660   REF  97  LAST  594   26,3622  0 5155 0             TC       ENDOFJOB
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P3661    CALCULATE X ANC Y VECTORS FDR SEARCH PATTERN COORDINATE SYSTFM


 3662                        26,3623   47375 D  CALCXY    VLGAD   VXV
 3663   REF   3  LAST  594   26,3624   03704 1                    VXRCM
 3664   REF   4  LAST  595   26,3625   C3712 D                    LOSDESPO
 3065                        26,3626   77656 1            UNIT
 3666   REF   6  LAST  595   26,3627   2772C 1            STCVL   UXVECT          UX = (VLM X RLM)X LOS
 3667   REF   5  LAST  597   26,3630   03712 0                    LOSDFSRD
 3668                        26,3631   53435 D            VXV     UNIT
 3669   REF   7  LAST  597   26,3632   0372D 1                    UXVECT
 3670   RFF   6  LAST  595   26,3633   03726 1            STORE   UYVECT          UY = LOS X UX
 3671                        26,3634   7765C 1            GOTO
 3672   REF   1              26,3635   55561 0                    DFFCALC


 3673                        26,3636   64375 1  DESGLOS   VLGAD   MXV             WHEN N= 0,DESIGNATE ALONG LOS
 3674   REF   6  LAST  597   25,3637   03712 C                    LOSDFSRO
 3675   PEF  15  LAST  595   26,3640   01734 0                    REFSMMAT        CONVERT LCS FROM REFERFNCF TO SM CDORDS
 3076                        26,3641   52172 1            VSL1    GCTC
 3677   REF   1              26,3642   55567 0                    CONTDESG


 3678   REF  22  LAST  502   26,3643   30 D74 1 CALLOGCH  CAE     FLAGWRDO        IS RENDEZVDUS FLAG SET
 3679   REF   8  LAST  543   26,3644   7 4745 1           MASK    RNDVZBIT
 3680                        26,3645   0 0006 1           EXTENO
 3681   REF  25  LAST  534   26,3646   I 5261 0           BZF     TASKOVER        NO-EXIT R24
 3682   REF   2  LAST  494   26,3647   3 7716 C           CAF     PRIO25          YES -SCHEDULE JCB TD DRIVE PAOAP TO NEXT
 3683   RFF  23  LAST  550   26,3650   C 5105 0           TC      FINDVAC         POINT IN SFARCH PATTERN
 3684   RFF   6  LAST  594   E7,1675                      EBANK=  RLMSRCH
 3685   REF   1              26,3651    03654 0           2CADR   DATGDCHK
 3685   REF   1              26,3652    54067 1
 3686   REF  26  LAST  507   26,3653   C 5261 1           TC      TASKCVER


 3687   REF  27  LAST  565   26,3654   3 4750 1 CATGDCHK  CAF     BIT4
 3688                        26,3655   C 0006 1           EXTEND                  CHECK IF DATA GOOD DISCPFTF PRESENT
 3689   REF  20  LAST  575   26,3656   02 033 D           RAND    CHAN33
 3690                        26,3657   C 00D6 1           EXTEND
 3691   REF   I              26,3660   1 3667 1           BZF     STCRE1S         YES- GD TO STORE 11111 FOR DISPLAY IN R1
 3692   REF  13  LAST  437   26,3661   4 6245 D           CS      SIX
 3693   RFF   4  LAST  595   26,3662   6 1736 1           AC      NSFCHPNT        IS N GREATFR THAN 6
 3694                        26,3663   C 0006 1           EXTEND
 3695   REF   2  LAST  52J   26,3664   I 3442 1           BZF     LPS24.I         YES - RESET N = 0 AND START ARDUND AGAIN
 3696   REF   5  LAST  597   26,3665   25'736 1           INCR    NSFCHPNT        NO-SET N = N+1 AN GO TO
 3697   REF   1              26,3666   1 3444 1           TCF     CHKSRCH         NEXT POINT IN PATTERN


 3698   REF   I              26,3667   3 3703 D STORF1S   CAF     ALL1S           STORE 11111 FOR DISPLAY IN P1
 3699   REF   5  LAST  519   26,3670   55'733 0           TS      DATAGOCD
 3700                         26,3671  0 0004 0           INHINT
 3701  REF   8  LAST  595     26,3672  0 6032 0           TC       KILLTASK       DELETE DESIGNATE TASK FROM
 3702  REF   5  LAST  595     26,3673    52613 1           CADR     DESLOOP +2     WAITLIST USING KILLTASK
 3703  REF  98  LAST  596     26,3674  0 5155 0           TC       ENDOFJOB

 3704  REF  26  LAST  568     26,3675  0 5567 0  LIMALARM TC       ALARM          ISSUE ALARM 527-LOS NOT IN MODE2
 3705                         26,3676    00527 1           OCT      527            COVERAGE IN P22 OR VEHICLE MANEUVER
 3706                         26,3677  0 0004 0           INHINT                  REQUIRED IN P20
 3707  REF   9  LAST  598     26,3700  0 6032 0           TC       KILLTASK       KILL WAITLIST CALL FOR NEXT
 3708  REF   4  LAST  594     26,3701    55643 0           CADR     CALLDGCH       POINT IN SEARCH PATTERN
 3709  REF  99  LAST  598     26,3702  0 5155 0           TC       ENDOFJOB


 3710                         26,3703    25547 0  ALL1S    DEC      11111
 3711                         26,3704    33555 1  SIN60DEG 2DEC     .86603
 3711                         26,3705    01106 1
 3712  REF   7  LAST  364     23,2521             COS60DEG =        DPHALF         (2DEC    .50)
 3713                            0014             UXVECTPR EQUALS 12D             PREVIOUS
 3714                            0022             UYVECTPR EQUALS 18D
 3715                            0014             RLMUNIT  EQUALS 12D
 3716                         26,3706    01642 0  OFFSTFAC 2DEC     0.05678        TANGENT OF 3.25 DEGREES
 3716                         26,3707    11045 0
 3717                         26,3710    00001 0  ONEOCT   OCT      00001          ****  NOTE-THESE TWO CONSTANTS MUST ****
 3718                         26,3711    00000 1  3SECONDS 2DEC     300            ****  BE IN THIS ORDER BECAUSE       ****
 3718                         26,3712    00454 1
A3719                                                                             ****  ONEOCT NEEDS A LOWER ORDER     ****
A3720                                                                             ****  WORD OF ZEROES                 ****
 3721                         26,3713    01130 1  6SECONDS DEC      600
 3722                         26,3714    00000 1  1.5SECS  2DEC     150
 3722                         26,3715    00226 1
 3723  REF   3  LAST  491     23,2523             ZERO/SP  EQUALS HI6ZEROS
 3724                            4616                      BLOCK  02
 3725  REF   3  LAST  226        6000                      SETLOC FFTAG5
 3726                            6025                      BANK
 3727  REF   1                                             COUNT* $$/P20
 3728                            6025  0 0006 1  GOTOV56   EXTEND                  P20 TERMINATES BY GOTOV56 INSTEAD OF
 3729  REF   1                   6026  3 6031 0            DCA      V856CADR       GOTOPOOH
 3730  REF   4  LAST  461        6027  1 5165 1            TCF      SUPDXCHZ
 3731  REF   2  LAST  490     E7,1471                      EBANK= WHOCARES
 3732  REF   2  LAST  263        6030    03045 0  V856CADR 2CADR    TRMTRACK
 3732                            6031    66107 1
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P3733    PROGRAM NAME: R29  (RENDEZVOUS RADAR DESIGNATE DURING POWERED FLIGHT)
R3734    MOD NO. 2        BY H. BLAIR-SMITH        JULY 2, 1968.


R3735    FUNCTIONAL DESCRIPTION:

R3736    DESIGNATES THE RENDEZVOUS RADAR TOWARD THE COMPUTED LOS TO THE CSM, WITH THE CHIEF OBJECTIVE OF OBTAINING RANGE
R3738    AND RANGE RATE DATA AT 2-SECOND INTERVALS FOR TRANSMISSION TO THE GROUND.  WHEN THE RR IS WITHIN .5 DEGREE OF
R3740    THE COMPUTED LOS, TRACKING IS ENABLED, AND DESIGNATION CONTINUES UNTIL THE DATA-GOOD DISCRETE IS RECEIVED.  AT
R3742    THAT POINT, DESIGNATION CEASES AND A RADAR-READING ROUTINE TAKES OVER, PREPARING A CONSISTENT SET OF DATA FOR
R3744    DOWN TELEMETRY.  THE SET INCLUDES RANGE, RANGE RATE, MARK TIME, TWO RR CDU ANGLES, THREE IMUCDU ANGLES, AND AN
R3746    INDICATOR WHICH IS 1 WHEN THE SET IS CONSISTENT AND 0 OTHERWISE.  THE INDICATOR IS IN TRKMKCNT.

R3749    CALLING SEQUENCE:  BEGUN EVERY 2 SECONDS AS AN INTEGRAL PART OF SERVICER


R3750    SUBROUTINES CALLED:

R3751    REMODE    RRTONLY
R3752    UNIT      MPACVBUF
R3753    QUICTRIG  AX*SR*T
R3754    SPSIN     SPCOS
R3755    SETRRECR  RROUT
R3756    RRRDOT    RRRANGE


R3757    EXIT:  TO NOR29NOW, IN SERVICER.


R3758    OUTPUT:  (ALL FOR DOWNLINK)

R3759    RM        RDOTM                     (RAW)
R3760    AIG       AMG
R3761    AOG       TRKMKCNT                  TRKMKCNT = 00001 IF SET IS CONSISTENT,
R3762    TANGNB    TANGNB +1                 OTHERWISE TRKMKCNT = 00000.
R3763    MKTIME
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P3764   ERASABLE INITIALIZATION REQUIRED:

R3765   NCR29FLG READRFLG           (TO 1 AND 0 BY FRESH START)  (RESET NOR29FLG TO LET SERVICER RUN R29)
R3767   PIPTIME  RADMODES (BIT 10)  (BIT SET TC 0 BY FRESH START)
R3768   R(CSM)   V(CSM)
R3769   R        V                  (PIPTIME THRU V BY AVE G IN SERVICER)


R3770   DEBRIS:

R3771   RADMODES (BIT 10)
R3772   LOSSM    LOSVDT/4      (= RRTARGET & LOSVEL)
R3773   SAVECOUT OLDESFLG      (SAVECOUT = MLOSV)
R3774   LCSCMFLG READRFLG


R3775   ALARMS:  NONE.


R3776   COMPONENT JOBS AND TASKS:

R3777   INITIALIZING, IF RR IS FOUND TC BE IN MODE 1:  JOB R29REMOJ AND TASK REMODE:  ALWAYS: TASK PREPOS29.
R3779   DESIGNATING:  TASK BEGDES29 & JOB R29DODES.
R3780   RADAR READING:  TASK R29READ AND JOB R29RDJOB.  ALL JOBS ARE NOVAC TYRE.


 3781                       33,2045              BANK    33
 3782   REF   1             33,2000              SETLOC  R29/SERV
 3783                       33,2045              BANK

 3784   REF   1                                  CCUNT*  $$/R29

 3785   REF   2  LAST  39      5014      NR29&RDR EQUALS  EBANK5
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P3786    SERVICER COMES TO R29 FROM "R29?" IF NOR29FLG, READRFLG, RRREMODE, RRCDUZRO, RRREPOS, AND DISPLAY-INERTIAL-DATA
R3788    ARE ALL RESET, AND THE RR IS IN LGC MODE (OFTEN CONFUSINGLY CALLED AUTO MODE).


 3790    REF  99   LAST  595    33,2045   4 0110 0  R29       CS      RADMODES
 3791    REF   5   LAST  550    33,2046   7 4742 0            MASK    DESIGBIT
 3792                           33,2047   0 0006 1            EXTEND
 3793    REF   1                33,2050   1 2123 1            BZF     R29.LOS           BRANCH IF DESIGNATION IS ALREADY ON.

 3794                           33,2051   0 0004 0            INHINT
 3795    REF 100   LAST  601    33,2052  26 110 0             ADS     RADMODES          SHOW THAT DESIGNATION IS NOW ON.
 3796    REF  54   LAST  593    33,2053   4 4736 0            CS      BIT14
 3797                           33,2054   0 0006 1            EXTEND
 3798    REF  40   LAST  594    33,2055  03 012 1             WAND    CHAN12            REMOVE RR TRACK ENABLE DISCRETE.
 3799    REF   2   LAST  556    33,2056   4 4740 1            CS      LOSCMBIT
 3800    REF  11   LAST  594    33,2057   7 0076 1            MASK    FLAGWRD2
 3801    REF  12   LAST  601    33,2060  54 076 1             TS      FLAGWRD2          CLEAR LOSCMFLG TO SHOW DES. LOOP IS OFF.
 3802    REF   1                33,2061   4 4753 0            CS      OLDESBIT
 3803    REF  39   LAST  555    33,2062   7 0074 0            MASK    STATE
 3804    REF  40   LAST  601    33,2063  54 074 0             TS      STATE             SHOW THAT DES. LOOP IS NOT REQUESTED.
 3805    REF 155   LAST  582    33,2064   0 4616 1            TC      BANKCALL
 3806    REF   3   LAST  544    33,2065    52167 0            CADR    SETRRECR          ENABLE RR ERROR COUNTERS.
 3807    REF  12   LAST  548    33,2066   3 4740 0            CA      ANTENBIT
 3808    REF 101   LAST  601    33,2067   7 0110 0            MASK    RADMODES
 3809    REF 205   LAST  577    33,2070  10 000 0             CCS     A                 TEST RR MODE BIT.
 3810    REF   1                33,2071   1 2104 1            TCF     SETPRPOS          MODE 2.

 3811    REF   2   LAST  330    33,2072   3 5031 0            CA      PRIO21            MODE 1; MUST REMODE.
 3812    REF  11   LAST  510    33,2073   0 5072 1            TC      NOVAC
 3813    REF  32   LAST  594    E7,1456                       EBANK=  LOSCOUNT
 3814    REF   1                33,2074    02113 0            2CADR   R29REMOJ          NEEDS OWN JOB TO PADSTALL IN.
 3814    REF   1                33,2075    66067 0
 3815    REF   6   LAST  601    33,2076   4 4742 0            CS      DESIGBIT
 3816    REF 102   LAST  601    33,2077   7 0110 0            MASK    RADMODES          CLEAR DESIGNATE FLAG IN RADMODES
 3817    REF 103   LAST  601    33,2100  54 110 0             TS      RADMODES          BEFORE CALLING REMODE
 3818    REF   6   LAST  594    33,2101   3 4736 1            CA      REMODBIT
 3819    REF 104   LAST  601    33,2102  26 110 0             ADS     RADMODES           SHOW THAT REMODING IS ON.
 3820    REF   1                33,2103   1 2573 0            TCF     NOR29NOW          CONTINUE SERVICER FUNCTIONS.

 3821    REF  74   LAST  567    33,2104   3 4753 1  SETPRPOS  CA      ONE
 3822    REF  25   LAST  594    33,2105   0 5203 0            TC      WAITLIST
 3823    REF  33   LAST  601    E7,1456                       EBANK=  LOSCOUNT
 3824    REF   1                33,2106    03604 0            2CADR   PREPOS29          TASK TO SET TRUNNION ANGLE TO -180 DEG.
 3824    REF   1                33,2107    52067 1
 3825    REF   7   LAST  561    33,2110   3 4741 1            CA      REPOSBIT
 3826    REF 105   LAST  601    33,2111  26 110 0             ADS     RADMODES          SHOW THAT REPOSITIONING IS ON.
 3827    REF   2   LAST  601    33,2112   1 2573 0            TCF     NOR29NOW
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P3828    FORCE RENDEZVOUS RADAR INTO MODE 2.


 3829    REF  75  LAST  601    33,2113   3 4753 1  R29REMOD CA      ONE
 3830    REF  26  LAST  601    33,2114   0 5203 0           TC      WAITLIST
 3831    REF  34  LAST  601    E7,1456                      EBANK=  LOSCOUNT
 3832    REF   2  LAST  550    33,2115    02202 0           2CADR   REMODE          REMODE MUST RUN AS A TASK.
 3832                          33,2116    52067 1
 3833    REF 156  LAST  601    33,2117   0 4616 1           TC      BANKCALL        WAIT FOR END OF REMODING.
 3834    REF  12  LAST  576    33,2120    17705 0           CADR    RADSTALL

 3835    REF 100  LAST  598    33,2121   1 5155 1           TCF     ENDOFJOB        BAD EXIT CAN'T HAPPEN.
 3836    REF 101  LAST  602    33,2122   1 5155 1           TCF     ENDOFJOB

R3837    TASK TO PREPOSITION THE RR TRUNNION ANGLE TO -180 DEG.

 3838    REF   1               25,2000                      SETLOC  R29S1
 3839                          25,3604                      BANK

 3840    REF   2  LAST  369    25,3604   3 4735 1  PREPOS29 CA      NEGMAX          -180 DEG.
 3841    REF   5  LAST  536    25,3605   0 2252 0           TC      RRTONLY         DRIVE TRUNNION CDU.
 3842    REF   8  LAST  601    25,3606   4 4741 0           CS      REPOSBIT        SHOW THAT REPOSITIONING IS OFF.
 3843    REF 106  LAST  601    25,3607   7 0110 0           MASK    RADMODES
 3844    REF 107  LAST  602    25,3610  54 110 0            TS      RADMODES
 3845    REF  27  LAST  597    25,3611   1 5261 0           TCF     TASKOVER


R3846    COMPUTE LINE-OF-SIGHT AND LOS VELOCITY, AND PASS THEM TO THE R29DOES LOOP.


 3848    REF   1               33,2045                      SETLOC  P29
 3849                          33,2123                      BANK

 3850                          33,2123   0 0006 1  R29.LOS  EXTEND
 3851    REF   4  LAST  338    33,2124   4 1234 1           DCS     PIPTIME
 3852    REF 259  LAST  579    33,2125  52 155 1            DXCH    MPAC
 3853                          33,2126   0 0006 1           EXTEND
 3854    REF  16  LAST  575    33,2127   3 0025 0           DCA     TIME2
 3855    REF 260  LAST  602    33,2130  20 155 1            DAS     MPAC            (MPAC) = T-PIPTIME, SCALED B-28.
 3856    REF   4  LAST  338    33,2131  54 163 1            TS      MODE            SET MODE TO DOUBLE PRECISION.
 3857    REF 261  LAST  602    33,2132   3 0155 0           CA      MPAC +1
 3858                          33,2133   0 0006 1           EXTEND
 3859    REF  23  LAST  554    33,2134   7 4740 1           MP      BIT12
 3860    REF 262  LAST  602    33,2135  52 155 1            DXCH    MPAC            T-PIPTIME NOW SCALED B-17.
 3861    REF  60  LAST  596    33,2136   0 6042 1           TC      INTPRET
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R3862   LOSCMFLG=0 MEANS THAT THE DESIGNATION IS READY FOR NEW DATA.  SETTING LOSCMFLG MAKES IT GO AWAY SO SETUP29D CAN
R3864   START IT UP WHEN THE DATA IS IN PLACE.

 3865                         33,2137   52315 1            PDVL    VSU                 PUSH DOWN T-PIPTIME.
 3866   REF   1               33,2140   01726 0                    V(CSM)
 3867   REF   2  LAST  149    33,2141   03527 1                    V                   LOSVEL = V(CSM) - V.
 3868                         33,2142   74325 0            PDDL    VXSC                SWAP LOSVEL FOR T-PIPTIME, MULTIPLY THEM
 3869                         33,2143   52255 1            VAD     VSU                  AND ADD THE RESULT TO R(CSM) - R TO GET
 3870   REF   1               33,2144   01720 0                    R(CSM)               AN UP-TO-DATE LOS VECTOR IN SM AXES.
 3871   REF   4  LAST  235    33,2145   03521 1                    R
 3872                         33,2146   77414 0            BOFSET  EXIT                (BOFSET DOES ITS THING INHINTED.)
 3873   REF   9  LAST  571    33,2147   01043 1                    LOSCMFLG            IF DESIGNATE LOOP IS OFF, CHANGE LOSCM-
 3874   REF   1               33,2150   66152 1                    SETUP29D             FLG TO ON AND GO TO SET UP NEW DATA.
 3875   REF   3  LAST  601    33,2151   1 2573 0           TCF     NOR29NOW            IF DES. LOOP IS ON, LET IT USE OLD DATA.

 3876   REF   1               33,2152   25101 0  SETUP29D  STOVL   LOSSM               LINE-OF-SIGHT VECTOR, STABLE MEMBER AXES
 3877                         33,2153   00001 0                    0
 3878                         33,2154   77761 1            VXSC
 3879   REF   1               33,2155   26177 1                    .5SEC817
 3880   REF   1               33,2156   01761 0            STORE   LOSVDT/4            1/2 SECOND'S WORTH OF LOS VELOCITY.
 3881                         33,2157   77414 0            CLEAR   EXIT
 3882   REF  10  LAST  603    33,2160   01263 1                    LOSCMFLG            LET R29DLOOP USE NEW DATA.

 3883   REF  41  LAST  601    33,2161   4 0074 0           CS      STATE
 3884   REF   2  LAST  601    33,2162   7 4753 0           MASK    OLDESBIT
 3885                         33,2163   0 0006 1           EXTEND
 3886   REF   4  LAST  603    33,2164   1 2573 0           BZF     NOR29NOW            BRANCH IF R29 DES. LOOP IS REQUESTED.
 3887                         33,2165   0 0004 0           INHINT
 3888   REF  42  LAST  603    33,2166   2 6074 0           ADS     STATE               OTHERWISE REQUEST IT NOW.

 3889   REF   1               33,2167   1 1055 1           CCS     PIPCTR              SEE IF TASK SHOULD BE OFFSET ONE SECOND.
 3890   REF   1               33,2170   4 4776 1           CS      SUPER110            -96D +100D = 4.
 3891   REF   4  LAST  383    33,2171   6 4777 1           AD      1SEC                0 +100D = 100D.
 3892   REF  27  LAST  602    33,2172   0 5203 0           TC      WAITLIST
 3893   REF  35  LAST  602    E7,1456                      EBANK=  LOSCOUNT
 3894   REF   1               33,2173   03357 0            2CADR   BEGDES29            START BEGDES29 TASK ASAP.
 3894   REF   1               33,2174   50067 0
 3895   REF   5  LAST  603    33,2175   1 2573 0           TCF     NOR29NOW            RELINT AND CONTINUE SERVICER FUNCTIONS.

 3896                         33,2176   00006 1  .5SEC817  2DEC    50 B-17
 3896                         33,2177   10000 0
```

```
P3897    R29 DESIGNATE JOB AND TASK MACHINERY.  TASK RECURS EVERY .5 SEC UNTIL DESIGNATE IS CALLED OFF; IT MAY WAIT FOR A
R3899    CENTISECOND OR TWO IF IT COMES UP WHILE SETUP29D IS SUPPLYING NEW DATA.


 3900                         24,3357                            BANK    24
 3901   REF    6  LAST  578   24,2000                            SETLOC  P20S
 3902                         24,3357                            BANK

 3903   REF    1                                                 COUNT*  $$/R29

 3904   REF    3  LAST  601   24,3357   3 5031 0   BEGDES29 CAF     PRIO21
 3905   REF   12  LAST  601   24,3360   0 5072 1            TC      NOVAC
 3906   REF    2  LAST  603   E3,1760                       EBANK=  LOSVDT/4
 3907   REF    1              24,3361    02550 0            2CADR   R29DODES        START R29DODES JOB TWICE A SECOND.
 3907   REF    1              24,3362    64063 0

 3908   REF    2  LAST  520   24,3363   3 4774 1   R29DLOOP CAF     .5SEC
 3909   REF    4  LAST  568   24,3364   0 5224 0            TC      VARDELAY

 3910   REF  108  LAST  602   24,3365   4 0110 0            CS      RADMODES
 3911   REF    7  LAST  601   24,3366   7 4742 0            MASK    DESIGBIT
 3912   REF  206  LAST  601   24,3367  10 000 0             CCS     A
 3913   REF   28  LAST  602   24,3370   1 5261 0            TCF     TASKOVER        QUIT IF DESIGNATION IS CALLED OFF

 3914   REF   13  LAST  601   24,3371   4 0076 1            CS      FLAGWRD2
 3915   REF    3  LAST  601   24,3372   7 4740 1            MASK    LOSCMBIT
 3916                         24,3373   0 0006 1            EXTEND
 3917                         24,3374   1 3377 0            BZF     +3              BRANCH IF SETUP29D'S SUPPLYING NEW DATA.
 3918   REF   14  LAST  604   24,3375  26 076 1             AOS     FLAGWRD2        SET LOSCMFLG: SHOW THAT DES. LOOP IS ON.
 3919   REF    2  LAST  603   24,3376   1 3357 1            TCF     BEGDES29

 3920   REF   76  LAST  602   24,3377   3 4753 1            CA      ONE
 3921   REF    1              24,3400   1 3364 1            TCF     R29DLOOP +1     WAIT A CENTISECOND FOR NEW DATA.
```

```
P3922   R29DODES:  RR DESIGNATION LOOP FOR R29

R3923   THIS ROUTINE DOES MUCH THE SAME THING AS DODES, BUT A GREAT DEAL FASTER.  IT TAKES THE NON-UNITIZED LOS VECTOR
R3925   IN STABLE MEMBER COORDINATES (LOSSM) AND A DELTA-LOS IN SM AXES (LOSVDT/4) WHICH IS 1/2 SEC TIMES LOS VELOCITY,
R3927   AND DEVELOPS THE SHAFT AND TRUNNION COMMANDS USING SINGLE PRECISION AS MUCH AS POSSIBLE, AND INTERPRETIVE NOT AT
R3929   ALL.  THE UNIT(LOSSM + LOSVEL * 1 SEC) IS COMPUTED IN DP AND TRANSFORMED TO NAV BASE COORDINATES IN DOUBLE PRE-
R3931   CISION (USING SP SINES AND COSINES OF CDU ANGLES), AND THE REST IS DONE IN SP.

R3933   THE FUNCTIONAL DIFFERENCE IS THAT R29DODES ALWAYS CLEARS LOSCMFLG WHEN IT ENDS, AND IT STARTS UP THE R29READ
R3935   TASK WHEN LOCK-ON IS ACHIEVED.


 3936                             32,2550                           BANK    32
 3937   REF   2  LAST   40        32,2000                           SETLOC  F2DPS*32
 3938                             32,2550                           BANK

 3939   REF   1                                                     COUNT*  $$/R29
 3940   REF   3  LAST  604        E3,1760                           EBANK=  LOSVDT/4

 3941   REF  77  LAST  604        32,2550   3 4753 1   R29DODES CA      ONE
 3942   REF  21  LAST  576        32,2551  55'106 0             TS      TANG              INDICATE 1ST PASS THRU VECTOR LOOP.
 3943   REF  12  LAST  557        32,2552   3 4756 1            CA      FIVE

 3944   REF 207  LAST  604        32,2553  10 000 0    R29DVBEG CCS     A                 COUNT DOWN BY TWOS IN VECTOR LOOP.
 3945   REF 173  LAST  566        32,2554  54 002 1             TS      Q
 3946   REF  22  LAST  605        32,2555  11'106 0             CCS     TANG
 3947   REF   1                   32,2556   1 2564 0            TCF     R29DPAS1          DO THIS ON 1ST PASS THRU LOOP.

 3948                             32,2557   0 0006 1            EXTEND                    (A "PASS" HERE MEANS 3 TIMES AROUND).
 3949   REF 174  LAST  605        32,2560   5 0002 0            INDEX   Q
 3950   REF   4  LAST  605        32,2561   3 1761 0            DCA     LOSVDT/4
 3951   REF 175  LAST  605        32,2562  50 002 0             INDEX   Q
 3952   REF   2  LAST  603        32,2563  21'101 1             DAS     LOSSM             ADVANCE LOS VECTOR 1/2 SECOND.

 3953                             32,2564   0 0006 1   R29DPAS1 EXTEND
 3954   REF 176  LAST  605        32,2565   5 0002 0            INDEX   Q
 3955   REF   3  LAST  605        32,2566   3 1101 0            DCA     LOSSM
 3956   REF 177  LAST  605        32,2567  50 002 0             INDEX   Q                 MOVE CURRENT LOS (1ST PASS) OR LOS PRO-
 3957   REF 263  LAST  602        32,2570  52 156 1             DXCH    MPAC +1           JECTED 1/2 SEC AHEAD (2ND PASS).
 3958   REF  23  LAST  605        32,2571  11'106 0             CCS     TANG
 3959   REF   1                   32,2572   1 2600 1            TCF     R29DVEND          BUG OUT HERE IN 1ST PASS.

 3960                             32,2573   0 0006 1            EXTEND
 3961   REF 178  LAST  605        32,2574   5 0002 0            INDEX   Q
 3962   REF   5  LAST  605        32,2575   3 1761 0            DCA     LOSVDT/4
 3963   REF 179  LAST  605        32,2576  50 002 0             INDEX   Q
 3964   REF 264  LAST  605        32,2577  20 156 1             DAS     MPAC +1           PROJECT LOS 1 SECOND AHEAD (2ND PASS).

 3965   REF 180  LAST  605        32,2600  10 002 1    R29DVEND CCS     Q
 3966   REF   1                   32,2601   1 2553 1            TCF     R29DVBEG          BRANCH TO CONTINUE VECTOR LOOP.
```

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R3967    UNITIZE AND TRANSFORM TO NAV BASE AXES THE PRESENT LOS (1ST PASS) OR THE 1-SEC PROJECTED LOS (2ND PASS).

 3969    REF 265  LAST  605    32,2602  52 156 1                DXCH   MPAC +1
 3970    REF 266  LAST  606    32,2603  52 155 1                DXCH   MPAC
 3971    REF   1               32,2604  3 2776 0                CA     R29FXLOC       = ADRES INTB15+ -340
 3972    REF  18  LAST  358    32,2605  54 120 0                TS     FIXLOC
 3973    REF   1               32,2606  0 4713 0                TC     USPRCADR       WITH FIXLOC ARMED FOR LENGTH AND LENGTH
 3974    REF   1               32,2607   01023 1                CADR   UNIT           SQUARED, BORROW UNITIZING ROUTINE.
 3975    REF   1               32,2610  0 7535 0                TC     MPACVBUF       MOVE UNIT(LOS) TO AX*SR*T ARG AREA.

 3976    REF  24  LAST  605    32,2611  11'106 0                CCS    TANG
 3977                          32,2612  1 2614 1                TCF    +2
 3978    REF   1               32,2613  1 2630 1                TCF    GOTANGLS       GET CDU ANGLES ONLY AFTER 1ST PASS.
 3979                          32,2614  0 0004 0                INHINT                ENSURE CONSISTENT CDU READINGS.
 3980                          32,2615  0 0006 1                EXTEND
 3981    REF  11  LAST  596    32,2616  3 0036 1                DCA    CDUT
 3982    REF   1               32,2617  53'767 1                DXCH   SAVECDUT       TRUNNION AND SHAFT ANGLES.
 3983    REF   3  LAST  575    32,2620  3 0033 1                CA     CDUY
 3984    REF  16  LAST  585    32,2621  54 765 1                TS     CDUSPOT
 3985    REF   6  LAST  359    32,2622  3 0034 0                CA     CDUZ
 3986    REF  17  LAST  606    32,2623  54 767 0                TS     CDUSPOT +2
 3987    REF  11  LAST  575    32,2624  3 0032 0                CA     CDUX
 3988    REF  18  LAST  606    32,2625  54 771 1                TS     CDUSPOT +4     CDU ANGLES IN FUNNY ORDER FOR AX*SR*T.
 3989    REF 157  LAST  602    32,2626  0 4616 1                TC     BANKCALL
 3990    REF   1               32,2627   47617 1                CADR   QUICTRIG       GET SINES AND COSINES OF CDU ANGLES.

 3991    REF  19  LAST  569    32,2630  4 6250 1       GOTANGLS CS     THREE
 3992    REF 158  LAST  606    32,2631  0 4616 1                TC     BANKCALL
 3993    REF   1               32,2632   47677 1                CADR   AX*SR*T        TRANSFORM UNIT LOS TO NB AXES (ULOSNB).

 3994    REF  25  LAST  606    32,2633  11'106 0                CCS    TANG
 3995                          32,2634  1 2636 1                TCF    +2
 3996    REF   1               32,2635  1 2703 0                TCF    R29DRAS2       GO TO RR COMMAND COMP. AFTER 2ND PASS.
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P3997    COMPUTE COSINE OF THE ANGLE BETWEEN THE PRESENT LOS AND THE RR BORESIGHT VECTOR, AND SET THE SELFTRACK ENABLE IF
R3999    THE COSINE IS APPROXIMATELY COS(.5 DEG) OR GREATER (I.E. SMALLER ANGLE).


 4000                             32,2636  C 0004 0              INHINT
 4001    REF  26  LAST  606       32,2637  55'106 0              TS      TANG              INDICATE 2ND PASS THRU VECTOR LOOP.
 4002    REF   2  LAST  606       32,2640  3 1766 1              CA      SAVECOUT
 4003    REF   3  LAST  191       32,2641  0 5032 0              TC      SPCOS
 4004    REF   2  LAST  253       32,2642  54 166 1              TS      PUSHLOC           PUSHLOC = COS T.
 4005    REF   3  LAST  607       32,2643  4 1766 0              CS      SAVECOUT
 4006    REF   3  LAST  190       32,2644  0 5033 1              TC      SPSIN
 4007    REF   5  LAST  602       32,2645  54 163 1              TS      MODE              MODE = -SIN T.
 4008                             32,2646  0 0006 1              EXTEND
 4009    REF  26  LAST  337       32,2647  7 0124 1              MP      VBUF +2           FORM - SIN T ULOSNBY.
 4010    REF 267  LAST  606       32,2650  52 155 1              DXCH    MPAC
 4011    REF   4  LAST  607       32,2651  3 1767 0              CA      SAVECOUT +1
 4012    REF   4  LAST  607       32,2652  0 5033 1              TC      SPSIN
 4013    REF   5  LAST  607       32,2653  55'766 0              TS      SAVECOUT          SAVECOUT NOW = SIN S.
 4014                             32,2654  0 0006 1              EXTEND
 4015    REF   3  LAST  607       32,2655  7 0166 1              MP      PUSHLOC
 4016                             32,2656  0 0006 1              EXTEND
 4017    REF  27  LAST  607       32,2657  7 0122 1              MP      VBUF              FORM SIN S COS T ULOSNBX.
 4018    REF 268  LAST  607       32,2660  20 155 1              DAS     MPAC
 4019    REF   6  LAST  607       32,2661  3 1767 0              CA      SAVECOUT +1
 4020    REF   4  LAST  607       32,2662  0 5032 0              TC      SPCOS
 4021    REF   7  LAST  607       32,2663  55'767 1              TS      SAVECOUT +1       SAVECOUT +1 NOW = COS S .
 4022                             32,2664  0 0006 1              EXTEND
 4023    REF   4  LAST  607       32,2665  7 0166 1              MP      PUSHLOC
 4024                             32,2666  0 0006 1              EXTEND
 4025    REF  28  LAST  607       32,2667  7 0126 0              MP      VBUF +4           FORM COS S COS T ULOSNBZ.
 4026    REF 269  LAST  607       32,2670  20 155 1              DAS     MPAC              COS(ERROR) = ULOSNB . (SIN S COS T,
 4027                             32,2671  0 0006 1              EXTEND                    - SIN T, COS S COS T).
 4028    REF 270  LAST  607       32,2672  3 0155 0              DCA     MPAC
 4029    REF 271  LAST  607       32,2673  20 155 1    TESTCOS   DAS     MPAC              (ULOSNB IN VBUF WAS A HALF-UNIT VECTOR).
 4030    REF 208  LAST  605       32,2674  10 000 0              CCS     A                 TEST FOR + OVERFLOW, NONE, OR MINUS.
 4031    REF  55  LAST  601       32,2675  3 4736 1              CA      BIT14
 4032                             32,2676  12 677 1              NOOP
 4033                             32,2677  0 0006 1              EXTEND
 4034    REF  41  LAST  601       32,2700  05 012 1              WOR     CHAN12            IF PLUS OVERFLOW, SET SELFTRACK ENABLE.
 4035                             32,2701  0 0003 1              RELINT
 4036    REF   2  LAST  605       32,2702  1 2552 0              TCF     R29DVBEG -1       MAKE 2ND PASS THRU VECTOR LOOP.
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```
P4037   COMPUTE SHAFT AND TRUNNION COMMANDS TO NULL HALF THE ERROR IN HALF A SECOND.


 4039   REF   8  LAST  607   32,2703  3 1767 0  R29DPAS2 CA       SAVECOUT +1
 4040                        32,2704  0 0006 1           EXTEND
 4041   REF  29  LAST  607   32,2705  7 0122 1           MP       VBUF              FORM COS S ULOSNB'X.
 4042   REF  27  LAST  607   32,2706  53'107 1           DXCH     TANG
 4043   REF   9  LAST  608   32,2707  4 1766 0           CS       SAVECOUT
 4044                        32,2710  0 0006 1           EXTEND
 4045   REF  30  LAST  608   32,2711  7 0126 0           MP       VBUF +4           FORM - SIN S ULOSNB'Z.
 4046   REF  28  LAST  608   32,2712  21'107 1           DAS      TANG               RAW SHAFT CMD = ULOSNB' . (COS S, 0,
 4047   REF   6  LAST  607   32,2713  4 0163 1           CS       MODE               - SIN S)
 4048                        32,2714  0 0006 1           EXTEND
 4049   REF  10  LAST  608   32,2715  7 1766 0           MP       SAVECOUT
 4050                        32,2716  0 0006 1           EXTEND
 4051   REF  31  LAST  608   32,2717  7 0122 1           MP       VBUF              FORM SIN T SIN S ULOSNB'X.
 4052   REF 272  LAST  607   32,2720  52 155 1           DXCH     MPAC
 4053   REF   5  LAST  607   32,2721  3 0166 0           CA       PUSHLOC
 4054                        32,2722  0 0006 1           EXTEND
 4055   REF  32  LAST  608   32,2723  7 0124 1           MP       VBUF +2           FORM COS T ULOSNB'Y.
 4056   REF 273  LAST  608   32,2724  20 155 1           DAS      MPAC
 4057   REF   7  LAST  608   32,2725  4 0163 1           CS       MODE
 4058                        32,2726  0 0006 1           EXTEND
 4059   REF  11  LAST  608   32,2727  7 1767 1           MP       SAVECOUT +1
 4060                        32,2730  0 0006 1           EXTEND
 4061   REF  33  LAST  608   32,2731  7 0126 0           MP       VBUF +4           FORM SIN T COS S ULOSNB'Z.
 4062   REF 274  LAST  608   32,2732  20 155 1           DAS      MPAC              RAW TRUNNION CMD = ULOSNB' .
 4063   REF 275  LAST  608   32,2733  3 0154 1           CA       MPAC              (SIN S SIN T, COS T, SIN S COS T).
 4064                        32,2734  0 0006 1           EXTEND
 4065   REF   1              32,2735  7 2777 0           MP       RR29GAIN
 4066   REF   4  LAST  554   32,2736  55'354 0           TS       TRUNNCMD
 40665  REF  29  LAST  608   32,2737  3 1106 1           CA       TANG
 4067                        32,2740  0 0006 1           EXTEND
 4068   REF   2  LAST  608   32,2741  7 2777 0           MP       RR29GAIN
 4069   REF   2  LAST  554   32,2742  55'355 1           TS       SHAFTCMD          STORE REFINED SHAFT COMMAND FOR RROUT
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P4070    WHETHER OR NOT TRACKING WAS ENABLED THIS TIME, CHECK ON RR DATA-GOOD.  IF PRESENT, STOP DESIGNATING AND START
R4072    READING DATA FROM THE RENDEZVOUS RADAR.


 4073    REF  28  LAST  597    32,2743  3 4750 1  DGOOD?    CAF     BIT4
 4074                          32,2744  0 0006 1            EXTEND
 4075    REF  21  LAST  597    32,2745  02 033 0            RAND    CHAN33           GET RR DATA-GOOD BIT.
 4076                          32,2746  0 0004 0            INHINT                   (MAINLY FOR RRCUT).
 4077                          32,2747  0 0006 1            EXTEND
 4078    REF   1               32,2750  1 2754 1            BZF     R29LOKON         BRANCH IF DATA-GOOD IS PRESENT.

 4079    REF 159  LAST  606    32,2751  0 4616 1            TC      BANKCALL
 4080    REF   3  LAST  556    32,2752   52317 0            CADR    RRCUT            DATA-GOOD IS ABSENT, SO SEND COMMANDS.
 4081    REF   1               32,2753  1 2772 0            TCF     END29DOD

 4082    REF   8  LAST  604    32,2754  4 4742 0  R29LOKON  CS      DESIGBIT
 4083    REF 109  LAST  604    32,2755  7 0110 0            MASK    RADMODES
 4084    REF 110  LAST  609    32,2756  54 110 0            TS      RADMODES         SHOW THAT DESIGNATION IS OVER.
 4085    REF  34  LAST  577    32,2757  4 4752 1            CS      BIT2
 4086                          32,2760  0 0006 1            EXTEND
 4087    REF  42  LAST  607    32,2761  03 012 1            WAND    CHAN12           DISABLE RR ERROR COUNTERS.
 4088    REF   2  LAST  222    32,2762  3 4743 0            CA      READRBIT
 4089    REF  11  LAST  559    32,2763  26 077 0            ADS     FLAGWRD3         SHOW THAT READING HAS BEEN REQUESTED.
 4090    REF   2  LAST  603    32,2764  11 055 1            CCS     PIPCTR           SEE IF TASK SHOULD BE OFFSET 1 SEC.
 4091    REF   2  LAST  603    32,2765  4 4776 1            CS      SUPER110         - 96D + 100D = 4.
 4092    REF   5  LAST  603    32,2766  6 4777 1            AD      1SEC             0 + 100D = 100D.
 4093    REF  28  LAST  603    32,2767  0 5203 0            TC      WAITLIST
 4094    REF  36  LAST  603    E7,1456                      EBANK=  LOSCOUNT
 4095    REF   1               32,2770   03401 1            2CADR   R29READ          START READING TASK AND JOB.
 4095    REF   1               32,2771   50067 0

 4096    REF   4  LAST  604    32,2772  4 4740 1  END29DOD  CS      LOSCMBIT
 4097    REF  15  LAST  604    32,2773  7 0076 1            MASK    FLAGWRD2
 4098    REF  16  LAST  609    32,2774  54 076 1            TS      FLAGWRD2         ALWAYS CLEAR LOSCMFLG.
 4099    REF 102  LAST  602    32,2775  1 5155 1            TCF     ENDOFJOB


 4100    REF   4  LAST   96    32,2776   00052 0  R29FXLOC  ADRES   INTB15+ -34D
 4101                          32,2777   56655 1  RR29GAIN  DEC     -.53624
 4102    REF   6  LAST  595    E3,1760            LOSVDT/4  EQUALS  LOSVEL
 4103    REF  14  LAST  595       1100            LOSSM     EQUALS  RRTARGET
 4104    REF   6  LAST  572    E3,1766            SAVECOUT  EQUALS  MLOSV
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P4105    RR READING IS SET UP BY R29CODES WHEN IT DETECTS RR LOCK-ON.


 4106                            24,3401                           BANK    24
 4107    REF   7  LAST  604      24,2000                           SETLOC  P20S
 4108                            24,3401                           BANK

 4109    REF   2 LAST  604 TO  605:     18     18*                 COUNT*  $$/R29

 4110    REF  37  LAST  609      E7,1456                           EBANK=  LOSCOUNT

 4111    REF  10  LAST  550      24,3401  3 7717 1  R29READ       CAF     PRIO26            CALLED BY WAITLIST.
 4112    REF  13  LAST  604      24,3402  0 5072 1                 TC      NOVAC
 4113    REF  38  LAST  610      E7,1456                           EBANK=  LOSCOUNT
 4114    REF   1                 24,3403   03414 0                 2CADR   R29RDJOB          START JOB TO READ AND DOWNLINK FOR R29.
 4114    REF   1                 24,3404   50067 0

 4115    REF   2  LAST  568      24,3405  3 5000 1                 CA      2SECS
 4116    REF   5  LAST  604      24,3406  0 5224 0                 TC      VARDELAY

 4117    REF  12  LAST  609      24,3407  3 0077 1                 CA      FLAGWRD3          2 SECONDS LATER, SEE IF READING IS STILL
 4118    REF   3  LAST  609      24,3410  7 4743 1                 MASK    READRBIT          ALLOWED (NO TRACKER FAIL ETC.)
 4119    REF 209  LAST  607      24,3411  10 000 0                 CCS     A
 4120    REF   2  LAST  609      24,3412  1 3401 0                 TCF     R29READ           IT'S OK; CALL IT AGAIN.
 4121    REF  29  LAST  604      24,3413  1 5261 0                 TCF     TASKOVER          IT AIN'T; WAIT FOR REDESIGNATE.

 4122    REF  13  LAST  610      24,3414  3 0077 1  R29RDJOB CA      FLAGWRD3          CALLED VIA NOVAC.
 4123    REF   3  LAST  282      24,3415  7 4741 0                 MASK    NR29FBIT
 4124    REF 210  LAST  610      24,3416  10 000 0                 CCS     A                 TEST "NOR29FLG".
 4125    REF   1                 24,3417  1 3501 1                 TCF     ENDR29RD          R29 OVER,EXIT WITH RR STILL LOCKED ON
 4126    REF 111  LAST  609      24,3420  3 0110 1                 CA      RADMODES
 4127    REF   6  LAST  541      24,3421  7 4752 1                 MASK    AUTOMBIT
 4128    REF 211  LAST  610      24,3422  10 000 0                 CCS     A                 TEST RR-NOT-IN-AUTO-MODE BIT.
 4129    REF   1                 24,3423  1 3476 0                 TCF     ENDRRD29          ASTRO TOOK RR OUT OF AUTO MODE.

 4130    REF 160  LAST  609      24,3424  0 4616 1                 TC      BANKCALL
 4131    REF   5  LAST  575      24,3425   53112 0                 CADR    RRRDOT            INITIATE READING OF RANGE RATE.
 4132    REF 161  LAST  610      24,3426  0 4616 1                 TC      BANKCALL
 4133    REF  13  LAST  602      24,3427   17705 0                 CADR    RADSTALL          GO TO SLEEP UNTIL IT'S READY.
 4134    REF   2  LAST  610      24,3430  1 3476 0                 TCF     ENDRRD29          BAD READ; REDESIGNATE.
```

```
P4135    R29 RADAR READING CONTINUED.


 4136    REF   7  LAST  575    24,3431  53'105 0           DXCH    TIMEHOLD
 4137    REF 276  LAST  608    24,3432  52 155 1           DXCH    MPAC              TIME OF RR READING, FOR DOWNLINK.
 4138                          24,3433  0 0004 0           INHINT                    BE SURE OF 5 CONSISTENT CDU ANGLES.
 4139                          24,3434  0 0006 1           EXTEND
 4140    REF  12  LAST  606    24,3435  3 0036 1           DCA     CDUT
 4141    REF 277  LAST  611    24,3436  52 157 0           DXCH    MPAC +2           RRCDU ANGLES AT RR READ, FOR DOWNLINK.
 4142                          24,3437  0 0006 1           EXTEND
 4143    REF   4  LAST  606    24,3440  3 0034 0           DCA     CDUY
 4144    REF 278  LAST  611    24,3441  52 161 0           DXCH    MPAC +4           MPAC'S 7 WORDS ARE BUFFER FOR COPYCYCLE.
 4145    REF  12  LAST  606    24,3442  3 0032 0           CA      CDUX
 4146    REF 279  LAST  611    24,3443  54 162 0           TS      MPAC +6           IMUCDU ANGLES AT RR READ, FOR DOWNLINK.

 4147    REF 162  LAST  610    24,3444  0 4616 1  R29RANGE TC      BANKCALL
 4148    REF   4  LAST  576    24,3445   53114 0           CADR    RRRANGE           INITIATE READING OF RR RANGE.
 4149    REF 163  LAST  611    24,3446  0 4616 1           TC      BANKCALL
 4150    REF  14  LAST  610    24,3447   17705 0           CADR    RADSTALL          GO TO SLEEP UNTIL IT'S READY.
 4151    REF   1               24,3450  1 3467 0           TCF     R29RRR?           BAD READ OR SCALE CHANGE ... WHICH?

 4152                          24,3451  0 0004 0           INHINT
 4153    REF   7  LAST  576    24,3452  53'331 0           DXCH    DNRRANGE          COPYCYCLE TO LAY OUT NEW R29 DOWNLINK.
 4154    REF   6  LAST  583    24,3453  53'757 1           DXCH    RM
 4155    REF 280  LAST  611    24,3454  52 155 1           DXCH    MPAC
 4156    REF   7  LAST  589    24,3455  53'755 0           DXCH    MKTIME
 4157    REF 281  LAST  611    24,3456  52 157 0           DXCH    MPAC +2
 4158    REF   9  LAST  596    24,3457  53'753 0           DXCH    TANGNB
 4159    REF 282  LAST  611    24,3460  52 161 0           DXCH    MPAC +4
 4160    REF   8  LAST  591    24,3461  53'460 0           DXCH    AIG
 4161    REF 283  LAST  611    24,3462  3 0162 1           CA      MPAC +6
 4162    REF   6  LAST  585    24,3463  55'461 1           TS      AOG
 4163    REF  78  LAST  605    24,3464  3 4753 1           CA      ONE
 4164    REF   4  LAST  316    24,3465  55'462 1           TS      TRKMKCNT          SHOW THAT DOWNLINK DATA IS CONSISTENT.
 4165    REF 103  LAST  609    24,3466  1 5155 1           TCF     ENDOFJOB

 4166    REF  18  LAST  577    24,3467  4 0101 0  R29RRR?  CS      FLAGWRD5
 4167    REF  29  LAST  555    24,3470  7 4742 0           MASK    BIT10
 4168    REF 212  LAST  610    24,3471  10 000 0           CCS     A                 WAS IT A SCALE CHANGE (REAL OR PHONY)?
 4169    REF   3  LAST  610    24,3472  1 3476 0           TCF     ENDRR029          NO, A BAD READ; REDESIGNATE.
 4170    REF  62  LAST  575    24,3473  0 5516 0           TC      DOWNFLAG
 4171    REF   3  LAST  575    24,3474   00120 1           ADRES   RNGSCFLG
 4172    REF   1               24,3475  1 3444 1           TCF     R29RANGE          YES: CLEAR FLAG AND READ AGAIN.

 4173    REF  56  LAST  607    24,3476  4 4736 0  ENDRR029 CS      BIT14             TROUBLE MADE US COME HERE TO LEAVE THE
 4174                          24,3477  0 0006 1           EXTEND                    RR-READING MODE. DISCREDIT DOWNTEL
 4175    REF  43  LAST  609    24,3500  03 012 1           WAND    CHAN12
 4176    REF 124  LAST  593    24,3501  3 4755 1  ENDR29RD CA      ZERO
 4177    REF   5  LAST  611    24,3502  55'462 1           TS      TRKMKCNT
 4178    REF  63  LAST  611    24,3503  0 5516 0           TC      DOWNFLAG
 4179    REF   1               24,3504   00063 1          ADRES   READRFLG
 4180    REF 104  LAST  611    24,3505  1 5155 1          TCF     ENDOFJOB
```

```
P4181    W-MATRIX MONITOR

 4182                              31,2007                           BANK    31
 4183    REF   1                   31,2000                           SETLOC  VB67
 4184                              31,2007                           BANK
 4185    REF   1                                                     COUNT*  $$/EXTV8

 4186    REF   3  LAST  319        E4,1600                           EBANK=  WWPOS

 4187    REF  61  LAST  602        31,2007  0 6042 1  V67CALL   TC      INTPRET
 4188                              31,2010   77624 1            CALL
 4189    REF   1                   31,2011   62120 0                    V67WW
 4190                              31,2012   77776 1            EXIT
 4191                              31,2013  0 0006 1            EXTEND                      SAVE THE PRESENT N99 VALUES FOR
 4192    REF   4  LAST  613        31,2014  3 1601 1            DCA     WWPOS               COMPARISON AFTER THE DISPLAY
 4193    REF   2  LAST  319        31,2015  53'607 0            DXCH    WWBIAS +2
 4194                              31,2016  0 0006 1            EXTEND
 4195    REF   2  LAST  319        31,2017  3 1603 0            DCA     WWVEL
 4196    REF   3  LAST  613        31,2020  53'611 1            DXCH    WWBIAS +4
 4197                              31,2021  0 0006 1            EXTEND
 4198    REF   4  LAST  613        31,2022  3 1605 0            DCA     WWBIAS
 4199    REF   5  LAST  613        31,2023  53'613 0            DXCH    WWBIAS +6
 4200    REF   1                   31,2024  3 2143 0  V06N99DS  CAF     V06N99
 4201    REF 164  LAST  611        31,2025  0 4616 1            TC      BANKCALL
 4202    REF   7  LAST  292        31,2026   20334 1            CADR    GOXDSPF
 4203    REF  33  LAST  492        31,2027  1 5472 1            TCF     ENDEXT
 4204    REF   1                   31,2030  1 2032 0            TCF     V6N99PRO
 4205    REF   1                   31,2031  1 2024 1            TCF     V06N99DS
 4206                              31,2032  22 007 0  V6N99PRO  ZL
 4207    REF  13  LAST  605        31,2033  3 4756 1            CA      FIVE
 4208    REF 181  LAST  605        31,2034  54 002 1  N99LOOP   TS      Q
 4209    REF 182  LAST  613        31,2035  50 002 0            INDEX   Q
 4210    REF   5  LAST  613        31,2036  4 1600 1            CS      WWPOS
 4211    REF 183  LAST  613        31,2037  50 002 0            INDEX   Q
 4212    REF   6  LAST  613        31,2040  6 1606 0            AD      WWPOS +6
 4213    REF  93  LAST  575        31,2041  26 001 1            ADS     L
 4214    REF 184  LAST  613        31,2042  10 002 1            CCS     Q                   THE SUM OF ALL DIFFERENCES MUST BE ZERO.
 4215    REF   1                   31,2043  1 2034 0            TCF     N99LOOP
 4216    REF 213  LAST  611        31,2044  22 000 1            LXCH    A
 4217                              31,2045  0 0006 1            EXTEND
 4218    REF   1                   31,2046  1 2051 0            BZF     V06N9933
 4219    REF  35  LAST  562        31,2047  0 5504 0            TC      UPFLAG
 4220    REF   1                   31,2050   00160 0            ADRES   V67FLAG

 4221    REF  62  LAST  613        31,2051  0 6042 1  V06N9933  TC      INTPRET
 4222                              31,2052   77414 0            BON     EXIT
 4223    REF   2  LAST  613        31,2053   03707 1                    V67FLAG
 4224                              31,2054   62056 0                    +2
 4225    REF  34  LAST  613        31,2055  1 5472 1            TCF     ENDEXT
 4226                              31,2056   77745 1            DLOAD
 4227   REF   7  LAST  613    31,2057   02201 0                       WWPOS
 4228                         31,2060   72412 0              SL4      SL1
 4229                         31,2061   14001 0              STODL    00
 4230   REF   3  LAST  613    31,2062   02203 1                       WWVEL
 4231                         31,2063   14003 1              STODL    20
 4232   REF   6  LAST  613    31,2064   02205 1                       WWBIAS
 4233                         31,2065   77661 0              SL                        SHIFT FROM NOUN SCALING (B-5) TO
 4234                         31,2066   20213 0                       100              INTERNAL SCALING (B+5)
 4235                         31,2067   00005 1              STORE    4D
 4236                         31,2070   72014 1              BON      LXA,1
 4237   REF  12  LAST  590    31,2071   04307 1                       SURFFLAG
 4238   REF   1               31,2072   62102 0                       V67SURF
 4239                         31,2073   00000 1                       00
 4240                         31,2074   72130 0              SXA,1    LXA,1
 4241   REF   3  LAST  590    31,2075   02000 0                       WRENDPOS
 4242                         31,2076   00002 0                       20
 4243                         31,2077   52130 1              SXA,1    GOTO
 4244   REF   2  LAST  590    31,2100   02001 1                       WRENDVEL
 4245   REF   1               31,2101   62110 0                       V67CLRF
 4246                         31,2102   66150 0  V67SURF     LXA,1    SXA,1
 4247                         31,2103   00000 1                       00
 4248   REF   2  LAST  590    31,2104   02006 0                       WSURFPOS
 4249                         31,2105   66150 0              LXA,1    SXA,1
 4250                         31,2106   00002 0                       20
 4251   REF   2  LAST  590    31,2107   02007 1                       WSURFVEL
 4252                         31,2110   66150 0  V67CLRF     LXA,1    SXA,1
 4253                         31,2111   00004 0                       40
 4254   REF   2  LAST  591    31,2112   02003 0                       WTRUN
 4255                         31,2113   77730 0              SXA,1
 4256   REF   2  LAST  590    31,2114   02002 1                       WSHAFT
 4257                         31,2115   77414 0              CLEAR    EXIT
 4258   REF   9  LAST  591    31,2116   02676 1                       RENDWFLG
 4259   REF  35  LAST  613    31,2117  1 5472 1              TCF      ENDEXT
 4260                         31,2120   40020 1  V67WW       STQ      BOV
 4261   REF   5  LAST  382    31,2121   00051 0                       S2
 4262                         31,2122   62123 0                       +1
 4263                         31,2123   45014 0              CLEAR    CALL
 4264   REF   3  LAST  613    31,2124   03667 0                       V67FLAG
 4265   REF  17  LAST  589    31,2125   27410 1                       INTSTALL
 4266                         31,2126   71331 0              SSP      OLDA0
 4267   REF   6  LAST  387    31,2127   00051 0                       S1
 4268                         31,2130   00006 1              DEC      6
 4269   REF   6  LAST  587    31,2131   06524 1                       ZEROVECS
 4270   REF   8  LAST  614    31,2132   02201 0              STORE    WWPOS
 4271   REF   4  LAST  614    31,2133   02203 1              STORE    WWVEL
 4272   REF   7  LAST  614    31,2134   02205 1              STORE    WWBIAS
 4273                         31,2135   77770 1              AXT,1
 4274                         31,2136   00066 1              DEC      54
 4275                         31,2137   47573 0  NXPOSVEL    VLOAD*   VSQ
 4276   REF  15  LAST  591    31,2140   02467 0                       W  +540,1
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L         P20-P25                                                                         USER'S PAGE NO. 120      E4 S3

 4277                          31,2141   77650 1             GOTO
 4278   REF   1                31,2142   60002 0                     ADDPOS
 4279                          31,2143   01543 1   V06N99    VN      0699

 4280   REF   1                30,2000                       SETLOC  V867A
 4281                          30,2002                       BANK
 4282   REF   1                                              COUNT*  $$/EXTVB

 4283                          30,2002   77615 0   ADDPOS    DAD
 4284   REF   9   LAST  614    30,2003   02201 0                     WWPOS
 4285   REF  10   LAST  615    30,2004   02201 0             STORE   WWPOS
 4286                          30,2005   47573 0             VLOAD*  VSQ
 4287   REF  16   LAST  614    30,2006   02555 0                     W +1080,1
 4288                          30,2007   77615 0             DAD
 4289   REF   5   LAST  614    30,2010   02203 1                     WWVEL
 4290   REF   6   LAST  615    30,2011   02203 1             STORE   WWVEL
 4291                          30,2012   47573 0             VLOAD*  VSQ
 4292   REF  17   LAST  615    30,2013   02643 1                     W +1620,1
 4293                          30,2014   77615 0             DAD
 4294   REF   8   LAST  614    30,2015   02205 1                     WWBIAS
 4295   REF   9   LAST  615    30,2016   02205 1             STORE   WWBIAS
 4296                          30,2017   75500 0             TIX,1   SQRT
 4297   REF   1                30,2020   62137 0                     NXPOSVEL
 4298                          30,2021   77661 0             SR                      SHIFT FROM INTERNAL SCALING (8+5) TO
 4299                          30,2022   20613 1                     10D             NOUN SCALING (8-5)
 4300   REF  10   LAST  615    30,2023   16205 1             STODL   WWBIAS
 4301   REF   7   LAST  615    30,2024   02203 1                     WWVEL
 4302                          30,2025   77766 0             SQRT
 4303   REF   8   LAST  615    30,2026   16203 1             STODL   WWVEL
 4304   REF  11   LAST  615    30,2027   02201 0                     WWPOS
 4305                          30,2030   77766 0             SQRT
 4306   REF  12   LAST  615    30,2031   02201 0             STORE   WWPOS
 4307                          30,2032   52000 0             BOV     GOTO
 4308                          30,2033   60035 1                     +2
 4309   REF   1                30,2034   60042 1                     V67XXX
 4310                          30,2035   77745 1             DLOAD
 4311   REF   4   LAST  380    30,2036   06532 0                     DPPOSMAX
 4312   REF  13   LAST  615    30,2037   02201 0             STORE   WWPOS
 4313   REF   9   LAST  615    30,2040   02203 1             STORE   WWVEL
 4314   REF  11   LAST  615    30,2041   02205 1             STORE   WWBIAS
 4315                          30,2042   45345 1   V67XXX    DLOAD   DSU
 4316   REF  14   LAST  615    30,2043   02201 0                     WWPOS
 4317   REF   1                30,2044   20060 0                     FT99999
 4318                          30,2045   71240 1             BMN     DLOAD
 4319                          30,2046   60051 0                     +3
 4320   REF   2   LAST  615    30,2047   20060 0                     FT99999
 4321   REF  15   LAST  615    30,2050   02201 0             STORE   WWPOS
 4322                          30,2051   66150 0             LXA,1   SXA,1
 4323   REF   6   LAST  614    30,2052   00051 0                     S2
 4324   REF   2   LAST  300    30,2053   00052 0                     QPRET
 4325                          30,2054   77776 1               EXIT
 4326   REF  40  LAST  569     30,2055  C 4635 0               TC       POSTJUMP
 4327   REF   2  LAST  300     30,2056   27421 0               CADR     INTWAKE

 4328                          30,2057   01670 1   FT99999   2CEC     30479 B-19
 4328                          30,2060   17000 1
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P4329
 4330                               25,3612                                  BANK    25
 4331    REF    3  LAST   559       25,2000                                  SETLOC  RADARUPT
 4332                               25,3612                                  BANK
 4333    REF    3 LAST   559 TO   567:     237     240*                      COUNT*  $$/RRUPT

 4334    REF   39  LAST   610       E7,1456                                  EBANK=  LOSCOUNT

 4346    REF   28  LAST   560       25,3612   4 4747 0   RADLITES CS         BIT5
 4347    REF   28  LAST   563       25,3613   6 0061 0            AD         ITEMP1
 4348    REF  214  LAST   613       25,3614  10 000 0             CCS        A
 4349    REF   79  LAST   611       25,3615   4 4753 0            CS         ONE
 4350    REF    1                   25,3616   1 3646 1            TCF        VLIGHT

 4351    REF    1                   25,3617   1 4570 0            TCF        RRTRKF

 4352    REF    4  LAST   259       25,3620  54 065 0   HLIGHT    TS         ITEMP5          ZERO ITEMP5 FOR H INDEX

 4353    REF    1                   25,3621   3 4747 1            CA         HLITE
 4354    REF   94  LAST   613       25,3622  54 001 1             TS         L

 4359    REF    1                   25,3623   3 4747 1            CA         LRALTBIT
 4360    REF  112  LAST   610       25,3624   7 0110 0   BOTHLITS MASK       RADMODES
 4361    REF  215  LAST   617       25,3625  10 000 0             CCS        A
 4362    REF    1                   25,3626   1 3640 1            TCF        ONLITES

 4363    REF    5  LAST   559       25,3627   3 0107 1            CA         FLGWRD11
 4364    REF    5  LAST   617       25,3630  50 065 1             INDEX      ITEMP5
 4365    REF    1                   25,3631   7 4753 0            MASK       HFLSHBIT
 4366    REF  216  LAST   617       25,3632  10 000 0             CCS        A
 4367    REF    2  LAST   617       25,3633   1 4570 0            TCF        RRTRKF

 4368                               25,3634   0 0006 1   LITIT    EXTEND
 4369    REF    3  LAST   182       25,3635  22 066 1             QXCH       ITEMP6
 4370    REF    2  LAST   528       25,3636   0 4602 1            TC         TRKFLON +1

 4371    REF    4  LAST   617       25,3637   0 0066 1            TC         ITEMP6

 4374    REF    6  LAST   617       25,3640  50 065 1   ONLITES   INDEX      ITEMP5
 4375    REF    2  LAST   617       25,3641   4 4753 0            CS         HFLSHBIT
 4376    REF    6  LAST   617       25,3642   7 0107 0            MASK       FLGWRD11
 4377    REF    7  LAST   617       25,3643  54 107 0             TS         FLGWRD11

 4378    REF   95  LAST   617       25,3644   3 0001 0            CA         L
 4379    REF    1                   25,3645   1 3634 1            TCF        LITIT
 4380    REF    7  LAST   617       25,3646  54 065 0   VLIGHT    TS         ITEMP5
 4381    REF    1                   25,3647   3 4751 0            CA         VLITE
 4382    REF   96  LAST   617       25,3650  54 001 1             TS         L
 4383    REF   27  LAST   560       25,3651   3 4744 1            CA         BIT8
 4384    REF    1                   25,3652   1 3624 0            TCF        BOTHLITS
 4385    REF  29  LAST  617      4747            HLITE    EQUALS BIT5
 4386    REF  30  LAST  575      4751            VLITE    EQUALS BIT3


*** END OF LEMP20S .145 ***
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L        P30,P37                                                                USER'S PAGE NO.   1       EO S3

P0023    PROGRAM DESCRIPTION  P30     DATE 3-6-67

R0024    MOD.1  BY  RAMA AIYAWAR
R0025    FUNCTIONAL DESCRIPTION
R0026       ACCEPT ASTRONAUT INPUTS OF TIG,DELV(LV)
R0027       CALL IMU STATUS CHECK ROUTINE (R02)
R0028       DISPLAY TIME TO GO, APOGEE, PERIGEE, DELV(MAG), MGA AT IGN
R0029       REQUEST BURN PROGRAM

R0030    CALLING SEQUENCE VIA JOB FROM V37

R0031    EXIT VIA V37 CALL OR TO GOTOPOOH (V34E)

R0032    SUBROUTINE CALLS-FLAGUP, PHASCHNG, BANKCALL, ENDOFJOB, GOFLASH, GOFLASHR
R0033                     GOPERF3R, INTPRET, BLANKET, GOTOPOOH, R02BOTH, S30.1,
R0034                     TTG/N35, MIDGIM, DISPMGA

R0035    ERASABLE INITIALIZATION- STATE VECTOR

R0036    OUTPUT-RINIT, VINIT, +MGA, VTIG, RTIG, DELVSIN, DELVSAB, DELVSLV, HAPO,
R0037           HPER, TTOGO

R0038    DEBRIS- A,L, MPAC, PUSHLIST

 00381                           32,3000                         BANK     32
 00382  REF    1                 35,2000                         SETLOC   P30S
 00383                           35,2000                         BANK
 00384  REF    2  LAST  316      E4,1652                         EBANK=   +MGA
 0039   REF    1                                                 COUNT*   $$/P30
 0040   REF   36  LAST  613      35,2000  0 5504 0  P30          TC       UPFLAG          SET UPDATE FLAG
 0041   REF    3  LAST  499      35,2001   00027 1               ADRES    UPDATFLG
 00411  REF   37  LAST  619      35,2002  0 5504 0               TC       UPFLAG          SET TRACK FLAG
 00412  REF    4  LAST  506      35,2003   00031 0               ADRES    TRACKFLG

 0042   REF    1                 35,2004  3 2032 1  P30N33       CAF      V06N33          T OF IGN
 0043   REF    1                 35,2005  0 3621 1               TC       VNPOOH          RETURNS ON PROCEED, POOH ON TERMINATE

 0051   REF    1                 35,2006  3 3636 1               CAF      V06N81          DISPLAY DELTA V (LV)
 0052   REF    2  LAST  619      35,2007  0 3621 1               TC       VNPOOH              REDISPLAY ON RECYCLE

 0057   REF   64  LAST  611      35,2010  0 5516 0               TC       DOWNFLAG        RESET UPDATE FLAG
 0058   REF    4  LAST  619      35,2011   00027 1               ADRES    UPDATFLG
 0059   REF   63  LAST  613      35,2012  0 6042 1               TC       INTPRET
 0060                            35,2013   77624 1               CALL
 0061   REF    1                 35,2014   70000 0                        S30.1
 0067   *                        35,2015   43014 0               SET      SET
 00675  REF    5  LAST  619      35,2016   00470 1                        UPDATFLG
 00676 *REF    1                 35,2017   01067 1                        XDELVFLG
 00677 *                         35,2020   77776 1               EXIT
 0068   REF    1                 35,2021  3 2033 0  PARAM30      CAF      V06N42          DISPLAY APOGEE,PERIGEE ,DELTA V
 0069   REF    3  LAST  619   35,2022  0 3621 1              TC    VNPOOH

 0070   REF   64  LAST  619   35,2023  0 6042 1              TC    INTPRET
 0071  *                      35,2024   77614 1              SET
 0072  *REF    1              35,2025   01071 0                    FINALFLG
 0074                         35,2026   77624 1  REVN1645   CALL
 0075   REF    1              35,2027   73515 1                    VN1645
 0076                         35,2030   77650 1              GOTO                    COMES HERE ON RECYCLE RESPONSE
 0077   REF    1              35,2031   72026 0                    REVN1645

 0100                         35,2032   01441 1  V06N33     VN     0633
 0102                         35,2033   01452 0  V06N42     VN     0642
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P0105    PROGRAM DESCRIPTION S30.1       DATE 9NOV66

R0106    MOD NO 1          LOG SECTION  P30,P37
R0107    MOD  BY  RAMA AIYAWAR **
R0108    FUNCTIONAL DESCRIPTION
R0109              BASED ON STORED TARGET PARAMETERS(R OF IGNITION(RTIG),V OF
R0110              IGNITION(VTIG),TIME OF IGNITION (TIG)),COMPUTE PERIGEE ALTITUDE
R0111              APOGEE ALTITUDE AND DELTAV REQUIRED(DELVSIN).
R0112    CALLING SEQUENCE
R0113         L     CALL
R0114         L+1          S30.1
R0115    NORMAL EXIT MODE
R0116         AT L+2 OR CALLING SEQUENCE (GOTO L+2)
R0117    SUBROUTINES CALLED
R0118              LEMPREC
R0119              PERIAPO
R0120    ALARM OR ABORT EXIT MODES
R0121                      NONE
R0122    ERASABLE INITIALIZATION REQUIRED
R0123              TIG        TIME OF IGNITION                        DP      B28CS
R0124              DELVSLV    SPECIFIED DELTA-V IN LOCAL VERT.
R0125                         COORDS. OF ACTIVE VEHICLE AT
R0126                     TIME OF IGNITION       VECTOR  B+7  METERS/CS
R0127    OUTPUT
R0128              RTIG   POSITION AT TIG        VECTOR  B+29 METERS
R0129              VTIG   VELOCITY AT TIG        VECTOR  B+29 METERS/CS
R0130              PDL 4D APOGEE ALTITUDE        DP      B+29 M ,  B+27 METERS.
R01301             HAPO   APOGEE ALTITUDE        DP      B+29 METERS
R0131              PDL 8D PERIGEE ALTITUDE       DP      B+29 M ,  B+27 METERS.
R01311             HPER   PERIGEE ALTITUDE       DP      B+29 METERS
R0132              DELVSIN   SPECIFIED DELTA-V IN INERTIAL
R0133                        COORD. OF ACTIVE VEHICLE AT
R0134                     TIME OF IGNITION       VECTOR  B+7  METERS/CS
R0135              DELVSAB MAG. OF DELVSIN       VECTOR  B+7  METERS/CS
R0136    DEBRIS QTEMP    TEMP. ERASABLE
R0137           QPRET,MPAC
R0138           PUSHLIST

 0139    REF    1                34,2000                          SETLOC P30S1
 0140                            34,2000                          BANK

 0141    REF    1                                                 COUNT* $$/S30S

 0142                            34,2000   71220 1  S30.1       STQ    DLOAD
 0143    REF    1                34,2001   03632 0                     QTEMP
 0144    REF   10  LAST   497    34,2002   03442 0                     TIG                 TIME IGNITION SCALED AT 2(+28)CS
 0145    REF   21  LAST   594    34,2003   34041 0              STCALL TDEC1
 0146    REF    3  LAST   209    34,2004   27056 1                     LEMPREC             ENCKE ROUTINE FOR LEM

 0147                            34,2005   67175 0              VLOAD  SXA,2
 01471  REF  10  LAST  594   34,2006   00001 0                      RATT
 0148   REF   1              34,2007   02777 1                      RTX2
 0150   REF   2  LAST  144   34,2010   03642 1           STORE      RTIG          RAOIUS VECTOR AT IGNITION TIME
 0153                        34,2011   57456 1           UNIT       VCOMP
 0154   REF   3  LAST  145   34,2012   27656 1           STCVL      OELVSIN       ZRF/LV IN OELVSIN SCALEO AT 2
 0155   REF   6  LAST  594   34,2013   00007 0                      VATT          VELOCITY VECTOR AT TIG, SCALEO 2(7) M/CS
 0156   REF   2  LAST  144   34,2014   03650 1           STORE      VTIG
 0158                        34,2015   53435 0           VXV        UNIT
 0159   REF   3  LAST  622   34,2016   03642 1                      RTIG
 0160                        34,2017   66001 0           SETPO      SXA,1
 0161                        34,2020   00001 0                      0
 01611  REF   2  LAST  125   34,2021   02776 0                      RTX1
 0162                        34,2022   47206 0           PUSH       VXV           YRF/LV POL 0   SCALEO AT 2
 0163   REF   4  LAST  622   34,2023   03656 1                      OELVSIN
 0164                        34,2024   63372 1           VSL1       POVL
 0165                        34,2025   63315 0           ROVL       POVL          YRF/LV POL 6   SCALED AT 2
 0166   REF   5  LAST  622   34,2026   03656 1                      OELVSIN       ZRF/LV POL 120 SCALEC AT 2
 0167   REF   2  LAST  200   34,2027   03434 1                      OELVSLV
 0168                        34,2030   76505 0           VXM        VSL1
 0169                        34,2031   00001 0                      0
 0170   REF   6  LAST  622   34,2032   03656 1           STORE      OELVSIN       OELTAV IN INERT. COOR   SCALEO TO 8+7M/CS
 0172                        34,2033   77646 0           ABVAL
 0173   REF   2  LAST  144   34,2034   27664 0           STOVL      OELVSAB       OELTA V MAG.
 0174   REF   4  LAST  622   34,2035   03642 1                      RTIG          (FOR PERIAPO)
 0175                        34,2036   53315 0           POVL       VAO           VREQUIREO = VTIG + OELVSIN (FOR PERIAPO)
 0176   REF   3  LAST  622   34,2037   03650 1                      VTIG
 0177   REF   7  LAST  622   34,2040   03656 1                      OELVSIN
 01771                       34,2041   77624 1           CALL
 0178   REF   1              34,2042   46341 0                      PERIAPO1
 01781                       34,2043   77624 1           CALL
 01782  REF   1              34,2044   46451 0                      SHIFTR1       RESCALE IF NEEOEO
 017822                      34,2045   77624 1           CALL                     LIMIT OISPLAY TO 9999.9 N. MI.
 017824 REF   1              34,2046   45636 0                      MAXCHK
 01783  REF   2  LAST  316   34,2047   16321 0           STOOL      HPER          PERIGEE ALT 2(29) METERS, FOR OISPLAY
 01784                       34,2050   00005 1                      40
 01785                       34,2051   77624 1           CALL
 01786  REF   2  LAST  622   34,2052   46451 0                      SHIFTR1       RESCALE IF NEEOEO
 01787                       34,2053   77624 1           CALL                     LIMIT OISPLAY TO 9999.9 N. MI.
 01788  REF   2  LAST  622   34,2054   45636 0                      MAXCHK
 0179   REF   4  LAST  316   34,2055   36317 1           STCALL     HAPO          AROGEE  ALT 2(29) METERS, FOR OISRLAY
 0180   REF   2  LAST  621   34,2056   03632 0                      QTEMP
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L        P32-P35, P72-P75                                       USER'S PAGE NO.   1       EO S3

P0010    COELLIPTIC SEQUENCE INITIATION (CSI) PROGRAMS (P32 AND P72)

R0011    MOD NO -1        LOG SECTION - P32-P35, P72-P75
R0012    MOD BY WHITE.P   DATE  1JUNE67

R0013    PURPOSE

R0014           (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE FOLLOWING
R0015               CONCENTRIC FLIGHT PLAN MANEUVERS - THE CO-ELLIPTIC SEQUENCE
R0016               INITIATION (CSI) MANEUVER AND THE CONSTANT DELTA ALTITUDE
R0017               (CDH) MANEUVER.

R0018           (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0019               APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0020           (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R0021               ASSOCIATED WITH THE CONCENTRIC FLIGHT PLAN MANEUVERS FOR
R0022               APPROVAL BY THE ASTRONAUT/GROUND.

R0023           (4) TO STORE THE CSI TARGET PARAMETERS FOR USE BY THE DESIRED
R0024               THRUSTING PROGRAM.

R0025    ASSUMPTIONS

R0026           (1) AT A SELECTED TPI TIME THE LINE OF SIGHT BETWEEN THE ACTIVE
R0027               AND PASSIVE VEHICLES IS SELECTED TO BE A PRESCRIBED ANGLE (E)
R0028               FROM THE HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE
R00285              POSITION.

R0029           (2) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION MUST BE
R0030               COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0031               COMPLETION OF THE PROGRAM.

R0032           (3) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION MUST BE
R0033               COMPUTED TO BE GREATER THAN 10 MINUTES FOR SUCCESSFUL
R0034               COMPLETION OF THE PROGRAM.

R0035           (4) CDH DELTA V IS SELECTED TO MINIMIZE THE VARIATION OF THE
R0036               ALTITUDE DIFFERENCE BETWEEN THE ORBITS.

R0037           (5) CSI BURN IS DEFINED SUCH THAT THE IMPULSIVE DELTA V IS IN THE
R0038               HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION AT CSI
R00385              IGNITION.

R0039           (6) THE PERICENTER ALTITUDE OF THE ORBIT FOLLOWING CSI AND CDH
R0040               MUST BE GREATER THAN 35,000 FT (LUNAR ORBIT) OR 85 NM (EARTH
R0041               ORBIT) FOR SUCCESSFUL COMPLETION OF THIS PROGRAM.

R0042           (7) THE CSI AND CDH MANEUVERS ARE ORIGINALLY ASSUMED TO BE
R0043               PARALLEL TO THE PLANE OF THE CSM ORBIT.  HOWEVER CREW
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R0044             MODIFICATION OF DELTA V (LV) COMPONENTS MAY RESULT IN AN
R0045             OUT-OF-PLANE CSI MANEUVER.

R0046         (8) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0047             STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 10).

R0048         (9) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY
R0049             THE GROUND.  THESE STORAGE CAPABILITIES ARE NORMALLY LIMITED
R0050             ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME
R0051             EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

R0052        (10) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0053             OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R0054             DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0055             PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R0056             AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0057             TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R0058             MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0059             THRUSTING MANEUVER.

R0060        (11) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0061        (12) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0062                  ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0063                  DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0064                  CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0065                  EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0066                  FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0067                  COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY
R0068                  CYCLE.

R0069                  EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF
R0070                  STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE
R0071                  THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS
R0072                  PROGRAM.

R0073        (13) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FOR 1 HOUR PRIOR TO
R0074             A THRUSTING MANEUVER.

R0075        (14) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0076                  P32 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0077                  P72 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0110    INPUT

R0111         (1) TCSI      TIME OF THE CSI MANEUVER
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R0112          (2) NN         NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R0113                         VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0114                         MANEUVER POINT
R0115          (3) ELEV       DESIRED LOS ANGLE AT TPI
R0116          (4) TTPI       TIME OF THE TPI MANEUVER
R0130     OUTPUT

R0131          (1) TRKMKCNT NUMBER OF MARKS
R0132          (2) TTOGO      TIME TO GO
R0133          (3) +MGA       MIDDLE GIMBAL ANGLE
R0134          (4) DIFFALT  DELTA ALTITUDE AT CDH
R0135          (5) T1TOT2   DELTA TIME FROM CSI TO CDH
R0136          (6) T2TOT3   DELTA TIME FROM CDH TO TPI
R0137          (7) DELVLVC  DELTA VELOCITY AT CSI - LOCAL VERTICAL COORDINATES
R0138          (8) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R0139     DOWNLINK

R01391         (1) TCSI       TIME OF THE CSI MANEUVER
R01392         (2) TCDH       TIME OF THE CDH MANEUVER
R01393         (3) TTPI       TIME OF THE TPI MANEUVER
R01394         (4) TIG        TIME OF THE CSI MANEUVER
R01395         (5) DELVEET1 DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01396         (6) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R01397         (7) DIFFALT  DELTA ALTITUDE AT CDH
R01398         (8) NN         NUMBER OF APSIDAL CROSSINGS THRU WHICH THE ACTIVE
R01399                        VEHICLE ORBIT CAN BE ADVANCED TO OBTAIN THE CDH
R0140                         MANEUVER POINT
R01401         (9) ELEV       DESIRED LOS ANGLE AT TPI

R01402    COMMUNICATION TO THRUSTING PROGRAMS

R01403         (1) TIG        TIME OF THE CSI MANEUVER
R01404         (2) RTIG       POSITION OF ACTIVE VEHICLE AT CSI - BEFORE ROTATION
R01405                        INTO PLANE OF PASSIVE VEHICLE
R01406         (3) VTIG       VELOCITY OF ACTIVE VEHICLE AT CSE - BEFORE ROTATION
R01407                        INTO PLANE OF PASSIVE VEHICLE
R01408         (4) DELVSIN  DELTA VELOCITY AT CSI - REFERENCE COORDINATES
R01409         (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CSI
R0141          (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R0150     SUBROUTINES USED

R0151          AVFLAGA
R0152          AVFLAGP
R01525         P20FLGON
R0153          VARALARM
R0154          BANKCALL
R0155          GOFLASH
R0156          GOTOPOOH
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R01562        VNPOOH
R01564        GOFLASHR
R0157         BLANKET
R0158         ENDOFJOB
R0159         SELECTMU
R0160         ADVANCE
R0161         INTINT
R0162         PASSIVE
R0163         CSI/A
R0164         S32/33.1
R0165         DISDVLVC
R0166         VN1645

 0400                          35,2034                             BANK    35
 0401   REF   1                35,2000                             SETLOC  CSI/COH
 0402                          35,2034                             BANK
 0403   REF   1                E7,1470                             EBANK=  SUBEXIT
 0404   REF   1                                                    COUNT*  $$/P3272
 0500   REF   1                35,2034   0 2354 1  P32             TC      AVFLAGA
 0502   REF   1                35,2035   0 2037 1                  TC      P32STRT
 0503   REF   1                35,2036   0 2361 1  P72             TC      AVFLAGP
 050305                        35,2037   0 0006 1  P32STRT         EXTEND
 050306 REF   1                35,2040   3 2425 0                  DCA     P30ZERO
 050307 REF   3  LAST   317    35,2041   53'621 1                  DXCH    CENTANG
 05031  REF   1                35,2042   0 2060 0                  TC      P32/P72A
 05032                         35,2043    77734 1  ALMXITA         SXA,2
 05033  REF   2  LAST   143    35,2044    03613 0                          CSIALRM
 05034                         35,2045    77740 1  ALMXIT          LXC,1
 05035  REF   3  LAST   626    35,2046    03613 0                          CSIALRM
 05038                         35,2047    77533 1                  SLOAD*  EXIT
 05039  REF   1                35,2050    32430 1                          ALARM/TB -1,1
 0504   REF 284  LAST   611    35,2051   3 0154 1                  CA      MPAC
 05041  REF   3  LAST   390    35,2052   0 5734 1                  TC      VARALARM
 05042  REF   1                35,2053   3 5006 1                  CAF     V05N09
 05043  REF 165  LAST   613    35,2054   0 4616 1                  TC      BANKCALL
 05044  REF   8  LAST   497    35,2055    20477 1                  CADR    GOFLASH
 05045  REF   6  LAST   497    35,2056   0 6001 0                  TC      GOTOPOOH
 05046                         35,2057   0 2053 0                  TC      -4
 0505   REF   1                35,2060   0 2366 0  P32/P72A        TC      P20FLGON
 05051  REF   2  LAST   626    35,2061   3 2424 1                  CAF     P30ZERO
 0506   REF   3  LAST   317    35,2062   55'467 1                  TS      NN +1
 05061  REF   4  LAST   307    35,2063   55'633 1                  TS      TCSI
 05062  REF   5  LAST   626    35,2064   55'634 0                  TS      TCSI +1
 0507   REF   1                35,2065   3 2415 0  VN0611          CAF     V06N11               TCSI
 0508   REF   4  LAST   620    35,2066   0 3621 1                  TC      VNPOOH
 050801 REF  65  LAST   620    35,2067   0 6042 1                  TC      INTPRET
 050802                        35,2070    57545 1                  DLOAD   DCOMP
 050803 REF   6  LAST   626    35,2071    03634 0                          TCSI
 050804                        35,2072    71240 1                  BMN     DLOAD
 050805 REF   1                35,2073    72120 1                          VN0655
 050806 REF   3  LAST  504    35,2074    01643 1                    TETLEM
 050807 REF  22  LAST  621    35,2075    34041 0           STCALL   TOEC1
 050808 REF   1               35,2076    46403 1                    PRECSET
 050809                       35,2077    53775 1           VLOAO    VSR*
 05081  REF   1               35,2100    03536 1                    RACT3
 050811                       35,2101    57176 0                    0,2
 050812 REF   2  LAST  498    35,2102    26655 0           STOVL    RVEC
 050813 REF   2  LAST  143    35,2103    03544 1                    VACT3
 050814                       35,2104    43057 1           VSR*     SET
 050815                       35,2105    57176 0                    0,2
 050816 REF   2  LAST  498    35,2106    03466 0                    RVSW
 050817 REF   3  LAST  498    35,2107    16744 1           STOOL    VVEC
 050818 REF   5  LAST  615    35,2110    06532 0                    OPPCSMAX
 050819 REF   2  LAST  126    35,2111    36756 0           STCALL   ROESIREO
 05082  REF   1               35,2112    25557 1                    TIMERAO
 050821                       35,2113    77615 0           OAO
 050822 REF   1               35,2114    03574 1                    TOEC2
 050823 REF   7  LAST  626    35,2115    03634 0           STORE    TCSI
 050824                       35,2116    77776 1           EXIT
 050825 REF   1               35,2117   0 2065 0           TC       VN0611
 050826                       35,2120    77776 1  VN0655   EXIT
 0509   REF   1               35,2121   3 3633 1           CAF      V06N55         NN, ELEV(RGLOS)
 0510   REF 166  LAST  626    35,2122   0 4616 1           TC       BANKCALL
 0511   REF   9  LAST  626    35,2123    20477 1           CADR     GOFLASH
 0512   REF   7  LAST  626    35,2124   0 6001 0           TC       GOTOPOOH
 0513                         35,2125   0 2127 1           TC       +2
 0514                         35,2126   0 2121 1           TC       -5
 0518   REF   1               35,2127   3 3632 0           CAF      V06N37         TTPI
 0519   REF   5  LAST  626    35,2130   0 3621 1           TC       VNPOOH
 0520   REF  66  LAST  626    35,2131   0 6042 1           TC       INTPRET
 0521                         35,2132    77745 1           OLOAO
 0522   REF   8  LAST  627    35,2133    03634 0                    TCSI
 0523   REF  11  LAST  621    35,2134    37442 1           STCALL   TIG
 0524   REF   1               35,2135    20000 0                    SELECTMU
 0525                         35,2136    77624 1  P32/P72B CALL
 0526   REF   1               35,2137    71016 0                    ADVANCE
 0527                         35,2140    77201 1           SETPO    VLOAO
 0528                         35,2141    00001 0                    00
 0529   REF   3  LAST  146    35,2142    03506 1                    VPASS1
 0530                         35,2143    65315 0           POVL     POOL
 0531   REF   2  LAST  143    35,2144    03500 1                    RPASS1
 0532   REF   9  LAST  627    35,2145    03634 0                    TCS1
 0533                         35,2146    65325 0           PODL     POOL
 0534   REF   4  LAST  308    35,2147    03636 1                    TTPI
 0535   REF   1               35,2150    33641 1                    TWCPI
 0536                         35,2151    45006 0           PUSH     CALL
 0537   REF   1               35,2152    73376 1                    INTINT
 0538                         35,2153    77624 1           CALL
 0539   REF   1               35,2154    46435 1                    PASSIVE
 0540                         35,2155    77624 1           CALL
 0541   REF   1                   35,2156   70113 0                    CSI/A
 0542                             35,2157   43014 0  P32/P72C 8ON      SET
 0543   REF   2  LAST  620        35,2160   01311 0                    FINALFLG
 0544   REF   1                   35,2161   72163 0                    P32/P720
 0545   REF   6  LAST  619        35,2162   00470 1                    UPDATFLG
 0546                             35,2163   77745 1  P32/P720 OLOAO
 0547   REF   3  LAST  318        35,2164   02253 1                    T1TOT2
 0548   REF   4  LAST  628        35,2165   C2253 1  P32/P72E STOPE    T1 TOT2
 0549                             35,2166   51025 1           OSU      BPL
 0550   PEF   1                   35,2167   32427 1                    60MIN
 0551   REF   1                   35,2170   72165 0                    P32/P72E
 0552                             35,2171   77745 1           OLOAO
 0553   REF   2  LAST  318        35,2172   02255 1                    T2TOT3
 0554   REF   3  LAST  628        35,2173   02255 1  P32/P72F STORE    T2TOT3
 0555                             35,2174   51025 1           OSU      BPL
 0556   PEF   2  LAST  628        35,2175   32427 1                    60MIN
 0557   REF   1                   35,2176   72173 1                    P32/P72F
 0558                             35,2177   77776 1           EXIT
 0559   REF   1                   35,2200  3 2417 1           CAF      V06N75
 0560   PEF   6  LAST  627        35,2201  0 3621 1           TC       VNPOOH
 0561   PEF  67  LAST  627        35,2202  0 6042 1           TC       INTPPET
 0562                             35,2203   45175 0           VLOAO    CALL
 0563   REF   3  LAST  200        35,2204   02267 0                    OELVEET1
 0566   REF   1                   35,2205   71100 0                    S32/33.1
 0567   PEF   4  LAST  628        35,2206   26267 0           STOVL    OELVEET1
 05671  REF   2  LAST  118        35,2207   02311 0                    PACT2
 05672  REF   2  LAST  118        35,2210   26303 0           STOVL    PACT1
 0568   REF   3  LAST  200        35,2211   02275 0                    OELVEET2
 0569                             35,2212   45170 0           AXT,1    CALL
 05691                            35,2213   01522 0           VN       0682
 0572   PEF   1                   35,2214   72375 0                    OISOVLVC
 0573                             35,2215   77745 1           OLOAO
 05731  PEF   5  LAST  627        35,2216   03636 1                    TTPI
 05732  PEF   1                   35,2217   37640 1           STCALL   TTPIO
 0574   REF   2  LAST  620        35,2220   73515 1                    VN1645
 0575                             35,2221   77650 1           GOTO
 0576   REF   1                   35,2222   72136 C                    P32/P72B
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P1010    CONSTANT DELTA HEIGHT (CDH) PROGRAMS (P33 AND P73)

R1011    MOD NO -1         LOG SECTION - P32-P35, P72-P75
R1012    MOD BY WHITE.P    DATE  1JUNE67
R1013    PURPOSE

R1014            (1) TO CALCULATE PARAMETERS ASSOCIATED WITH THE CONSTANT DELTA
R1015                ALTITUDE MANEUVER (CDH).

R1016            (2) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R1017                APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R1018            (3) TO DISPLAY TO THE ASTRONAUT AND THE GROUND DEPENDENT VARIABLES
R1019                ASSOCIATED WITH THE CDH MANEUVER FOR APPROVAL BY THE
R1020                ASTRONAUT/GROUND.

R1021            (4) TO STORE THE CDH TARGET PARAMETERS FOR USE BY THE DESIRED
R1022                THRUSTING PROGRAM.

R1023    ASSUMPTIONS

R1024            (1) THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF THE
R1025                CO-ELLIPTIC SEQUENCE INITIATION (CSI) PROGRAM (P32/P72).
R1026                THERFORE -

R1027                (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R1028                    BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R1029                    A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R1030                    HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R1031                (B) THE TIME BETWEEN CSI IGNITION AND CDH IGNITION WAS
R1032                    COMPUTED TO BE GREATER THAN 10 MINUTES.

R1033                (C) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R1034                    COMPUTED TO BE GREATER THAN 10 MINUTES.

R1035                (D) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R1036                    ORBITS WAS MINMIZED.

R1037                (E) CSI BURN WAS DEFINED SUCH THAT THE IMPULSIVE DELTA V WAS
R1038                    IN THE HORIZONTAL PLANE DEFINED BY ACTIVE VEHICLE

R10385                   POSITION AT CSI IGNITION.

R1039                (F) THE PERICENTER ALTITUDES OF THE ORBITS FOLLOWING CSI AND
R1040                    CDH WERE CUMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
R1041                    ORBIT OR 85 NM FOR EARTH ORBIT.

R1042                (G) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R1043                    THE PLANE OF THE PASSIVE VEHICLE ORBIT.  HOWEVER, CREW
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R1044                  MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
R1045                  IN AN OUT-OF-PLANE MANEUVER.

R1046             (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R1047                 STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION 4).

R1048             (3) COMPUTED VARIABLES MAY BE STORED FOR LATER VERIFICATION BY
R1049                 THE GROUND.  THESE STORAGE CAPABILITES ARE NORMALLY LIMITED
R1050                 ONLY TO THE PARAMETERS FOR ONE THRUSTING MANEUVER AT A TIME
R1051                 EXCEPT FOR CONCENTRIC FLIGHT PLAN MANEUVER SEQUENCES.

R1052             (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R1053                 OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R1054                 DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R1055                 PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R1056                 AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R1057                 TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R1058                 MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R1059                 THRUSTING MANEUVER.

R1060             (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R1061             (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R1062                      ACTIVE VEGICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R1063                      DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R1064                      CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R1065                      EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R1066                      FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R1067                      COMPLETED THE FINAL MANEUVER COMPUTATION AND DISPLAY
R1068                      CYCLE.

R1069                      EXTERNAL DELTA V STEERING FLAG - DESIGNATES THE TYPE OF
R1070                      STEERING REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE
R1071                      THRUSTING PROGRAM SELECTED AFTER COMPLETION OF THIS
R1072                      PROGRAM.

R1073             (7) IT IS NORMALLY REQUIRED THAT THE ISS BE ON FUR 1 HOUR PRIOR TO
R1074                 A THRUSTING MANEUVER.

R1075             (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R1076                      P33 IF THIS VEHICLE IS ACTIVE VEHICLE.

R1077                      P73 IF THIS VEHICLE IS PASSIVE VEHICLE.

R1110        INPUT

R1111             (1) TTPIO    TIME OF THE TPI MANEUVER - SAVED FROM P32/P72
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R1112          (2) ELEV     DESIRED LOS ANGLE AT TPI - SAVED FROM P32/P72
R1113          (3) TCDH     TIME OF THE CDH MANEUVER

R1130   OUTPUT

R1131          (1) TRKMKCNT NUMBER OF MARKS
R1132          (2) TTOGO    TIME TO GO
R1133          (3) +MGA     MIDDLE GIMBAL ANGLE
R1134          (4) DIFFALT  DELTA ALTITUDE AT CDH
R1135          (5) T2TOT3   DELTA TIME FROM CDH TO COMPUTED TPI
R1136          (6) NOMTPI   DELTA TIME FROM NOMINAL TPI TO COMPUTED TPI
R1137          (7) DELVLVC  DELTA VELOCITY AT CDH - LOCAL VERTICAL COORDINATES

R1139   DOWNLINK

R11391         (1) TCDH     TIME OF THE CDH MANEUVER
R11392         (2) TTPI     TIME OF THE TPI MANEUVER
R11393         (3) TIG      TIME OF THE CDH MANEUVER
R11394         (4) DELVEET2 DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R11395         (5) DIFFALT  DELTA ALTITUDE AT CDH
R11396         (6) ELEV     DESIRED LOS ANGLE AT TPI
R11402  COMMUNICATION TO THRUSTING PROGRAMS

R11403         (1) TIG      TIME OF THE CDH MANEUVER
R11404         (2) RTIG     POSITION OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R11405                      INTO PLANE OF PASSIVE VEHICLE
R11406         (3) VTIG     VELOCITY OF ACTIVE VEHICLE AT CDH - BEFORE ROTATION
R11407                      INTO PLANE OF PASSIVE VEHICLE
R11408         (4) DELVSIN  DELTA VELOCITY AT CDH - REFERENCE COORDINATES
R11409         (5) DELVSAB  MAGNITUDE OF DELTA VELOCITY AT CDH
R1141          (6) XDELVFLG SET TO INDICATE EXTERNAL DELTA V VG COMPUTATION

R1150   SUBROUTINES USED

R1151          AVFLAGA
R1152          AVFLAGP
R11525         P20FLGON
R1153          VNPOOH
R1154          SELECTMU
R1155          ADVANCE
R1156          CDHMVR
R1157          INTINT3P
R1158          ACTIVE
R1159          PASSIVE
R1160          S33/34.1
R1161          ALARM
R1162          BANKCALL
R1163          GOFLASH
R1164          GOTOPOOH
R1166          S32/33.1
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 1499   REF   1                                                  COUNT*  $$/P3373
 1500   REF   2  LAST  626    35,2223   0 2354 1  P33            TC      AVFLAGA
 1502   REF   1               35,2224   0 2226 0                 TC      P33/P73A
 1503   REF   2  LAST  626    35,2225   D 2361 1  P73            TC      AVFLAGP
 1505   REF   2  LAST  626    35,2226   0 2366 D  P33/P73A       TC      P20FLGDN
 15051  REF   1               35,2227   3 2416 0                 CAF     V06N13            TCDH
 1506   REF   7  LAST  628    35,2230   C 3621 1                 TC      VNPDDH
 1507   REF  68  LAST  628    35,2231   0 6042 1                 TC      INTPRET
 1508                         35,2232    77745 1                 DLOAD
 15081  REF   2  LAST  628    35,2233    C3640 0                         TTPI0
 15082  REF   6  LAST  628    35,2234    17636 1                 STODL   TTPI
 1509   REF   4  LAST  307    35,2235    01777 1                         TCDH
 1510   REF  12  LAST  627    35,2236    37442 1                 STCALL  TIG
 1511   REF   2  LAST  627    35,2237    20000 0                         SELECTMU
 1512                         35,2240    77624 1  P33/P73B       CALL
 1513   REF   2  LAST  627    35,2241    71016 0                         ADVANCE
 1514                         35,2242    77624 1                 CALL
 1515   REF   1               35,2243    71133 0                         CDHMVR
 1516                         35,2244    77201 1                 SETPD   VLOAD
 1517                         35,2245    C0C01 0                         0D
 1518   REF   3  LAST  627    35,2246    C3544 1                         VACT3
 1519                         35,2247    45115 0                 PDVL    CALL
 1520   REF   3  LAST  628    35,225D    02311 0                         RACT2
 1521   REF   1               35,2251    71071 1                         INTINT3P
 1522                         35,2252    77624 1                 CALL
 1523   REF   1               35,2253    46425 D                         ACTIVE
 1524                         35,2254    77201 1                 SETPD   VLDAD
 1525                         35,2255    C0C01 0                         0D
 1526   REF   2  LAST  143    35,2256    03530 1                         VPASS2
 1527                         35,2257    45115 0                 PDVL    CALL
 1528   REF   2  LAST  143    35,2260    03522 1                         RPASS2
 1529   REF   2  LAST  632    35,2261    71071 1                         INTINT3P
 1530                         35,2262    77624 1                 CALL
 1531   REF   2  LAST  627    35,2263    46435 1                         PASSIVE
 1532                         35,2264    43145 0                 DLOAD   SET
 1533   REF   3  LAST  626    35,2265    32425 0                         P30ZERC
 1534   REF   1               35,2266    03460 C                         ITSWICH
 1535   REF   1               35,2267    36317 1                 STCALL  NOMTPI
 1536   REF   1               35,2270    72674 1                         S33/34.1
 1537                         35,2271    77454 1                 BZE     EXIT
 1538   REF   1               35,2272    72307 0                         P33/P73C
 1539   REF  27  LAST  598    35,2273   C 5567 0                 TC      ALARM
 1540                         35,2274    00611 1                 OCT     611
 1541   REF   2  LAST  626    35,2275   3 5006 1                 CAF     V05N09
 1542   REF 167  LAST  627    35,2276   0 4616 1                 TC      BANKCALL
 1543   REF  10  LAST  627    35,2277    20477 1                 CADR    GOFLASH
 1544   REF   8  LAST  627    35,2300   0 6001 0                 TC      GCTOPCDH
 1545                         35,2301   0 2303 0                 TC      +2
 1546   REF   2  LAST  632    35,2302   0 2226 0               TC      P33/P73A
 1547   REF  69  LAST  632    35,2303   0 6042 1               TC      INTPRET
 1548                         35,2304    77745 1               DLDAO
 1549   REF   4  LAST  632    35,2305    32425 0                       P30ZERO
 1550   REF   2  LAST  632    35,2306    02317 0               STORE   NOMTPI
 1551                         35,2307    43014 0   P33/P73C    BON     SET
 1552   REF   3  LAST  628    35,2310    01311 0                       FINALFLG
 1553   REF   1               35,2311    72313 0                       P33/P73D
 1554   REF   7  LAST  628    35,2312    00470 1                       UPDATFLG
 1557                         35,2313    43345 1   P33/P73D    DLOAD   DAD
 1558   REF   3  LAST  633    35,2314    02317 0                       NOMTPI
 1559   REF   7  LAST  632    35,2315    03636 1                       TTPI
 1560   REF   8  LAST  633    35,2316    03636 1               STORE   TTPI
 1561                         35,2317    77625 0               DSU
 1562   REF   5  LAST  632    35,2320    01777 1                       TCDH
 1563                         35,2321    51025 1   P33/P73E    DSU     BPL
 1564   REF   3  LAST  628    35,2322    32427 1                       60MIN
 1565   REF   1               35,2323    72321 1                       P33/P73E
 1566                         35,2324    77615 0               DAD
 1567   REF   4  LAST  633    35,2325    32427 1                       60MIN
 1568   REF   5  LAST  628    35,2326    16253 1               STODL   T1TOT2
 1569   REF   9  LAST  633    35,2327    03636 1                       TTPI
 1570                         35,2330    41425 1               DSU     PUSH
 1571   REF   3  LAST  632    35,2331    03640 0                       TTPI0
 1572                         35,2332    45246 0   P33/P73F    ABS     DSU
 1573   REF   5  LAST  633    35,2333    32427 1                       60MIN
 1574                         35,2334    43244 1               BPL     DAD
 1575   REF   1               35,2335    72332 0                       P33/P73F
 15751  REF   6  LAST  633    35,2336    32427 1                       60MIN
 15753                        35,2337    45565 0               SIGN    STADR
 15755  REF   4  LAST  628    35,2340    75522 0               STORE   T2TOT3
 1576                         35,2341    77776 1               EXIT
 1577   REF   2  LAST  628    35,2342   3 2417 1               CAF     V06N75
 1578   REF   8  LAST  632    35,2343   0 3621 1               TC      VNPOOH
 1579   REF  70  LAST  633    35,2344   0 6042 1               TC      INTPRET
 1580                         35,2345    45175 0               VLOAD   CALL
 1581   REF   4  LAST  628    35,2346    02275 0                       DELVEET2
 1584   REF   2  LAST  628    35,2347    71100 0                       S32/33.1
 1585   REF   5  LAST  633    35,2350    36275 1               STCALL  DELVEET2
 1589   REF   3  LAST  628    35,2351    73515 1                       VN1645
 1590                         35,2352    77650 1               GOTO
 1591   REF   1               35,2353    72240 1                       P33/P73B
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P3800    ..... AVFLAGA/P .....

R3850    SUBROUTINES USED

R3851             UPFLAG
R3852             DOWNFLAG

 3900                           35,2354  0 0006 1  AVFLAGA  EXTEND                        AVFLAG = LEM
 3901    REF   2  LAST  626     35,2355  23'470 0           QXCH    SUBEXIT
 3902    REF  38  LAST  619     35,2356  0 5504 0           TC      UPFLAG
 3903    REF   1                35,2357   00050 1           ADRES   AVFLAG
 3904    REF   3  LAST  634     35,2360  0 1470 0           TC      SUBEXIT
 3905                           35,2361  0 0006 1  AVFLAGP  EXTEND                        AVFLAG = CSM
 3906    REF   4  LAST  634     35,2362  23'470 0           QXCH    SUBEXIT
 3907    REF  65  LAST  619     35,2363  0 5516 0           TC      DOWNFLAG
 3908    REF   2  LAST  634     35,2364   00050 1           ADRES   AVFLAG
 3909    REF   5  LAST  634     35,2365  0 1470 0           TC      SUBEXIT
 39091                          35,2366  0 0006 1  P20FLGON EXTEND
 39092   REF   6  LAST  634     35,2367  23'470 0           QXCH    SUBEXIT
 39093   REF  39  LAST  634     35,2370  0 5504 0           TC      UPFLAG
 3910    REF   8  LAST  633     35,2371   00027 1           ADRES   UPDATFLG          SET UPDATFLG
 39101   REF  40  LAST  634     35,2372  0 5504 0           TC      UPFLAG
 39102   REF   5  LAST  619     35,2373   00031 0           ADRES   TRACKFLG          SET TRACKFLG
 3911    REF   7  LAST  634     35,2374  0 1470 0           TC      SUBEXIT
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P4600     ..... OISDVLVC  .....

R4650     SUBROUTINES USED

R4651            S32/33.X
R4652             VNPCCH

 4700     REF  11  LAST  319   35,2375    03434 1  OISOVLVC STCRE    OELVLVC
 4701                          35,2376    45020 1           STQ      CALL
 4702     REF   2  LAST  142   35,2377    03463 0                    NORMEX
 47021    REF   1              35,2400    71120 1                    S32/33.X
 47022                         35,2401    64375 1           VLOAO    MXV
 47023    REF  12  LAST  635   35,2402    03434 1                    OELVLVC
 47024                         35,2403    00001 0                    OD
 470241                        35,2404    66172 0           VSL1     SXA,1
 470243   REF   1              35,2405    03615 0                    VERBNOUN
 47025    REF  13  LAST  635   35,2406    03434 1           STORE    DELVLVC
 47026                         35,2407    77776 1           EXIT
 4703     REF   2  LAST  635   35,2410  3 1615 1            CA       VERBNOUN
 4704     REF   9  LAST  633   35,2411  0 3621 1            TC       VNPOOH
 4705     REF  71  LAST  633   35,2412  0 6042 1            TC       INTPRET
 4706                          35,2413    77650 1           GOTO
 4707     REF   3  LAST  635   35,2414    03463 0                    NORMEX
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P4800   ..... CONSTANTS .....

 4901                            35,2415   01413 0   V06N11     VN       0611
 4902                            35,2416   01415 0   V06N13     VN       0613
 4903                            35,2417   01513 1   V06N75     VN       0675
 4914                            35,2420   77776 1   SN359+     2DEC     -.000086601
 4914                            35,2421   62460 1
 4915                            35,2422   17777 0   CS359+     2DEC     +.499999992
 4915                            35,2423   37776 0
 4916                            35,2424   00000 1   P30ZERO    2DEC     0
 4916                            35,2425   00000 1
 4917                            35,2426   00025 0   60MIN      2DEC     360000
 4917                            35,2427   37100 1
 4919                            35,2430   00600 1   ALARM/T8   OCT      00600            NO 1
 4920                            35,2431   00601 0              OCT      00601               2
 4921                            35,2432   00602 0              OCT      00602               3
 4922                            35,2433   00603 1              OCT      00603               4
 4923                            35,2434   00604 0              OCT      00604               5
 4924                            35,2435   00605 1              OCT      00605               6
 4925                            35,2436   00606 1              OCT      00606               7
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P5300    ..... CSI/A       .....

R5150    SUBROUTINES USED

R5152           VECSHIFT
R5153           TIMETHET
R5154           PERIAPO
R5155           SHIFTR1
R5156           INTINT2C
R5157           COHMVR
R5158           PERIAPO1
R5159           INTINT
R5160           ACTIVE

 5400                             34,2057                            BANK    34
 5401    REF    1                 34,2000                            SETLOC  CSI/CDH1
 5402                             34,2057                            BANK
 5403    REF    8  LAST  634      E7,1470                            EBANK=  SUBEXIT
 5404    REF    1                                                    COUNT*  $$/CSI
 5413                             34,2057    00000 1  LOOPMX     2DEC    16
 5413                             34,2060    00020 0
 5414                             34,2061    00003 1  INITST     2DEC    .03048 B-7           INITIAL DELDV = 10 FPS
 5414                             34,2062    34661 1
 5415                             34,2063    00606 1  DVMAX1     2DEC    3.0480 B-7           MAXIMUM DV1 = 1000 FPS
 5415                             34,2064    04467 0
 5416                             34,2065    00601 0  DVMAX2     2DEC    3.014472 B-7                    989 FPS
 5416                             34,2066    33216 1
 5417                             34,2067    10000 0  1DPB2      2DEC    1.08-2
 5417                             34,2070    00000 1
 5418                             34,2071    00000 1  1DPB28     2DEC    1
 5418                             34,2072    00001 0
 5419                             34,2073    00004 0  PMINE      2DEC    157420 B-29      85 NM    - MUST BE 8 WORDS BEFORE PMINM
 5419                             34,2074    31566 0
 5420                             34,2075    00000 1  EPSILN1    2DEC    .0003048 B-7          .1 FPS
 5420                             34,2076    01177 1
 5421                             34,2077    00002 0  NICKELDP   2DEC    .021336 B-7      7 FPS (CHANGED FROM .05 FPS)
 5421                             34,2100    27311 1
 5422                             34,2101    77754 1  FIFPSDP    2DEC    -.152400 B-7          50  FPS
 5422                             34,2102    57611 0
 5423                             34,2103    00000 1  PMINM      2DEC    10668 B-29       35000 FT - MUST BE 8 WORDS AFTER PMINE
 5423                             34,2104    12326 0
 5424                             34,2105    00116 1  DELMAX1    2DEC    .6096000 B-7          200 FPS
 5424                             34,2106    00730 0
 5425                             34,2107    00000 1  ONETHTH    2DEC    .0001 B-3
 5425                             34,2110    06433 0
 5426                             34,2111    00003 1  TMIN       2DEC    60000            10 MIN
 5426                             34,2112    25140 0
 5500                             34,2113    43014 0  CSI/A      CLEAR   SET              INITIALIZE INDICATORS
 5501    REF    1                 34,2114    03260 0                     S32.1F1          DVT1 HAS EXCEEDED MAX INDICATOR
 5502    REF    1                 34,2115    03061 0                     S32.1F2          FIRST PASS FOR NEWTON ITERATION INDICATR
 5503                          34,2116   43014 0          CLEAR   SET
 5504   REF   1                34,2117   03262 1                  S32.1F3A       00=1ST 2 PASSES 2ND CYCLE 01=FIRST CYCLE
 5505   REF'  1                34,2120   03063 1                  S32.1F38       10=2NO CYCLE 11=50FPS STAGE 2ND CYCLE
 5506                          34,2121   77745 1          OLCAD
 5507   REF   5  LAST   633    34,2122   32425 0                  P30ZERC
 5508   REF   1                34,2123   03606 1          STORE   LDOPCT
 5509   REF   4  LAST   626    34,2124   03614 1          STORE   CSIALRM
 5510                          34,2125   77201 1  CSI/8   SETPD   VLOAD
 5511                          34,2126   00001 0                  DO
 5512   REF   3  LAST   628    34,2127   02303 0                  RACT1
 5513                          34,2130   41446 1          ABVAL   PUSH           RAI                                 829 PL020
 5514                          34,2131   70501 1          NORM    SR1
 5515   REF   2  LAST   491    34,2132   00050 1                  X2                                           829-N2+ 81 PL040
 5516                          34,2133   51515 1          POVL    ABVAL
 5517   REF   1                34,2134   03552 0                  RPASS3
 5518                          34,2135   55301 0          NORM    BDDV           RA1/RP3                              81 PL020
 5519   REF   5  LAST   592    34,2136   00047 1                  X1
 5520                          34,2137   53664 0          XSU,2   SR*                                                 82
 5521   REF   6  LAST   638    34,2140   00046 0                  X1
 5522                          34,2141   57175 0                  1,2
 5523                          34,2142   41215 1          OAD     OMP            (1+(RA1/RP3))RA1           829+82=831 PL00D
 5524   REF   1                34,2143   30070 0                  1DP82
 5525                          34,2144   65301 0          NORM    PDDL                                                   PL02D
 5526   REF   7  LAST   638    34,2145   00047 1                  X1
 5527   REF   1                34,2146   02321 0                  RTMU
 5528                          34,2147   56342 1          SR1     DOV                                       838-831=  87 PL000
 5529                          34,2150   75457 0          SL*     SQRT                                                87
 5530                          34,2151   20172 1                  0 -7,1
 5531                          34,2152   53515 0          PDVL    UNIT                                                   PL020
 5532   REF   4  LAST   638    34,2153   02303 0                  RACT1
 5533                          34,2154   47315 0          PDVL    VXV
 5534   REF   2  LAST   118    34,2155   02261 0                  UP1
 5535                          34,2156   77656 1          UNIT                   UNIT(URP1 X UVP1 X UPA1) = UH1
 5536                          34,2157   72441 0          OOT     SL1            VA1 . UH1                            87
 5537   REF   2  LAST   146    34,2160   03472 0                  VACT1
 5538                          34,2161   45421 1          80SU    STAOR                                                  PL000
 5539   REF   3  LAST   143    34,2162   60203 0          STDOL   OELVCSI
 5540   REF   1                34,2163   30062 0                  INITST         10 FPS
 5541   REF   4  LAST   144    34,2164   03612 1          STORE   DFLOV
 5542                          34,2165   43345 1  CSI/81  OLOAD   DAO            IF LOOPCT = 16
 5543   REF   2  LAST   638    34,2166   03606 1                  LOOPCT
 5544   REF   1                34,2167   30072 1                  1DP828
 5545   REF   3  LAST   638    34,2170   03606 1          STORE   LOOPCT
 5546                          34,2171   77025 0          OSU     AXT,2
 5547   REF   1                34,2172   30060 1                  LOOPMX
 5548                          34,2173   00006 1                  6
 5549                          34,2174   77644 1          8PL
 5550   REF   1                34,2175   70776 0                  SCNOSDL
 5551                          34,2176   77601 0  CSI/82  SETPO
 5552                          34,2177   00001 0                  00
 5553                               34,2200   51545 1              DLOAD   ABS
 5554   REF    4   LAST   638       34,2201   03574 1                      DELVCSI
 5555                               34,2202   50025 0              DSU     BMN
 5556   REF    1                    34,2203   30064 0                      DVMAX1
 5557   REF    1                    34,2204   70224 1                      CSI/B23
 5558                               34,2205   43174 1              AXT,2   BON
 5559                               34,2206   00007 0                      7
 5560   REF    2   LAST   637       34,2207   03300 1                      S32.1F1
 5561   REF    2   LAST   638       34,2210   70776 0                      SCNDSOL
 5562                               34,2211   43014 0              BOFF    BON
 5563   REF    2   LAST   638       34,2212   03342 1                      S32.1F3A
 5564   REF    1                    34,2213   70216 0                      CSI/B22             FLAG 3 NEQ 3
 5565   REF    2   LAST   638       34,2214   03303 1                      S32.1F3B
 5566   REF    3   LAST   639       34,2215   70776 0                      SCNDSOL
 5567                               34,2216   71214 0   CSI/B22    SET     DLOAD
 5568   REF    3   LAST   639       34,2217   03060 1                      S32.1F1
 5569   REF    1                    34,2220   30066 1                      DVMAX2
 5570                               34,2221   77765 0              SIGN
 5571   REF    5   LAST   639       34,2222   03574 1                      DELVCSI
 5572   REF    6   LAST   639       34,2223   03574 1              STORE   DELVCSI
 5573                               34,2224   41575 0   CSI/B23    VLOAD   PUSH
 5574   REF    5   LAST   638       34,2225   02303 0                      RACT1
 5575                               34,2226   63256 0              UNIT    PDVL
 5576   REF    3   LAST   638       34,2227   02261 0                      UP1
 5577                               34,2230   53435 0              VXV     UNIT                UNIT(URP1 X UVP1 X URA1) = UH1
 5578                               34,2231   76561 1              VXSC    VSL1
 5579   REF    7   LAST   639       34,2232   03574 1                      DELVCSI
 5580   REF    5   LAST   628       34,2233   02267 0              STORE   DELVEET1
 5581                               34,2234   40055 0              VAD     BOV
 5582   REF    3   LAST   638       34,2235   03472 0                      VACT1
 5583   REF    1                    34,2236   70237 0                      CSI/B23D
 5584   REF    2   LAST   144       34,2237   37566 0   CSI/B23D   STCALL  VACT4
 5585   REF    1                    34,2240   46441 1                      VECSHIFT
 5586   REF    4   LAST   627       34,2241   26744 1              STOVL   VVEC
 5587                               34,2242   77614 1              SET
 5588   REF    3   LAST   627       34,2243   03466 0                      RVSW
 5589   REF    3   LAST   627       34,2244   26655 0              STOVL   RVEC
 5590   REF    1                    34,2245   32421 1                      SN359+
 5591   REF    3   LAST   498       34,2246   36730 0              STCALL  SNTH                ALSO CSTH
 5592   REF    2   LAST   498       34,2247   24732 1                      TIMETHET
 5593                               34,2250   72142 0              SR1     LXA,1
 5594   REF    3   LAST   622       34,2251   02776 0                      RTX1
 5595   REF    1                    34,2252   37604 1              STCALL  HAFPA1
 5596   REF    1                    34,2253   46351 1                      PERIAPO
 5597                               34,2254   77624 1              CALL
 5598   REF    3   LAST   622       34,2255   46451 0                      SHIFTR1
 5599   REF    1                    34,2256   17602 0              STODL   POSTCSI
 5600   REF    4   LAST   626       34,2257   03621 1                      CENTANG
 560001                             34,2260   52054 1              BZE     GOTC
 560002                             34,2261   70263 1                      +2
 560003 REF   1              34,2262   70372 0                 CIRCL
 560004                      34,2263   77745 1           OLOAO
 560005 REF   2  LAST  126   34,2264   02752 0                 ECC
 5601         ,              34,2265   50025 0           OSU   BMN
 5602   REF   1              34,2266   30110 1                 ONETHTH
 5603   REF   2  LAST  640   34,2267   70372 0                 CIRCL
 5604                        34,2270   45145 0           OLOAO CALL
 5605   REF   1              34,2271   00041 1                 R1
 5606   REF   4  LAST  639   34,2272   46451 0                 SHIFTR1
 5607                        34,2273   60201 1           SETRO NORM
 5608                        34,2274   00003 1                 20
 5609   REF   8  LAST  638   34,2275   00047 1                 X1
 5610                        34,2276   50315 0           ROVL  OOT                                    PL040
 5611   REF   6  LAST  639   34,2277   02303 0                 RACT1
 5612   REF   3  LAST  639   34,2300   03566 1                 VACT4
 5613                        34,2301   56246 1           ABS   OOV
 5614                        34,2302   00003 1                 020     (/ROOTV/)/R1          836-B29= B7
 5615                        34,2303   45257 0           SL*   OSU
 5616                        34,2304   20201 0                 0,1
 5617   REF   1              34,2305   30100 0                 NICKELOR
 5618                        34,2306   71240 1           8MN   OLOAO
 5619   REF   3  LAST  640   34,2307   70372 0                 CIRCL
 5620   REF   2  LAST  126   34,2310   02740 0                 R
 5621                        34,2311   45312 0           SL2   OSU
 5622   REF   2  LAST  638   34,2312   30070 0                 10P82
 5623                        34,2313   14017 1           STOOL 140
 5624   REF   3  LAST  11B   34,2314   02317 0                 RTSR1/MU
 5625                        34,2315   56342 1           SR1   OOV     (1/POOTMU)/R1      B-16-B29 = B-45 RL020
 5626                        34,2316   41325 0           POOL  DMP
 5627   REF   3  LAST  640   34,2317   02740 0                 P
 5628   REF   2  LAST  640   34,2320   00041 1                 R1
 5629                        34,2321   77624 1           CALL
 5630   REF   5  LAST  640   34,2322   46451 0                 SHIFTR1
 5631                        34,2323   72412 0           SL4   SL1
 5632                        34,2324   41366 1           SQRT  OMR     ((R/MU)**.5)/R1    B14+B-45 = B-31 PL020
 5633                        34,2325   52414 1           BOFF  SL3
 5634   REF   2  LAST   37   34,2326   04343 1                 CMOONFLG
 5635   REF   1              34,2327   70330 0                 CSI/B3
 5636                        34,2330   50315 0  CSI/B3   ROVL  OOT
 5637   REF   7  LAST  640   34,2331   02303 0                 RACT1
 563B   REF   4  LAST  640   34,2332   03566 1                 VACT4
 5639   REF   2  LAST  144   34,2333   03617 1           STORE ROOTV
 5640                        34,2334   77646 0           A8S
 5641                        34,2335   41301 0           NORM  OMR     ((P/MU)**.5)ROOTV/R1                  RL020
 5642   REF   3  LAST  63B   34,2336   00050 1                 X2
 5643                        34,2337   53660 1           XSU,1 SL*                       B-31+B36-B3= 82
 5644   REF   4  LAST  640   34,2340   00047 1                 X2
 5645                        34,2341   20204 0                 3,1
 5646                        34,2342   14015 0           STCOL 12D
 5647   REF   6  LAST  638   34,2343   32425 0                 P30ZERC
 5648                                 34,2344   00021 1             STORE   16D
 5649                                 34,2345   53575 0             VLOAD   UNIT
 5650                                 34,2346   00015 0                     12D
 5651   REF   4  LAST  639            34,2347   26730 1             STOVL   SNTH              ALSO STORES CSTH AND 0
 5652   REF   8  LAST  640            34,2350   02303 0                     RACT1
 5653                                 34,2351   75315 1             PDVL    SIGN
 5654   REF   5  LAST  640            34,2352   03566 1                     VACT4
 5655   REF   3  LAST  640            34,2353   03617 1                     RDOTV
 5656                                 34,2354   45076 1             VCOMP   CALL
 5657   REF   2  LAST  639            34,2355   46441 1                     VECSHIFT
 5658   REF   5  LAST  639            34,2356   26744 1             STOVL   VVEC
 5659                                 34,2357   77614 1             SET
 5660   REF   4  LAST  639            34,2360   03466 0                     RVSW
 5661   REF   4  LAST  639            34,2361   36655 1             STCALL  RVEC
 5662   REF   3  LAST  639            34,2362   24732 1                     TIMETHET
 5663                                 34,2363   51125 0             PDDL    BPL
 5664   REF   4  LAST  641            34,2364   03617 1                     RDOTV
 5665   REF   1                       34,2365   70376 1                     NTP/2
 5666                                 34,2366   45345 1             DLOAD   DSU
 5667   REF   2  LAST  639            34,2367   03604 0                     HAFPA1
 5668                                 34,2370   52006 0             PUSH    GOTD
 5669   REF   2  LAST  641            34,2371   70376 1                     NTP/2
 5670                                 34,2372   71201 1  CIRCL      SETPD   DLOAD
 5671                                 34,2373   00001 0                     00D
 5672   REF   7  LAST  640            34,2374   32425 0                     P30ZERO
 5673                                 34,2375   77606 1             PUSH
 5674                                 34,2376   41345 0  NTP/2      DLOAD   DMP
 5675   REF   4  LAST  626            34,2377   03467 1                     NN
 5676   REF   3  LAST  641            34,2400   03604 0                     HAFPA1
 5677                                 34,2401   45261 0             SL      DSU
 5678                                 34,2402   20217 1                     14D
 5679                                 34,2403   77615 0             DAD
 5680   REF  10  LAST  627            34,2404   03634 0                     TCSI
 5681   REF   6  LAST  633            34,2405   01777 1             STORE   TCDH
 5682                                 34,2406   77021 1             BDSU    AXT,2
 5683   REF  10  LAST  633            34,2407   03636 1                     TTPI
 5684                                 34,2410   00005 1                     5D
 5685                                 34,2411   40240 0             BMN     SETPD
 5686   REF   4  LAST  639            34,2412   70776 0                     SCNDSOL
 5687                                 34,2413   00001 0                     0D
 5688                                 34,2414   63375 0             VLOAD   PDVL
 5689   REF   6  LAST  641            34,2415   03566 1                     VACT4
 5690   REF   9  LAST  641            34,2416   02303 0                     RACT1
 5691                                 34,2417   77624 1             CALL
 5692   REF   1                       34,2420   71062 0                     INTINT2C
 5693   REF   4  LAST  632            34,2421   26311 0             STOVL   RACT2
 5694   REF   7  LAST  622            34,2422   00007 0                     VATT
 5695   REF   1                       34,2423   27514 1             STOVL   VACT2
 5696   REF   4  LAST  627            34,2424   03506 1                     VPASS1
 5697                                 34,2425   63201 1             SETPD   PDVL
 5698                                34,2426   00DC1 0              0D
 5699   REF   3  LAST   627          34,2427   C3500 1              PPASS1
 570D                                34,2430   77624 1       CALL
 5701   REF   2  LAST   641          34,2431   71062 0              INTINT2C
 5702   REF   3  LAST   632          34,2432   27522 1       STOVL  RPASS2
 57D3   REF   8  LAST   641          34,2433   D00D7 0              VATT
 5704   REF   3  LAST   632          34,2434   37530 D       STCALL VPASS2
 5705   REF   2  LAST   632          34,2435   71133 0              COHMVR
 57D6                                34,2436   40375 1       VLCAD  SETPO
 5707   REF   5  LAST   641          34,2437   C2311 0              RACT2
 5708                                34,2440   0D001 D              0D
 57D9                                34,2441   45115 D       POVL   CALL
 571D   REF   4  LAST   632          34,2442   03544 1              VACT3
 5711   REF   2  LAST   622          34,2443   46341 0              PERIAPO1
 5712                                34,2444   77624 1       CALL
 5713   REF   6  LAST   640          34,2445   46451 0              SHIFTR1
 5714   REF   2  LAST   143          34,2446   27604 0       STCVL  POSTCDH
 5715   REF   5  LAST   642          34,2447   C3544 1              VACT3
 5716                                34,2450   632D1 1       SETPD  PDVL
 5717                                34,2451   DDD01 0              0D
 5718   REF   6  LAST   642          34,2452   02311 D              PACT2
 5719                                34,2453   65325 0       PODL   PDDL
 5720   REF   7  LAST   641          34,2454   D1777 1              TCDH
 5721   REF  11  LAST   641          34,2455   C3636 1              TTPI
 5722                                34,2456   41525 0       PDOL   PUSH
 5723   REF   ?  LAST   627          34,2457   33641 1              TWCPI
 5724                                34,2460   77624 1       CALL
 5725   REF   2  LAST   627          34,2461   73376 1              INTINT
 5726                                34,2462   77624 1       CALL
 5727   REF   2  LAST   632          34,2463   46425 0              ACTIVE
 5728                                34,2464   77745 1       OLDAD
 5738   REF   4  LAST   317          34,2465   D2257 0              ELEV
 5739                                34,2466   734D1 0       SETPD  SINE
 5740                                34,2467   C0D07 D              6D
 5741                                34,2470   53515 D       PDVL   UNIT
 5742   REF   2  LAST   627          34,2471   D3536 1              RACT3
 5743                                34,2472   C0001 D       STORE  0DD              URA3 AT 00D
 5744                                34,2473   47315 D       POVL   VXV              PL14D,PLD8D
 5745   REF   4  LAST   639          34,2474   D2261 0              UP1
 5746                                34,2475   77656 1       UNIT
 5747                                34,2476   71525 D       PDCL   COSINE           UNIT(URA3XUVA3XURA3) = UH?       81 PL14D
 5748   REF   5  LAST   642          34,2477   C2257 0              ELEV
 5749                                34,250D   45561 1       VXSC   STAOR            (CDSLOS)(UH3)                    82 PL08D
 575D                                34,2501   77754 1       STCRE  18D                  PLUS
 5751                                34,25D2   74345 0       DLOAD  VXSC             (SINLDS)(URA3) = U               82 PLD0D
 5752                                34,25D3   76455 1       VAC    VSL1
 5753                                34,25C4   00023 0              18D                                               81
 5754                                34,2505   502D6 0       PUSH   00T                                                  PL06D
 5755   REF   3  LAST   642          34,2506   D3536 1              RACT3            (U . RA3) = TEMP1        81 +829=B3D
 5756                                34,25D7   41552 D       SL1    PUSH                                             829 PL080
 5757                       34,2510   72316 D             OSQ     TLOAO        TEMP1**2                        858
 5758   PEF 285  LAST  626  34,2511   00155 0                     MPAC
 5759                       34,2512   50315 0             POVL    DOT                                                PL110
 576D   REF   4  LAST  642  34,2513   03536 1                     RACT3
 5761   REF   5  LAST  643  34,2514   03536 1                     RACT3
 5762                       34,2515   57551 1             TLCAD   DCOMP        RA3.RA3
 5763   REF 286  LAST  643  34,2516   0D155 D                     MPAC
 5764                       34,2517   50315 D             PDVL    ODT          PP3.RP3                         B58 PL140
 5765   REF   2  LAST  638  34,2520   03552 D                     RPASS3
 5766   KEF   3  LAST  643  34,2521   03552 0                     RPASS3                                             PL11D
 5767                       34,2522   76371 0             TAO     TAD          TEMP1**2+PA3.RA3+RP3.RP3=TEMP2        PL080
 5768                       34,2523   71244 0             BPL     DLCAO
 5769   REF   1             34,2524   7C542 D                     K1CRK2
 5770   REF   4  LAST  638  34,2525   03606 1                     LODPCT
 5771                       34,2526   77025 0             DSU     AXT,2
 5772   REF   2  LAST  638  34,2527   30072 1                     10P828
 5773                       34,2530   00001 0                     10
 5774                       34,2531   77654 0             BZE
 5775   REF   1             34,2532   72043 0                     ALMXITA
 5776                       34,2533   70545 1             DLCAD   SR1
 5777   REF   5  LAST  638  34,2534   03612 1                     DELOV
 5778   REF   6  LAST  643  34,2535   03612 1             STORE   DELOV
 5779                       34,2536   77621 1             BDSU
 5780   KEF   1             34,2537   C3576 0                     DVPREV
 5761   REF   R  LAST  639  34,2540   37574 0             STCALL  OELVCSI
 5782   REF   1             34,2541   70165 1                     CSI/81
 5783                       34,2542   41566 1   K1DRK2    SQRT    PUSH         TEMP3 = TEMP2**.5               829 PL100
 5784                       34,2543   45276 0             DCOMP   DSU
 5785                       34,2544   00007 0                     (60          -TEMP1-TEMP3 =K2 AT 10C
 5786                       34,2545   14D13 0             STODL   100                                                PL080
 5787                       34,2546   45425 0             OSU     STAOR                                              PL060
 5788                       34,2547   77762 1             STORE   120          -TEMP1+TEMP3 =K1 AT 120
 5789                       34,2550   77646 D             ABS
 5790                       34,2551   14017 1             STCDL   140
 5791                       34,2552   00013 0                     100
 5792                       34,2553   45246 0             ABS     DSU
 5793                       34,2554   C0017 1                     140
 5794                       34,2555   71240 1             BMN     OLOAD
 5795   REF   1             34,2556   70561 1                     K2.
 5796                       34,2557   CC015 0                     120
 5797                       34,2560   00D13 D             STCRE   100          K=K1
 5798                       34,2561   77745 1   K2.       OLCAO
 5799                       34,2562   00013 0                     100
 5800                       34,2563   76561 1             VXSC    VSL1
 5801                       34,2564   53455 0             VAO     UNIT         V=RA3+KU  UNIT                   81
 5802   KEF   6  LAST  643  34,2565   03536 1                     RACT3
 5803                       34,2566   53515 0             POVL    UNIT                                               PL060
 5804   PEF   4  LAST  643  34,2567   C3552 0                     RPASS3
 5805                       34,2570   53515 0             PDVL    UNIT                                               PL12D
 58D6   REF   1             34,2571   03560 1                     VPASS3
 5807                        34,2572   63235 0              VXV      PDVL          UVP3 X URP3                      PL18D
 5808                        34,2573   00007 0                       06D
 5809                        34,2574   00007 0                       06D
 5810                        34,2575   50235 0              VXV      DOT
 5811                        34,2576   00001 0                       00D
 5812                        34,2577   77626 0              STADR                                                   PL12D
 5813                        34,2600   53762 1              STOVL    12D           (URP3XV).(UVP3XURP3)=TEMP        PL06D
 5814                        34,2601   72441 0              DOT      SL1                                            PL00D
 5815                        34,2602   75326 1              ARCCOS   SIGN
 5816                        34,2603   00015 0                       12D                                         B0
 5817                        34,2604   41542 1              SR1      PUSH          GAMMA=SIGN(TEMP)ARCCOS(UNITV.URP3)  PL02D
 5818                        34,2605   71214 0              BON      DLOAD
 5819  REF   2  LAST  637    34,2606   03301 0                       S32.1F2
 5820  REF   1               34,2607   70644 0                       FRSTPASS
 5821                        34,2610   00001 0                       00D           NOT THE FIRST PASS OF A CYCLE
 5822                        34,2611   65225 1              DSU      PDDL          GAMMA-GAMPREV                 B1 PL04D
 5823  REF   2  LAST  144    34,2612   03610 0                       GAMPREV
 5824  REF   9  LAST  643    34,2613   03574 1                       DELVCSI
 5825                        34,2614   60225 1              DSU      NORM                                        B7
 5826  REF   2  LAST  643    34,2615   03576 0                       DVPREV
 5827  REF   9  LAST  640    34,2616   00047 1                       X1
 5828                        34,2617   65265 0              BDDV     PDDL          (GAM-GAMPREV)/(DV-DVPREV)   B-6+N1 PL06D
 5829                        34,2620   00003 1                       02D                 = SLOPE
 5830  REF  10  LAST  644    34,2621   03574 1                       DELVCSI
 5831  REF   3  LAST  644    34,2622   03576 0              STORE    DVPREV
 5832                        34,2623   43014 0              BOFF     BOFF
 5833  REF   3  LAST  639    34,2624   03342 1                       S32.1F3A
 5834  REF   1               34,2625   70656 0                       THROCHK
 5835  REF   3  LAST  639    34,2626   03343 0                       S32.1F3B
 5836  REF   2  LAST  644    34,2627   70656 0                       THROCHK
 5837                        34,2630   41345 0              DLOAD    DMP
 5838                        34,2631   00003 1                       02D
 5839  REF   3  LAST  644    34,2632   03610 0                       GAMPREV
 5840                        34,2633   71244 0              BPL      DLOAD
 5841  REF   1               34,2634   70663 0                       FIFTYFPS
 5842  REF   2  LAST  628    34,2635   30062 0                       INITST
 5843                        34,2636   77765 0              SIGN
 5844  REF   7  LAST  643    34,2637   03612 1                       DELOV
 5845  REF   8  LAST  644    34,2640   03612 1              STORE    DELOV
 5846                        34,2641   43014 0              SET      CLEAR
 5847  REF   4  LAST  644    34,2642   03062 0                       S32.1F3A
 5848  REF   4  LAST  644    34,2643   03263 0                       S32.1F3B
 5849                        34,2644   77745 1  FRSTPASS    DLOAD
 5850                        34,2645   00001 0                       00D
 5851  REF   4  LAST  644    34,2646   17610 0              STODL    GAMPREV
 5852  REF  11  LAST  644    34,2647   03574 1                       DELVCSI
 5853  REF   4  LAST  644    34,2650   03576 0              STORE    DVPREV
 5854                        34,2651   43025 1              DSU      CLEAR
 5855  REF   9  LAST  644    34,2652   03612 1                       DELOV
 5856  REF   3  LAST  644    34,2653   03261 1                       S32.1F2
 5857   REF  12  LAST  644   34,2654   37574 0                STCALL DELVCSI
 5858   REF   2  LAST  643   34,2655   70165 1                       CSI/81
 5859                        34,2656   43014 0  THRDCHK  BON    BON
 5860   REF   5  LAST  644   34,2657   03302 0                       S32.1F3A
 5861   REF   1              34,2660   70702 0                       NEWTN
 5862   REF   5  LAST  644   34,2661   03303 1                       S32.1F3B
 5863   REF   2  LAST  645   34,2662   70702 0                       NEWTN
 5864                        34,2663   75345 1  FIFTYFPS DLOAD  SIGN
 5865   REF   1              34,2664   30102 1                       FIFPSDP
 5866                        34,2665   00005 1                       04D
 5867                        34,2666   77765 0           SIGN
 5868   REF   5  LAST  644   34,2667   03610 0                       GAMPREV
 5869   REF  10  LAST  644   34,2670   03612 1           STORE  DELDV
 5870                        34,2671   43276 0           DCOMP  DAD
 5871   REF  13  LAST  645   34,2672   03574 1                       DELVCSI
 5872   REF  14  LAST  645   34,2673   17574 1           STODL  DELVCSI
 5873                        34,2674   00001 0                       00D
 5874                        34,2675   43014 0           SET    SET
 5875   REF   6  LAST  645   34,2676   03063 1                       S32.1F3B
 5876   REF   6  LAST  645   34,2677   03062 0                       S32.1F3A
 5877   REF   6  LAST  645   34,2700   37610 1           STCALL GAMPREV
 5878   REF   1              34,2701   70176 0                       CSI/82
 5879                        34,2702   60345 0  NEWTN    DLOAD  NORM
 5880                        34,2703   00005 1                       04D
 5881   REF   5  LAST  640   34,2704   00050 1                       X2
 5882                        34,2705   54065 0           BDDV   XSU,1
 5883                        34,2706   00001 0                       00D
 5884   REF   6  LAST  645   34,2707   00047 1                       X2
 5885                        34,2710   77657 0           SR*
 5886                        34,2711   20601 1                       0,1
 5887   REF  11  LAST  645   34,2712   17612 1           STODL  DELDV
 5888                        34,2713   00001 0                       00D
 5889   REF   7  LAST  645   34,2714   03610 0           STORE  GAMPREV
 5890                        34,2715   51545 1           DLOAD  ABS
 5891   REF  12  LAST  645   34,2716   03612 1                       DELDV
 5892                        34,2717   45206 1           PUSH   DSU                             PL08D
 5893   REF   1              34,2720   30076 0                       EPSILN1
 5894                        34,2721   71240 1           BMN    DLOAD
 5895   REF   1              34,2722   70737 0                       CSI/SOL
 5896                        34,2723   50025 0           DSU    BMN
 5897   REF   1              34,2724   30106 0                       DELMAX1
 5898   REF   1              34,2725   70732 0                       CSISTEP
 5899                        34,2726   75345 1           DLOAD  SIGN
 5900   REF   2  LAST  645   34,2727   30106 0                       DELMAX1
 5901   REF  13  LAST  645   34,2730   03612 1                       DELDV
 5902   REF  14  LAST  645   34,2731   03612 1           STORE  DELDV
 5903                        34,2732   45345 1  CSISTEP  DLOAD  DSU
 5904   REF  15  LAST  645   34,2733   03574 1                       DELVCSI
 5905   REF  15  LAST  645   34,2734   03612 1                       DELDV
 5906   REF  16  LAST  645   34,2735   37574 0           STCALL DELVCSI
 5907   REF   3  LAST  645   34,2736   70165 1                      CSI/B1
 5908                        34,2737   77145 1   CSI/SOL   DLOAD    AXT,2
 5909   REF   2  LAST  639   34,2740   03602 0                      POSTCSI
 5910                        34,2741   00002 0                      2
 5911                        34,2742   77750 0             LXA,1
 5912   REF   4  LAST  639   34,2743   02776 0                      RTX1
 5913                        34,2744   50023 0             DSU*     BMN
 5914   REF   1              34,2745   30072 1                      PMINE -2,1
 5915   REF   5  LAST  641   34,2746   70776 0                      SCNDSOL
 5916                        34,2747   71374 1             AXT,2    DLOAD
 5917                        34,2750   00003 1                      3
 5918   REF   3  LAST  642   34,2751   03604 0                      POSTCDH
 5919                        34,2752   50023 0             DSU*     BMN
 5920   REF   2  LAST  646   34,2753   30072 1                      PMINE -2,1
 5921   REF   6  LAST  646   34,2754   70776 0                      SCNDSOL
 5922                        34,2755   45345 1             DLOAD    DSU
 5923   REF   8  LAST  642   34,2756   01777 1                      TCDH
 5924   REF  11  LAST  641   34,2757   03634 0                      TCSI
 5925   REF   6  LAST  633   34,2760   02253 1             STORE    T1TOT2
 5926                        34,2761   45374 0             AXT,2    DSU
 5927                        34,2762   00004 0                      4
 5928   REF   1              34,2763   30112 0                      TMIN
 5929                        34,2764   77040 0             BMN      AXT,2
 5930   REF   7  LAST  646   34,2765   70776 0                      SCNDSOL
 5931                        34,2766   00005 1                      5
 5932                        34,2767   45345 1             DLOAD    DSU
 5933   REF  12  LAST  642   34,2770   03636 1                      TTPI
 5934   REF   9  LAST  646   34,2771   01777 1                      TCDH
 5935   REF   5  LAST  633   34,2772   02255 1             STORE    T2TOT3
 5936                        34,2773   51025 1             DSU      BPL
 5937   REF   2  LAST  646   34,2774   30112 0                      TMIN
 5938   REF   1              34,2775   72157 1                      P32/P72C
 5939                        34,2776   43014 0   SCNDSOL   BON      BOFF
 5940   REF   7  LAST  645   34,2777   03302 0                      S32.1F3A
 5941   REF   1              34,3000   72045 0                      ALMXIT
 5942   REF   7  LAST  645   34,3001   03343 0                      S32.1F3B
 5943   REF   2  LAST  646   34,3002   72045 0                      ALMXIT
 5944                        34,3003   71334 0             SXA,2    DLOAD
 5945   REF   5  LAST  638   34,3004   03613 0                      CSIALRM
 5946   REF   8  LAST  641   34,3005   32425 0                      P30ZERO
 5947                        34,3006   43014 0             CLEAR    SET
 5948   REF   4  LAST  639   34,3007   03260 0                      S32.1F1
 5949   REF   4  LAST  644   34,3010   03061 0                      S32.1F2
 5950                        34,3011   43014 0             CLEAR    CLEAR
 5951   REF   8  LAST  646   34,3012   03262 1                      S32.1F3A
 5952   REF   8  LAST  646   34,3013   03263 0                      S32.1F3B
 5953   REF   5  LAST  643   34,3014   37606 0             STCALL   LOOPCT
 5954   REF   1              34,3015   70125 0                      CSI/B
```

```
L         P32-P35, P72-P75                                                    USER'S PAGE NO. 25        E7 S3

P6000     ..... ADVANCE      .....

R6050     SUBROUTINES USED

R6051           PRECSET
R6052           ROTATE

 6100                                 34,3016    71220 1  ADVANCE   STQ     DLCAD
 6101     REF   9  LAST  637          34,3017    03470 1                    SUBEXIT
 6102     REF  13  LAST  632          34,3020    03442 0                    TIG
 6103     REF  23  LAST  627          34,3021    34041 0            STCALL  TOEC1
 6104     REF   2  LAST  627          34,3022    46403 1                    PRECSET
 6105                                 34,3023    77214 0            SET     VLCAD
 61055    REF   2  LAST  619          34,3024    01067 1                    XDELVFLG
 6106     REF   2  LAST  643          34,3025    03560 1                    VPASS3
 6107     REF   4  LAST  642          34,3026    03530 1            STORE   VPASS2
 6108     REF   5  LAST  641          34,3027    27506 1            STOVL   VPASS1
 6109     REF   5  LAST  643          34,3030    03552 0                    RPASS3
 6110     REF   4  LAST  642          34,3031    03522 1            STORE   RPASS2
 6111     REF   4  LAST  642          34,3032    03500 1            STORE   RPASS1
 6112                                 34,3033    47256 0            UNIT    VXV
 6113     REF   6  LAST  647          34,3034    03506 1                    VPASS1
 6114                                 34,3035    77656 1            UNIT
 6115     REF   5  LAST  642          34,3036    26261 0            STOVL   UP1
 6116     REF   7  LAST  643          34,3037    03536 1                    RACT3
 6117     REF   5  LAST  622          34,3040    37642 0            STCALL  RTIG
 6118     REF   1                     34,3041    71052 0                    ROTATE
 6119     REF   7  LAST  642          34,3042    02311 0            STORE   RACT2
 6120     REF  10  LAST  641          34,3043    26303 0            STOVL   RACT1
 6121     REF   6  LAST  642          34,3044    03544 1                    VACT3
 6122     REF   4  LAST  622          34,3045    37650 0            STCALL  VTIG
 6123     REF   2  LAST  647          34,3046    71052 0                    ROTATE
 6124     REF   2  LAST  641          34,3047    03514 1            STORE   VACT2
 6125     REF   4  LAST  639          34,3050    37472 1            STCALL  VACT1
 6126     REF  10  LAST  647          34,3051    03470 1                    SUBEXIT
```

```
P6200     ..... ROTATE      .....

 6300                            34,3052    41406 0  ROTATE    PUSH     PUSH
 6301                            34,3053    74241 0            DOT      VXSC
 6302      REF    6  LAST   647  34,3054    02261 0                     UP1
 6303      REF    7  LAST   648  34,3055    02261 0                     UP1
 6304                            34,3056    51352 1            VSL2     BVSU
 6305                            34,3057    63256 0            UNIT     PDVL
 6306                            34,3060    74246 1            ABVAL    VXSC
 6307                            34,3061    43572 0            VSL1     RVQ
```

```
P7000     °°°°° INTINTNA  °°°°°

 7100                              34,3062   65325 0  INTINT2C POOL     POOL
 7101     REF  12  LAST  646      34,3063   03634 0                    TCSI
 7102     REF  10  LAST  646      34,3064   01777 1                    TCOH
 7103                              34,3065   41525 0           POOL     PUSH
 7104     REF   3  LAST  642      34,3066   33641 1                    TWOPI
 7105                              34,3067   77650 1           GOTO
 7106     REF   3  LAST  642      34,3070   73376 1                    INTINT
 7107                              34,3071   65325 0  INTINT3P POOL     POOL
 7108     REF  11  LAST  649      34,3072   01777 1                    TCOH
 7109     REF  13  LAST  646      34,3073   03636 1                    TTPI
 7110                              34,3074   41525 0           POOL     PUSH
 7111     REF   9  LAST  646      34,3075   32425 0                    P30ZERO
 7112                              34,3076   77650 1           GOTO
 7113     REF   4  LAST  649      34,3077   73376 1                    INTINT
```

```
P7400      ..... S32/33.1  .....

R7450      SUBROUTINES USED

R7451            S32/33.X

 7500                              34,3100   76020 1  S32/33.1 STQ      AXT,1
 75001     REF  11  LAST  647      34,3101   03470 1                    SUBEXIT
 75002                             34,3102   01521 0           VN       0681
 75003                             34,3103   77624 1           CALL
 75004     REF   2  LAST  628      34,3104   72375 0                    DISDVLVC
 7501                              34,3105   77624 1           CALL
 7502      REF   2  LAST  635      34,3106   71120 1                    S32/33.X
 7503                              34,3107   61375 1           VLOAD    VXM
 7504      REF  14  LAST  635      34,3110   03434 1                    DELVLVC
 7505                              34,3111   00001 0                    00
 75051                             34,3112   77772 0           VSL1
 7506      REF   8  LAST  622      34,3113   03656 1           STORE    DELVSIN
 7507                              34,3114   51406 1           PUSH     ABVAL
 7508      REF   3  LAST  622      34,3115   27664 0           STOVL    DELVSAB
 7509                              34,3116   77650 1           GOTO
 7510      REF  12  LAST  650      34,3117   03470 1                    SUBEXIT
```

```
P7800    ..... S32/33.X  .....

 7900                           34,3120   77201 1   S32/33.X SETPD   VLOAD
 7901                           34,3121   00007 0                    60
 7902    REF   8  LAST  648     34,3122   02261 0                    UP1
 7903                           34,3123   63276 1            VCOMP   PDVL
 7904    REF  11  LAST  647     34,3124   02303 0                    RACT1
 7905                           34,3125   57456 1            UNIT    VCOMP
 7906                           34,3126   47206 0            PUSH    VXV
 7907    REF   9  LAST  651     34,3127   02261 0                    UP1
 7908                           34,3130   77772 0            VSL1
 7909                           34,3131   00001 0            STORE   00
 7910                           34,3132   77616 0            RVQ
```

```
P8000    ..... CDHMVR    .....

R8050    SUBROUTINES USED

R8051          VECSHIFT
R8052          TIMETHET
R8053          SHIFTR1

 8100                              34,3133   77220 1  CDHMVR   STQ     VLOAD
 8101   REF  13  LAST  650         34,3134   03470 1                   SUBEXIT
 8102   REF   8  LAST  647         34,3135   02311 0                   RACT2
 8103                              34,3136   53406 0           PUSH    UNIT
 8104   REF   1                    34,3137   27544 1           STOVL   UNVEC                  UR SUB A
 8105   REF   5  LAST  647         34,3140   03522 1                   RPASS2
 8106                              34,3141   50256 0           UNIT    DOT
 8107   REF   2  LAST  652         34,3142   03544 1                   UNVEC
 8108                              34,3143   72406 0           PUSH    SL1
 8109   REF   3  LAST  498         34,3144   16732 0           STODL   CSTH
 8110                              34,3145   65316 0           DSQ     PDDL
 8111   REF   5  LAST  592         34,3146   06514 1                   DP1/4TH
 8112                              34,3147   45302 1           SR2     DSU
 8113                              34,3150   72566 1           SQRT    SL1
 8114                              34,3151   57515 1           PDVL    VCOMP
 8115                              34,3152   77635 1           VXV
 8116   REF   6  LAST  652         34,3153   03522 1                   RPASS2
 8117                              34,3154   65241 0           DOT     PDDL
 8118   REF  10  LAST  651         34,3155   02261 0                   UP1
 8119                              34,3156   45565 0           SIGN    STADR
 8120   REF   5  LAST  641         34,3157   51047 0           STOVL   SNTH
 8121   REF   7  LAST  652         34,3160   03522 1                   RPASS2
 8122                              34,3161   45115 0           PDVL    CALL
 8123   REF   5  LAST  647         34,3162   03530 1                   VPASS2
 8124   REF   3  LAST  641         34,3163   46441 1                   VECSHIFT
 8125   REF   6  LAST  641         34,3164   26744 1           STOVL   VVEC
 8126                              34,3165   77614 1           CLEAR
 8127   REF   5  LAST  641         34,3166   03666 1                   RVSW
 8128   REF   5  LAST  641         34,3167   36655 1           STCALL  RVEC
 8129   REF   4  LAST  641         34,3170   24732 1                   TIMETHET
 8130                              34,3171   53754 1           LXA,2   VSL*
 8131   REF   2  LAST  622         34,3172   02777 1                   RTX2
 8132                              34,3173   57576 1                   0,2
 8133                              34,3174   00023 0           STORE   18D
 8134                              34,3175   76441 1           DOT     SL1R
 8135   REF   3  LAST  652         34,3176   03544 1                   UNVEC
 8136                              34,3177   51515 1           PDVL    ABVAL              00 = V SUB PV
 8137                              34,3200   63257 1           SL*     PDVL
 8138                              34,3201   57576 1                   0,2
 8139   REF   9  LAST  652         34,3202   02311 0                   RACT2
 8140                              34,3203   65246 1           ABVAL   PDDL               20 = LENGTH OF R SUB A
 8141                              34,3204   77625 0           DSU
 8142                           34,3205   00003 1                   02D
 8143  REF   4  LAST  318       34,3206   17600 1          STODL    DIFFALT                DELTA H IN METERS       B+29
 8144  REF   2  LAST  126       34,3207   02742 1                   R1A
 8145                           34,3210   65301 0          NORM     PDDL                   2 - R V**/MU                    04D
 8146  REF  10  LAST  644       34,3211   00047 1                   X1
 8147  REF   3  LAST  640       34,3212   00041 1                   R1
 8148                           34,3213   77624 1          CALL
 8149  REF   7  LAST  642       34,3214   46451 0                   SHIFTR1
 8150                           34,3215   56362 0          SR1R     DDV
 8151                           34,3216   41457 1          SL*      PUSH
 8152                           34,3217   20174 1                   0 -5,1
 8153                           34,3220   65225 1          DSU      PDDL                   A SUB A                 B+29    04D
 8154  REF   5  LAST  653       34,3221   03600 1                   DIFFALT
 8155                           34,3222   56302 0          SR2      DDV                    A SUB P                B+31
 8156                           34,3223   00005 1                   04D                                           B+2
 8157                           34,3224   75406 1          PUSH     SQRT                       A SUB P/A SUB A      06D
 8158                           34,3225   41275 1          DMPR     DMP
 8159                           34,3226   00007 0                   06D
 8160                           34,3227   00001 0                   00D
 8161                           34,3230   65272 0          SL3R     PDDL                   V SUB AV METERS/CS      B+7     08D
 8162                           34,3231   00003 1                   02D                    R SUB A MAGNITUDE   B+29
 8163                           34,3232   65301 0          NORM     PDDL
 8164  REF  11  LAST  653       34,3233   00047 1                   X1
 8165  REF   2  LAST  638       34,3234   02321 0                   RTMU
 8166                           34,3235   56342 1          SR1      DDV                    2MU  B+38
 8167                           34,3236   65257 1          SL*      PDDL                      2 MU/R SUBAA     B+14     10D
 8168                           34,3237   20174 1                   0 -5,1
 8169                           34,3240   00005 1                   04D                    ASUBA                  B+29
 8170                           34,3241   65301 0          NORM     PDDL
 8171  REF   7  LAST  645       34,3242   00050 1                   X2
 8172  REF   3  LAST  653       34,3243   02321 0                   RTMU
 8173                           34,3244   56342 1          SR1      DDV
 8174                           34,3245   44257 1          SL*      BDSU
 8175                           34,3246   57604 1                   0 -6,2                  2U/R - U/A   B+14 (METERS/CS)SQ
 8176                           34,3247   63525 0          PDDL     DSQ                                                   10D
 8177                           34,3250   00011 1                   08D
 8178                           34,3251   75421 1          BDSU     SQRT
 8179                           34,3252   47315 0          PDVL     VXV                     SQRT(MU(2/R SUB A-1/A SUB A)-VSUBA2)10D
 8180  REF  11  LAST  652       34,3253   02261 0                   UP1
 8181  REF   4  LAST  652       34,3254   03544 1                   UNVEC
 8182                           34,3255   74256 0          UNIT     VXSC
 8183                           34,3256   00013 0                   10D
 8184                           34,3257   74315 0          PDVL     VXSC
 8185  REF   5  LAST  653       34,3260   03544 1                   UNVEC
 8186                           34,3261   00011 1                   08D
 8187                           34,3262   76455 1          VAD      VSL1
 8188                           34,3263   77626 0          STADR
 8189  REF   7  LAST  647       34,3264   74233 0          STORE    VACT3
 8190                           34,3265   77651 0          VSU
 8191  REF   3  LAST  647       34,3266   03514 1                   VACT2
 8199    REF   6  LAST  633   34,3267    36275 1            STCALL DELVEET2        DELTA VCDH - REFERENCE COORDINATES
 8200    REF  14  LAST  652   34,3270    03470 1                   SUBEXIT
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L        P32-P35, P72-P75                                                                   USER'S PAGE NO. 33      E7 S3

P8201    ..... COMPTGO   .....

R8202    SUBROUTINES USED

R8203              CLOKTASK
R8204              2PHSCHNG

 8205                             35,2437                             BANK    35
 8206    REF   2  LAST   626      35,2000                             SETLOC  CSI/CDH
 8207                             35,2437                             BANK

 8208    REF   1                  E7,1465                             EBANK=  RTRN

 8209    REF   1                                                      COUNT*  $$/P3575

 8210                             35,2437  0 0006 1  COMPTGO          EXTEND
 8211    REF   2  LAST   655      35,2440  23'465 1                   QXCH    RTRN
 8212    REF 125  LAST   611      35,2441  3 4755 1                   CAF     ZERO
 8213    REF   2  LAST   150      35,2442  55'162 1                   TS      DISPDEX
 8214    REF  35  LAST   609      35,2443  3 4752 0                   CAF     BIT2
 8215                             35,2444  0 0004 0                   INHINT
 8216    REF  29  LAST   609      35,2445  0 5203 0                   TC      WAITLIST
 8217    REF   2  LAST   243      E7,1455                             EBANK=  WHICH
 8218    REF   2  LAST   244      35,2446   02723 0                   2CADR   CLOKTASK
 8218                             35,2447   74067 0
 8219    REF   3  LAST   506      35,2450  0 5327 1                   TC      2PHSCHNG
 8220                             35,2451   40036 0                   OCT     40036
 8221                             35,2452   05024 1                   OCT     05024
 8222                             35,2453   13000 0                   OCT     13000
 8223    REF   3  LAST   655      35,2454  0 1465 1                   TC      RTRN

*** END OF LEMP30S .105 ***
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P0001   GROUND TRACKING DETERMINATION PROGRAM P21
R0002   PROGRAM DESCRIPTION
R0003   MOD NO - 1
R0004   MOD BY - N.M.NEVILLE .
R0005   FUNCTIONAL DECRIPTION-
R0006
R0007   TO PROVIDE THE ASTRONAUT DETAILS OF THE LM OR CSM GROUND TRACK WITHOUT
R0008   THE NEED FOR GROUND COMMUNICATION (REQUESTED BY DSKY).
R0009   CALLING SEQUENCE -
R0010
R0011   ASTRONAUT REQUEST THROUGH DSKY V37E21E
R0012   SUBROUTINES CALLED-
R0013
R0014   GOPERF4
R0015   GOFLASH
R0016   THISPREC
R0017   OTHPREC
R0018   LAT-LONG
R0019   NORMAL EXIT MODES-
R0020
R0021   ASTRONAUT REQUEST TROUGH DSKY TO TERMINATE PROGRAM V34E
R0022   ALARM OR ABORT EXIT MODES-
R0023
R0024   NONE
R0025   OUTPUT -
R0026
R0027   OCTAL DISPLAY OF OPTION CODE AND VEHICLE WHOSE GROUND TRACK IS TO BE
R0028   COMPUTED
R0029            OPTION CODE  00002
R0030            THIS         00001
R0031            OTHER        00002
R0032   DECIMAL DISPLAY OF TIME TO BE INTEGRATED TO HOURS , MINUTES , SECONDS
R0033   DECIMAL DISPLAY OF LAT,LONG,ALT
R0034   ERASABLE INITIALIZATION REQUIRED
R0035
R0036   AX0      2DEC   4.652459653 E-5   RADIANS       %68-69 CONSTANTS"
R0037
R0038   -AY0     2DEC   2.147535898 E-5   RADIANS
R0039
R0040   AZ0      2DEC   .7753206164       REVOLUTIONS
R0041   FOR LUNAR ORBITS 504LM VECTOR IS NEEDED
R0042
R0043   504LM    2DEC   -2.700340600 E-5  RADIANS
R0044
R0045   504LM _2 2DEC   -7.514128400 E-4  RADIANS
R0046
R0047   504LM _4 2DEC   _2.553198641 E-4  RADIANS
R0048
R0049   NONE
R0050   DEBRIS
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R0051
R0052   CENTRALS-A,C,L
R0053   OTHER-THOSE USED BY THE ABCVE LISTEO SUBRCUTINES
R0054   SEE LEMPREC,LAT-LUNG
 0055   REF   B  LAST  496   30,2000                        SBANK= LOWSUPER      FOR LOW 2CADR'S.

 0056                        33,2200                        BANK   33
 0057   REF   B  LAST  610   24,2000                        SETLOC P20S
 0058                        24,3506                        BANK

 0059   REF   4  LAST  241   E7,1762                        EBANK= P21TIME
 0060   REF   1                                             COUNT* $$/P21
 0061   REF  80  LAST  617   24,3506  3 4753 1  PRCG21      CAF    ONE
 0062   REF   3  LAST  497   24,3507  55'144 0              TS     OPTION2       ASSUMEO VEHICLE IS LM , R2 = 00001
 0063   REF  36  LAST  655   24,3510  3 4752 0              CAF    BIT2           OPTION 2
 0064   REF 168  LAST  632   24,3511  0 4616 1              TC     BANKCALL
 0065   REF   2  LAST  497   24,3512   20634 I              CAOR   GOPERF4
 0066   REF   9  LAST  632   24,3513  C 6001 0              TC     GOTOPOOH      TERMINATE
 0067                        24,3514  0 3516 C              TC     +2            PROCEEO VALUE OF ASSUMEO VEHICLE OK
 0068                        24,3515  0 3510 0              TC     -5            R2 LOAOEO THROUGH CSKY
 00682  REF 126  LAST  655   24,3516  3 4755 1              CAF    ZERC          INITIAL TIME = PRESENT TIME
 00684  REF  23  LAST  577   24,3517  55'044 1              TS     OSPTEM1
 00686  REF  24  LAST  657   24,3520  55'045 0              TS     DSPTEM1 +1
 0069   REF   1              24,3521  3 3675 0  P21PROG1    CAF    V6N34         LOAO DESIRED TIME OF LAT-LONG
 0070   REF 169  LAST  657   24,3522  0 4616 1              TC     BANKCALL
 0071   REF  11  LAST  632   24,3523   20477 1              CACR   GOFLASH
 0072   REF  10  LAST  657   24,3524  C 6C01 0              TC     GOTOPOCH      TERM
 0073                        24,3525  0 3527 1              TC     +2            PRCCEEO VALUES CK
 0074                        24,3526  0 3521 I              TC     -5            TIME LOAOEO THROUGH OSKY
 0075   REF  72  LAST  635   24,3527  C 6C42 1              TC     INTPRET
 0076                        24,3530   53145 1              OLOAO  BZE
 0077   REF  25  LAST  657   24,3531   01045 1                     OSPTEM1
 00775  REF   1              24,3532   51667 I                     P21PRTM
 0078   REF  24  LAST  647   24,3533   34041 0  P21PROG2    STCALL TOEC1         INTEG TO TIME SPECIFIEO IN TOEC1
 0079   REF  18  LAST  614   24,3534   27410 1                     INTSTALL
 0080                        24,3535   43014 0              BON    CLEAR
 0081   REF   1              24,3536   00304 0                     P21FLAG
 0082   REF   1              24,3537   51555 0                     P21CCNT       ON---RECYCLE USING BASE VECTOR
 0083   REF  17  LAST  589   24,3540   01674 0                     VINTFLAG      OFF--1ST PASS CALL BASE VECTOR
 0084                        24,3541   70535 0              SLCAD  SR1
 0085   REF   4  LAST  657   24,3542   01145 0                     OPTICN2
 0086                        24,3543   43030 0              BHIZ   SET
 0087                        24,3544   51546 1                     +2            ZERO--THIS VEHICLE(LM)
 0088   REF  18  LAST  657   24,3545   01474 1                     VINTFLAG      CNE--CTHER VEHICLE(CM)
 0089                        24,3546   43014 0              CLEAR  CLEAR
 0090   REF  12  LAST  589   24,3547   C1676 1                     DIMOFLAG
 0091   REF   6  LAST  589   24,3550   01673 1                     INTYPFLG      PRECISION
 0092                        24,3551   77624 1              CALL
 0093   REF   9  LAST  590   24,3552   27133 0                     INTEGRV       CALCULATE
 0094                        24,3553   77650 1              GOTO                 -ANO
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L         GROUND TRACKING DETERMINATICN FROGRAM - P21                                          USER'S PAGE NO.   3       E7 S3

 0095    REF   1                24,3554   51576 1                    P21VSAVE        -SAVE BASE VECTCF
 0096                           24,3555   77775 1   P21CONT  VLOAO
 0097    REF   2  LAST  150     24,3556   03676 0                    P21BASER        RECYCLE--INTEG FROM BASE VECTOR
 0098    REF   5  LAST  499     24,3557   25535 0            STOVL   RCV             --POS
 0099    REF   2  LAST  150     24,3560   03704 1                    P21BASEV
 0100    REF   4  LAST  323     24,3561   15543 1            STODL   VCV             --VEL
 0101    REF   5  LAST  657     24,3562   03763 0                    P21TIME
 0102    REF   5  LAST  499     24,3563   01517 0            STCRF   TET             --TIME
 0103                           24,3564   43014 0            CLEAR   CLEAR
 0104    REF  13  LAST  657     24,3565   01676 1                    DIMOFLAG
 0105    REF   1                24,3566   00263 0                    MOCNFLAG
 0106                           24,3567   53135 0            SLOAD   BZE
 0107    REF   1                24,3570   01163 1                    P21ORIG
 0108                           24,3571   51574 0                    +3              ZERO=EARTH
 0109                           24,3572   77614 1            SET                     ---2=MOON
 0110    REF   2  LAST  658     24,3573   00063 1                    MOCNFLAG
 0111                           24,3574   77624 1      +3    CALL
 0112    REF   1                24,3575   27106 0                    INTEGRVS
 0113                           24,3576   77745 1   P21VSAVE CLCAD                   SAVE CURRENT BASEVECTOR
 0114    REF   7  LAST  594     24,3577   00015 0                    TAT
 0115    REF   6  LAST  658     24,3600   27763 0            STOVL   P21TIME         --TIME
 0116    REF   4  LAST  498     24,3601   00017 1                    RATT1
 0117    REF   3  LAST  658     24,3602   27676 0            STOVL   P21BASER        --POS B-29 OR B-27
 0118    REF   7  LAST  498     24,3603   00025 0                    VATT1
 0119    REF   3  LAST  658     24,3604   03704 1            STORE   P21BASEV        --VEL B-07 OR B-05
 01191                          24,3605   53646 0            ABVAL   SL*
 01192                          24,3606   57576 1                    0,2
 01193   REF   3  LAST  319     24,3607   27712 0            STOVL   P21VEL          VEL/ FOR N91 DISP
 01194   REF  11  LAST  622     24,3610   00001 0                    RATT
 01195                          24,3611   50256 0            UNIT    OOT
 01196   REF   9  LAST  642     24,3612   00007 0                    VATT             U(R).V
 01197                          24,3613   67471 1            OOV     ASIN            U(R).U(V)
 01198   REF   4  LAST  658     24,3614   03712 0                    P21VEL
 01199   REF   3  LAST  319     24,3615   03714 0            STORE   P21GAM          SIN-1 U(R).U(V) , -90 TC &90
 0120                           24,3616   67334 1            SXA,2   SLOAO
 0121    REF   2  LAST  658     24,3617   01162 0                    P21ORIG         0=EARTH
 0122    REF   5  LAST  657     24,3620   01145 0                    OPTION2
 0123                           24,3621   46142 1            SR1     BHIZ
 0124                           24,3622   51625 1                    +3
 0125                           24,3623   77650 1            GOTO
 0126                           24,3624   51630 0                    +4
 0127                           24,3625   77614 1      +3    BON
 0128    REF  13  LAST  614     24,3626   04307 1                    SURFFLAG
 0129    REF   1                24,3627   51632 1                    P21OSP
 0130                           24,3630   77614 1      +4    SET
 0131    REF   2  LAST  657     24,3631   00064 0                    P21FLAG
 0132                           24,3632   67214 1   P21OSP   CLEAR   SLOAO           GENFRATE DISPLAY OATA
 0133    REF   1                24,3633   01663 0                    LUNAFLAG
 0134    REF   8  LAST  653     24,3634   00050 1                    X2
 0135                           24,3635   43054 1            BZE     SET
 0136                          24,3636   51640 1                     +2             0=FARTH
 0137   REF   2  LAST  658     24,3637   01463 1                     LUNAFLAG
 0138                          24,3640   77775 1            VLDAO
 0139   REF  12  LAST  658     24,3641   00001 0                     RATT
 0140   REF   2  LAST  115     24,3642   16032 1            STOOL    ALPHAV
 0141   REF   8  LAST  658     24,3643   00015 0                     TAT
 0142                          24,3644   45014 0            CLEAR    CALL
 0143   REF   1                24,3645   00662 0                     ERADFLAG
 0144   REF   1                24,3646   26347 0                     LAT-LCNG
 01442                         24,3647   77605 1            DMP                     MPAC = ALT,METERS 8-29
 01443  REF   1                24,3650   11677 1                     K.01
 01445  REF   2  LAST  319     24,3651   03716 1            STORF    P21ALT         ALT/100 FCR Nº1 OISP
 0145                          24,3652   77776 1            EXIT
 0146   REF   1                24,3653  3 3674 1            CAF      VC6N43         DISPLAY LAT,LONG,ALT
 0147   REF 170  LAST  657     24,3654  0 4616 1            TC       BANKCALL       LAT,LONG = 1/2 REVS B0
 0148   REF  12  LAST  657     24,3655   20477 1            CADR     GOFLASH        ALT = KM  B14
 0149   REF  11  LAST  657     24,3656  C 6001 0            TC       GCTOPOCH       TERM
 0150   REF  12  LAST  659     24,3657  C 6001 0            TC       GOTOPOOH
 0151   REF  73  LAST  657     24,3660  0 6042 1            TC       INTPRET        V32E RECYCLF
 0152                          24,3661   43345 1            OLOAD    OAD
 0153   REF   7  LAST  658     24,3662   03763 0                     P21TIME
 0154   REF   1                24,3663   11673 0                     600SEC         600 SECONDS OR 10 MIN
 0155   REF  26  LAST  657     24,3664   01045 1            STORE    OSPTEM1
 0156                          24,3665   77634 0            RTB
 0157   REF   1                24,3666   51521 0                     P21PROG1
 01572                         24,3667   52034 1  P21PRTM   RTB      GOTO
 01574  REF  13  LAST  594     24,3670   21574 1                     LOADTIME
 01576  REF   1                24,3671   51533 C                     P21PROG2
 0158                          24,3672   00003 1  600SEC    2DEC     60000          10 MIN
 0158                          24,3673   25140 0
 0159                          24,3674   01453 1  V06N43    VN       00643
 0160                          24,3675   01442 1  V6N34     VN       00634
 01602                         24,3676   00243 1  K.01      2OEC     .01
 01602                         24,3677   32703 1
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P0010    TRANSFER PHASE INITIATION (TPI) PROGRAMS (P34 AND P74)

R0011    MOD NO -1           LOG SECTION - P32-P35, P72-P75
R0012    MOD BY WHITE.P      DATE 1JUNE67

R0013    PURPOSE

R0014          (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0015              REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE TRANSFER
R0016              PHASE INITIATION (TPI) MANEUVER, GIVEN -

R0017              (A) TIME OF IGNITION TIG (TPI) OR THE ELEVATION ANGLE (E) OF
R0018                  THE ACTIVE/PASSIVE VEHICLE LOS AT TIG (TPI).

R0019              (B) CENTRAL ANGLE OF TRANSFER (CENTANG) FROM TIG (TPI) TO
R0020                  INTERCEPT TIME (TIG (TPF)).

R0021          (2) TO CALCULATE TIG (TPI) GIVEN E OR E GIVEN TIG (TPI).

R0022          (3) TO CALCULATE THESE PARAMETERS BASED UPON MANEUVER DATA
R0023              APPROVED AND KEYED INTO THE DSKY BY THE ASTRONAUT.

R0024          (4) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0025              VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0026              ASTRONAUT/GROUND.

R0027          (5) TO STORE THE TPI TARGET PARAMETERS FOR USE BY THE DESIRED
R0028              THRUSTING PROGRAM.

R0029    ASSUMPTIONS

R0030          (1) LM ONLY - THIS PROGRAM IS BASED UPON PREVIOUS COMPLETION OF
R0031              THE CONSTANT DELTA ALTITUDE (CDH) PROGRAM (P33/P73).
R0032              THEREFORE -

R0033              (A) AT A SELECTED TPI TIME (NOW IN STORAGE) THE LINE OF SIGHT
R0034                  BETWEEN THE ACTIVE AND PASSIVE VEHICLES WAS SELECTED TO BE
R0035                  A PRESCRIBED ANGLE (E) (NOW IN STORAGE) FROM THE
R0036                  HORIZONTAL PLANE DEFINED BY THE ACTIVE VEHICLE POSITION.

R0037              (B) THE TIME BETWEEN CDH IGNITION AND TPI IGNITION WAS
R0038                  COMPUTED TO BE GREATER THAN 10 MINUTES.

R0039              (C) THE VARIATION OF THE ALTITUDE DIFFERENCE BETWEEN THE
R0040                  ORBITS WAS MINIMIZED.

R0041              (D) THE PERICENTER ALTITUDES OF ORBITS FOLLOWING CSI AND

R0042                  CDH WERE COMPUTED TO BE GREATER THAN 35,000 FT FOR LUNAR
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R0043                 ORBIT OR 85 NM FOR EARTH ORBIT.

R0044             (E) THE CSI AND CDH MANEUVERS WERE ASSUMED TO BE PARALLEL TO
R0045                 THE PLANE OF THE PASSIVE VEHICLE ORBIT.  HOWEVER, CREW
R0046                 MODIFICATION OF DELTA V (LV) COMPONENTS MAY HAVE RESULTED
R0047                 IN AN OUT-OF-PLANE MANEUVER.

R0048         (2) STATE VECTOR UPDATED BY P27 ARE DISALLOWED DURING AUTOMATIC
R0049             STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (4)).

R0050         (3) THIS PROGRAM MUST BE DONE OVER A TRACKING STATION FOR REAL
R0051             TIME GROUND PARTICIPATION IN DATA INPUT AND OUTPUT.  COMPUTED
R0052             VARIABLES MAY BE STORED FOR LATER VERIFICATION BY THE GROUND.
R0053             THESE STORAGE CAPABILITIES ARE LIMITED ONLY TO THE PARAMETERS
R0054             FOR ONE THRUSTING MANEUVER AT A TIME EXCEPT FOR CONCENTRIC
R0055             FLIGHT PLAN MANEUVER SEQUENCES.

R0056         (4) THE RENDEZVOUS RADAR MAY OR MAY NOT BE USED TO UPDATE THE LM
R0057             OR CSM STATE VECTORS FOR THIS PROGRAM.  IF RADAR USE IS
R0058             DESIRED THE RADAR WAS TURNED ON AND LOCKED ON THE CSM BY
R0059             PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS WILL BE MADE
R0060             AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN ENABLED BY THE
R0061             TRACK AND UPDATE FLAGS (SEE P20).  THE RENDEZVOUS TRACKING
R0062             MARK COUNTER IS ZEROED BY THE SELECTION OF P20 AND AFTER EACH
R0063             THRUSTING MANEUVER.

R0064         (5) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0065         (6) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0066                 ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0067                 DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0068                 CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0069                 EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0070                 FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0071                 SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

R0072                 EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0073                 REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0074                 PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0075         (7) ONCE THE PARAMETERS REQUIRED FOR COMPUTION OF THE MANEUVER
R0076             HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0077             VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0078             THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0079             THROUGH THE USE OF V06N52.

R0080             THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0081             CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
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R0082               170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0083               ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0084               UPON DELTA V AND EXPECTED MANEUVER TIME.

R0085           (8) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0086                   P34 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0087                   P74 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0088       INPUT

R0089           (1) TTPI      TIME OF THE TPI MANEUVER
R0090           (2) ELEV      DESIRED LOS ANGLE AT TPI
R0091           (3) CENTANG   ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0092                         TRANSFER FROM TPI TO TIME OF INTERCEPT

R0093       OUTPUT

R0094           (1) TRKMKCNT  NUMBER OF MARKS
R0095           (2) TTOGO     TIME TO GO
R0096           (3) +MGA      MIDDLE GIMBAL ANGLE
R0097           (4) TTPI      COMPUTED TIME OF TPI MANEUVER
R0098                OR
R0099               ELEV      COMPUTED LOS ANGLE AT TPI
R0100           (5) POSTTPI   PERIGEE ALTITUDE AFTER THE TPI MANEUVER
R0101           (6) DELVTPI   MAGNITUDE OF DELTA V AT TPI
R0102           (7) DELVTPF   MAGNITUDE OF DELTA V AT INTERCEPT
R0103           (8) DVLOS     DELTA VELOCITY AT TPI - LINE OF SIGHT
R0104           (9) DELVLVC   DELTA VELOCITY AT TPI - LOCAL VERTICAL COORDINATES

R0105       DOWNLINK

R0114           (1) TTPI      TIME OF THE TPI MANEUVER
R0115           (2) TIG       TIME OF THE TPI MANEUVER
R0116           (3) ELEV      DESIRED LOS ANGLE AT TPI
R0117           (4) CENTANG   ORBITAL CENTRAL ANGLE OF THE PASSIVE VEHICLE DURING
R0118                         TRANSFER FROM TPI TO TIME OF INTERCEPT
R0119           (5) DELVEET3  DELTA VELOCITY AT TPI - REFERENCE COORDINATES
R0120           (6) TPASS4    TIME OF INTERCEPT
R0121       COMMUNICATION TO THRUSTING PROGRAMS

R0122           (1) TIG       TIME OF THE TPI MANEUVER
R0123           (2) RTARG     OFFSET TARGET POSITION
R0124           (3) TPASS4    TIME OF INTERCEPT
R0125           (4) XDELVFLG  RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0126       SUBROUTINES USED

R0127           AVFLAGA
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R0128          AVFLAGP
R0129          VNPOOH
R0130          DISPLAYE
R0131          SELECTMU
R0132          PRECSET
R0133          S33/34.1
R0134          ALARM
R0135          BANKCALL
R0136          GOFLASH
R0137          GOTOPOOH
R0138          TIMETHET
R0139          S34/35.2
R0140          PERIAPO1
R0141          SHIFTR1
R0142          S34/35.5
R0143          VN1645

 0144    REF   3  LAST  655   35,2000                          SETLOC CSI/CDH
 0145                         35,2455                          BANK
 0146    REF  15  LAST  654   E7,1470                          EBANK= SUBEXIT
 0147    REF   1                                               COUNT* $$/P3474
 0148    REF   3  LAST  632   35,2455  0 2354 1  P34           TC     AVFLAGA
 0149    REF   1              35,2456  0 2460 1                TC     P34/P74A
 0150    REF   3  LAST  632   35,2457  0 2361 1  P74           TC     AVFLAGP
 0151    REF   3  LAST  632   35,2460  0 2366 0  P34/P74A TC   P20FLGON        SET UPDATFLG, TRACKFLG
 01515   REF   2  LAST  627   35,2461  3 3632 0                CAF    V06N37          TTPI
 0152    REF  10  LAST  635   35,2462  0 3621 1                TC     VNPOOH
 01521                        35,2463  0 0006 1                EXTEND
 01522   REF   1              35,2464  3 3655 1                DCA    130DEG
 01523   REF   5  LAST  639   35,2465  53'621 1                DXCH   CENTANG
 01528   REF  10  LAST  649   35,2466  3 2424 1                CAF    P30ZERO
 01529   REF   5  LAST  641   35,2467  55'466 0                TS     NN
 0153    REF   1              35,2470  0 3603 1                TC     DISPLAYE        ELEV AND CENTANG
 0154    REF  74  LAST  659   35,2471  0 6042 1                TC     INTPRET
 0155                         35,2472   71214 0                CLEAR  DLOAD
 0156    REF   1              35,2473   01270 0                       ETPIFLAG
 0157    REF  14  LAST  649   35,2474   03636 1                       TTPI
 0158    REF  14  LAST  647   35,2475   17442 0                STODL  TIG
 0159    REF   6  LAST  642   35,2476   02257 0                       ELEV
 0160                         35,2477   43054 1                BZE    SET
 0161    REF   1              35,2500   72502 0                       P34/P74B
 0162    REF   2  LAST  663   35,2501   01070 1                       ETPIFLAG
 0163                         35,2502   77624 1  P34/P74B CALL
 0164    REF   3  LAST  632   35,2503   20000 0                       SELECTMU
 0165                            0032            DELELO   EQUALS 26D
 0166                         35,2504   43145 0  P34/P74C DLOAD  SET
 0167    REF   7  LAST  614   35,2505   06524 1                       ZEROVECS
 0168    REF   2  LAST  632   35,2506   03460 0                       ITSWICH
 0169                         35,2507   43014 0                BON    CLEAR
 0170    REF   3  LAST  663   35,2510   01310 1                       ETPIFLAG
 0171   PEF   1                 35,2511   72513 C                      SWCHSET
 0172   REF   3   LAST   663    35,2512   C3660 1                      ITSWICH
 0173   REF   4   LAST   633    35,2513   02317 0   SWCHSET   STORE    NOMTPI
 0174                           35,2514   43345 1   INTLOOP   OLCAO    OAO
 0175   REF  15   LAST   663    35,2515   03636 1                      TTPI
 0176   REF   5   LAST   664    35,2516   02317 G                      NCMTPI
 0177   REF  25   LAST   657    35,2517   34041 0             STCALL   TOEC1
 0178   REF   3   LAST   647    35,2520   46403 1                      PRECSET
 0179                           35,2521   77624 1             CALL
 0180   REF   2   LAST   632    35,2522   72674 1                      S33/34.1
 0181                           35,2523   77454 1             BZE      EXIT
 0182   REF   1                 35,2524   72535 1                      SWCHCLR
 0183   REF  28   LAST   632    35,2525  0 5567 0             TC       ALARM
 0184                           35,2526   00611 1             OCT      611
 0185   REF   3   LAST   632    35,2527  3 5006 1             CAF      V05N09
 0186   REF 171   LAST   659    35,2530  0 4616 1             TC       BANKCALL
 0187   REF  13   LAST   659    35,2531   2C477 1             CAOR     GOFLASH
 0168   REF  13   LAST   659    35,2532  C 6001 0             TC       GOTOPOOH
 0189   REF   2   LAST   663    35,2533  0 2460 1             TC       P34/P74A           PROCEEO
 0190                           35,2534  0 2525 1             TC       -7                 V32

 0191                           35,2535   43014 0   SWCHCLR   BONCLR   BON
 0192   REF   4   LAST   664    35,2536   03600 1                      ITSWICH
 0193   REF   1                 35,2537   72514 1                      INTLOOP
 0194   REF   4   LAST   663    35,2540   01310 1                      ETPIFLAG
 0195   REF   1                 35,2541   72545 0                      P34/P740           OISPLAY TTPI
 0196                           35,2542   77776 1             EXIT
 0197   REF   2   LAST   663    35,2543  C 3603 1             TC       OISPLAYE           OISPLAY ELEV ANO CENTANG
 0198   REF   1                 35,2544  C 2550 0             TC       P34/P74E
 0199                           35,2545   77776 1   P34/P740  EXIT
 0200   REF   3   LAST   663    35,2546  3 3632 0             CAF      V06N37             TTPI
 0201   REF  11   LAST   663    35,2547  0 3621 1             TC       VNPOOH
 0202   REF  75   LAST   663    35,2550  0 6042 1   P34/P74E  TC       INTPRET
 0203                           35,2551   71201 1             SETPO    OLCAO
 0204                           35,2552   00001 0                      00
 0205   REF   5   LAST   646    35,2553   02777 1                      RTX1
 0206   REF  12   LAST   653    35,2554   14047 1             STOOL    X1
 0207   REF   6   LAST   663    35,2555   03621 1                      CENTANG
 0208                           35,2556   71406 0             PUSH     COS
 0209   REF   4   LAST   652    35,2557   16732 0             STOOL    CSTH
 0210                           35,2560   77756 0             SIN
 0211   REF   6   LAST   652    35,2561   26730 1             STCVL    SNTH
 0212   REF   6   LAST   647    35,2562   03552 0                      RPASS3
 0213                           35,2563   77657 0             VSR*
 0214                           35,2564   57176 0                      0,2
 0215   REF   6   LAST   652    35,2565   26655 0             STOVL    RVEC
 0216   REF   3   LAST   647    35,2566   03560 1                      VPASS3
 0217                           35,2567   43057 1             VSR*     SET
 0218                           35,2570   57176 0                      0,2
 0219   REF   6   LAST   652    35,2571   03466 0                      RVSW
 0220   REF   7  LAST  652    35,2572    36744 0           STCALL VVEC
 0221   REF   5  LAST  652    35,2573    24732 1                  TIMETHET
 0222                         35,2574    77745 1           DLOAO
 0223   REF  16  LAST  664    35,2575    03636 1                  TTPI
 0224   REF   1               35,2576    03610 0           STORE  INTIME           FOR INITVEL
 0225                         35,2577    77615 0           OAC
 0226   REF   2  LAST  498    35,2600    00037 0                  T                RENDEZVOUS TIME
 0227   REF   3  LAST  200    35,2601    37631 1           STCALL TPASS4           FOR INITVEL
 0228   REF   1               35,2602    73216 0                  S34/35.2
 0229                       . 35,2603    51575 1           VLOAD  ABVAL
 0230   REF   3  LAST  200    35,2604    02366 0                  OELVEFT3
 0231   REF   6  LAST  317    35,2605    27576 0           STCVL  DELVTPI
 0232   REF   1               35,2606    03506 1                  VPASS4
 0233                         35,2607    51451 0           VSU    ABVAL
 0234   REF   1               35,2610    03566 1                  VTPRIME
 0235   REF   3  LAST  317    35,2611    26350 0           STOVL  DELVTPF
 0236   REF   8  LAST  647    35,2612    03536 1                  RACT3
 0237                         35,2613    45115 0           PDVL   CALL
 0238   REF   1               35,2614    02337 1                  VIPRIME
 0239   REF   3  LAST  642    35,2615    46341 0                  PERIAPCI
 0240                         35,2616    77624 1           CALL
 0241   REF   8  LAST  653    35,2617    46451 0                  SHIFTRI
 0242   REF   4  LAST  317    35,2620    17606 1           STCOL  PCSTTPI
 0243   REF  17  LAST  665    35,2621    03636 1                  TTPI
 0244   REF  15  LAST  663    35,2622    03442 0           STORE  TIG
 0245                         35,2623    77776 1           EXIT
 0246   REF   1               35,2624  3 3634 0           CAF    V06N58
 0247   REF  12  LAST  664    35,2625  0 3621 1           TC     VNPOOH
 0248   REF  76  LAST  664    35,2626  0 6042 1           TC     INTPRET
 0249                         35,2627    77624 1           CALL
 0250   REF   1               35,2630    73432 0                  S34/35.5
 0251                         35,2631    77624 1           CALL
 0252   REF   4  LAST  633    35,2632    73515 1                  VNI645
 0253                         35,2633    77650 1           GOTO
 0254   REF   1               35,2634    72504 0                  P34/P74C
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R0255    RENDEZVOUS MID-COURSE MANEUVER PROGRAMS (P35 AND P75)

R0256    MOD NO -1         LOG SECTION - P32-P35, P72-P75
R0257    MOD BY WHITE.P   DATE   1JUNE67

R0258    PURPOSE

R0259           (1) TO CALCULATE THE REQUIRED DELTA V AND OTHER INITIAL CONDITIONS
R0260               REQUIRED BY THE ACTIVE VEHICLE FOR EXECUTION OF THE NEXT
R0261               MIDCOURSE CORRECTION OF THE TRANSFER PHASE OF AN ACTIVE
R0262               VEHICLE RENDEZVOUS.

R0263           (2) TO DISPLAY TO THE ASTRONAUT AND THE GROUND CERTAIN DEPENDENT
R0264               VARIABLES ASSOCIATED WITH THE MANEUVER FOR APPROVAL BY THE
R0265               ASTRONAUT/GROUND.

R0266           (3) TO STORE THE TPM TARGET PARAMETERS FOR USE BY THE DESIRED
R0267               THRUSTING PROGRAM.

R0268    ASSUMPTIONS

R0269           (1) THE ISS NEED NOT BE ON TO COMPLETE THIS PROGRAM.

R0270           (2) STATE VECTOR UPDATES BY P27 ARE DISALLOWED DURING AUTOMATIC
R0271               STATE VECTOR UPDATING INITIATED BY P20 (SEE ASSUMPTION (3)).

R0272           (3) THE RENDEZVOUS RADAR IS ON AND IS LOCKED ON THE CSM.  THIS WAS
R0273               DONE DURING PREVIOUS SELECTION OF P20.  RADAR SIGHTING MARKS
R0274               WILL BE MADE AUTOMATICALLY APPROXIMATELY ONCE A MINUTE WHEN
R0275               ENABLED BY THE TRACK AND UPDATE FLAGS (SEE P20). THE
R0276               RENDEZVOUS TRACKING MARK COUNTER IS ZEROED BY THE SELECTION OF
R0277               P20 AND AFTER EACH THRUSTING MANEUVER.

R0278           (4) THE OPERATION OF THE PROGRAM UTILIZES THE FOLLOWING FLAGS -

R0279                    ACTIVE VEHICLE FLAG - DESIGNATES THE VEHICLE WHICH IS
R0280                    DOING RENDEZVOUS THRUSTING MANEUVERS TO THE PROGRAM WHICH
R0281                    CALCULATES THE MANEUVER PARAMETERS.  SET AT THE START OF
R0282                    EACH RENDEZVOUS PRE-THRUSTING PROGRAM.

R0283                    FINAL FLAG - SELECTS FINAL PROGRAM DISPLAYS AFTER CREW HAS
R0284                    SELECTED THE FINAL MANEUVER COMPUTATION CYCLE.

R0285                    EXTERNAL DELTA V FLAG - DESIGNATES THE TYPE OF STEERING
R0286                    REQUIRED FOR EXECUTION OF THIS MANEUVER BY THE THRUSTING
R0287                    PROGRAM SELECTED AFTER COMPLETION OF THIS PROGRAM.

R0288           (5) THE TIME OF INTERCEPT (T(INT)) WAS DEFINED BY PREVIOUS
R0289               COMPLETION OF THE TRANSFER PHASE INITIATION (TPI) PROGRAM
R0290               (P34/P74) AND IS PRESENTLY AVAILABLE IN STORAGE.
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R0291          (6) ONCE THE PARAMETERS REQUIRED FOR COMPUTION OF THE MANEUVER
R0292              HAVE BEEN COMPLETELY SPECIFIED, THE VALUE OF THE ACTIVE
R0293              VEHICLE CENTRAL ANGLE OF TRANSFER IS COMPUTED AND STORED.
R0294              THIS NUMBER WILL BE AVAILABLE FOR DISPLAY TO THE ASTRONAUT
R0295              THROUGH THE USE OF V06N52.

R0296              THE ASTRONAUT WILL CALL THIS DISPLAY TO VERIFY THAT THE
R0297              CENTRAL ANGLE OF TRANSFER OF THE ACTIVE VEHICLE IS NOT WITHIN
R0298              170 TO 190 DEGREES.  IF THE ANGLE IS WITHIN THIS ZONE THE
R0299              ASTRONAUT SHOULD REASSESS THE INPUT TARGETING PARAMETERS BASED
R0300              UPON DELTA V AND EXPECTED MANEUVER TIME.

R0301          (7) THIS PROGRAM IS SELECTED BY THE ASTRONAUT BY DSKY ENTRY -

R0302                   P35 IF THIS VEHICLE IS ACTIVE VEHICLE.

R0303                   P75 IF THIS VEHICLE IS PASSIVE VEHICLE.

R0304      INPUT

R0305          (1) TPASS4   TIME OF INTERCEPT - SAVED FROM P34/P74
R0306      OUTPUT

R0307          (1) TRKMKCNT NUMBER OF MARKS
R0308          (2) TTOGO    TIME TO GO
R0309          (3) +MGA     MIDDLE GIMBAL ANGLE
R0310          (4) DVLOS    DELTA VELOCITY AT MID - LINE OF SIGHT
R0311          (5) DELVLVC  DELTA VELOCITY AT MID - LOCAL VERTICAL COORDINATES

R0312      DOWNLINK

R0325          (1) TIG      TIME OF THE TPM MANEUVER
R0326          (2) DELVEET3 DELTA VELOCITY AT TPM - REFERENCE COORDINATES
R0327          (3) TPASS4   TIME OF INTERCEPT
R0328      COMMUNICATION TO THRUSTING PROGRAMS

R0329          (1) TIG      TIME OF THE TPM MANEUVER
R0330          (2) RTARG    OFFSET TARGET POSITION
R0331          (3) TPASS4   TIME OF INTERCEPT
R0332          (4) XDELVFLG RESET TO INDICATE LAMBERT (AIMPOINT) VG COMPUTATION

R0333      SUBROUTINES USED

R0334          AVFLAGA
R0335          AVFLAGP
R0336          LOADTIME
R0337          SELECTMU
R0338          PRECSET
R0339          S34/35.1
R0340          S34/35.2
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R0341          S34/35.5
R0342          VN1645

 0343   REF   2 LAST  655 TO  657:    14    14*          COUNT* $$/P3575
 0344   REF   1                 E7,1575                  EBANK= KT

 0345   REF   4  LAST  663   35,2635  0 2354 1  P35      TC     AVFLAGA
 0346                        35,2636  0 0006 1           EXTEND
 0347   REF   3  LAST  389   35,2637  3 1401 0           DCA    ATIGINC
 0348   REF   1              35,2640  0 2644 0           TC     P35/P75A
 0349   REF   4  LAST  663   35,2641  0 2361 1  P75      TC     AVFLAGP
 0350                        35,2642  0 0006 1           EXTEND
 0351   REF   1              35,2643  3 1403 1           DCA    PTIGINC
 0352   REF   2  LAST  668   35,2644  5 3576 0  P35/P75A DXCH   KT
 03525  REF   4  LAST  663   35,2645  0 2366 0           TC     P20FLGON         SET UPDATFLG, TRACKFLG
 0353   REF  77  LAST  665   35,2646  0 6042 1           TC     INTPRET
 0359                        35,2647   77624 1           CALL
 0360   REF   4  LAST  663   35,2650   20000 0                  SELECTMU
 0361                        35,2651   77634 0  P35/P75B RTB
 0362   REF  14  LAST  659   35,2652   21574 1                  LOADTIME
 03621  REF   2  LAST  285   35,2653   03612 1           STORE  TSTRT
 03622                       35,2654   77615 0           DAD
 03623  REF   3  LAST  668   35,2655   03576 0                  KT
 03624  REF  16  LAST  665   35,2656   03442 0           STORE  TIG
 0363   REF   2  LAST  665   35,2657   03610 0           STORE  INTIME           FOR INITVEL
 0364   REF  26  LAST  664   35,2660   34041 0           STCALL TDEC1
 0365   REF   4  LAST  664   35,2661   46403 1                  PRECSET          ADVANCE BOTH VEHICLES
 0366                        35,2662   77624 1           CALL
 0367   REF   1              35,2663   73204 0                  S34/35.1         GET NORM AND LOS FOR TRANSFORM
 0368                        35,2664   77624 1           CALL
 0369   REF   2  LAST  665   35,2665   73216 0                  S34/35.2         GET DELTA V(LV)
 0370                        35,2666   77624 1           CALL
 0371   REF   2  LAST  665   35,2667   73432 0                  S34/35.5
 0372                        35,2670   77624 1           CALL
 0373   REF   5  LAST  665   35,2671   73515 1                  VN1645
 0379                        35,2672   77650 1           GOTO
 0380   REF   1              35,2673   72651 0                  P35/P75B
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P0381    ..... S33/34.1  .....

 0382                          35,2674   66220 1  S33/34.1 STQ    SSP
 0383   REF   4  LAST  635     35,2675   03463 0                  NORMEX
 0384   REF   1                35,2676   03614 1                  TITER
 0385                          35,2677   40000 0           OCT    40000
 0386                          35,2700   40345 1           DLCAO  SETPO
 0387   REF   1                35,2701   33643 0                  MAX250
 0388                          35,2702   00001 0                  00
 0389   REF   1                35,2703   27574 1           STOVL  SECMAX
 0390   REF   9  LAST  665     35,2704   03536 1                  RACT3
 0391   REF   1                35,2705   27500 1           STOVL  RAPREC
 0392   REF   8  LAST  653     35,2706   03544 1                  VACT3
 0393   REF   1                35,2707   27506 1           STOVL  VAPPEC
 0394   PEF   7  LAST  664     35,2710   03552 0                  FPASS3
 0395   REF   1                35,2711   27522 1           STCVL  RPPREC
 0396   REF   4  LAST  664     35,2712   03560 1                  VPASS3
 0397   REF   1                35,2713   03530 1           STORE  VPPPEC
 0398                          35,2714   77624 1  ELCALC   CALL
 0399   REF   2  LAST  668     35,2715   73204 0                  S34/35.1        NOPMAL ANO LOS
 0400                          35,2716   63235 0           VXV    POVL
 0401   REF  10  LAST  669     35,2717   03536 1                  PACT3           (RA*VA)*RA CO
 0402                          35,2720   53515 0           POVL   UNIT            ULOS AT 6D
 0403   REF  11  LAST  669     35,2721   03536 1                  RACT3
 0404                          35,2722   46315 1           POVL   VPROJ           XCHNJ ANO UP
 0405                          35,2723   51352 1           VSL2   BVSU
 0406   REF   1                35,2724   C2311 0                  ULCS
 0407                          35,2725   63256 0           UNIT   PDVL            UP AT OO
 0408                          35,2726   63241 0           COT    POVL            UP.UN*RA AT OO
 0409                          35,2727   C0001 0                  00              UP IN MPAC
 0410                          35,2730   75241 1           OOT    SIGN
 0411   REF   2  LAST  669     35,2731   02311 C                  ULOS
 0412                          35,2732   65552 0           SL1    ACOS
 0413                          35,2733   50315 0           POVL   DOT             EA AT OD
 0414   REF   3  LAST  669     35,2734   C2311 C                  ULCS
 0415   REF  12  LAST  669     35,2735   03536 1                  RACT3
 0416                          35,2736   71244 0           BPL    OLCAD
 0417   REF   1                35,2737   72742 0                  TESTY
 0418   REF   6  LAST  627     35,2740   06532 0                  OPPOSMAX
 0419                          35,2741   41425 1           OSU    PUSH
 0420                          35,2742   71214 0  TESTY    BOFF   DLOAO
 0421   PEF   5  LAST  664     35,2743   03740 1                  ITSWICH
 0422   REF   1                35,2744   73171 1                  ELEX
 0423   REF   1                35,2745   03576 0                  OELEL
 0424   REF   1                35,2746   14033 1           STCCL  DELELO
 0425                          35,2747   77625 0           OSU
 0426   REF   7  LAST  663     35,2750   02257 0                  ELEV
 0427   REF   2  LAST  669     35,2751   03576 C           STORE  DELEL
 0428                          35,2752   45246 0           ABS    OSU
 0429   REF   1                35,2753   33647 1                  ELFPS
 0430                          35,2754   77640 0            BMN
 0431   REF   1                35,2755   73201 0                    TIMEX                 COMMERCIALS EVERYWHERE
 0432                          35,2756   70535 0  FIGTIME   SLOAD   SR1
 0433   REF   2  LAST  669     35,2757   03614 1                    TITER
 0434                          35,2760   72030 1            BHIZ    LXA,1
 0435   REF   5  LAST  669     35,2761   03463 0                    NORMEX                TOO MANY ITERATIONS
 0436   REF 287  LAST  643     35,2762   00154 1                    MPAC
 0437                          35,2763   77330 1            SXA,1   VLOAD
 0438   REF   3  LAST  670     35,2764   03613 0                    TITER
 0439   REF   8  LAST  669     35,2765   03552 0                    RPASS3
 0440                          35,2766   65256 0            UNIT    PDDL
 0441                          35,2767   00045 0                    36D
 0442                          35,2770   53515 0            PDVL    UNIT
 0443   REF  13  LAST  669     35,2771   03536 1                    RACT3
 0444                          35,2772   77725 1            PDDL
 0445                          35,2773   41525 0            PDDL    PUSH
 0446                          35,2774   00045 0                    36D
 0447                          35,2775   77621 1            BDSU
 0448                          35,2776   00015 0                    12D
 0449                          35,2777   14037 0            STODL   30D                   RP - RA MAGNITUDES
 0450   REF   8  LAST  598     35,3000   06522 1                    DPHALF
 0451                          35,3001   41425 1            DSU     PUSH
 0452   REF   8  LAST  669     35,3002   02257 0                    ELEV
 0453                          35,3003   50165 0            SIGN    BMN
 0454                          35,3004   00037 0                    30D
 0455   REF   6  LAST  670     35,3005   03463 0                    NORMEX
 0456                          35,3006   71545 0            DLOAD   COS
 0457                          35,3007   56205 0            DMP     DDV
 0458                          35,3010   00017 1                    14D
 0459                          35,3011   00015 0                    12D
 0460                          35,3012   77676 0            DCOMP                         SINCE COS(180-A)=-COS A
 0461                          35,3013   00035 1            STORE   28D
 0462                          35,3014   44246 1            ABS     BDSU
 0463   REF   9  LAST  670     35,3015   06522 1                    DPHALF
 0464                          35,3016   77240 1            BMN     VLOAD
 0465   REF   7  LAST  670     35,3017   03463 0                    NORMEX
 0466   REF   1                35,3020   02261 0                    UNRM
 0467                          35,3021   53435 0            VXV     UNIT
 0468                          35,3022   00007 0                    6D                    UN*RA
 0469                          35,3023   41241 0            DOT     DMP
 0470   REF   9  LAST  669     35,3024   03544 1                    VACT3
 0471                          35,3025   00015 0                    12D
 0472                          35,3026   47315 0            PDVL    VXV
 0473                          35,3027   00001 0                    0D
 0474   REF   5  LAST  669     35,3030   03560 1                    VPASS3
 0475                          35,3031   53435 0            VXV     UNIT
 0476                          35,3032   00001 0                    0D                    (RP*VP)*RP
 0477                          35,3033   41241 0            DOT     DMP
 0478   REF   6  LAST  670     35,3034   03560 1                    VPASS3
 0479                          35,3035   00017 1                    14D
 0480                          35,3036   77621 1                BDSU
 0481                          35,3037   63301 0                NORM     PDVL            NORMALIZED WA - WP 120
 0482   REF  13  LAST  664     35,3040   00047 1                         X1
 0483                          35,3041   00007 0                         6D
 0484                          35,3042   50235 0                VXV      DOT
 0485                          35,3043   00001 0                         0D
 0486   REF   2  LAST  670     35,3044   02261 0                         UNRM            RA*PP.UN 140
 0487                          35,3045   50315 0                PDVL     DOT
 0488                          35,3046   00001 0                         0D
 0489                          35,3047   00007 0                         6D
 0490                          35,3050   65552 0                SL1      ACOS
 0491                          35,3051   77765 0                SIGN
 0492                          35,3052   43225 0                DSU      DAD               ALPHA   PI
 0493   REF  10  LAST  670     35,3053   06522 1                         DPHALF
 0494   REF   9  LAST  670     35,3054   02257 0                         ELEV
 0495                          35,3055   65525 0                PDDL     ACOS
 0496                          35,3056   00035 1                         28D
 0497                          35,3057   75221 1                BDSU     SIGN
 0498   REF  11  LAST  671     35,3060   06522 1                         DPHALF
 0499                          35,3061   00037 0                         30D             CONTAINS RP-RA
 0500                          35,3062   77615 0                DAD
 0501                          35,3063   56205 0                DMP      DDV
 0502   REF   4  LAST  649     35,3064   33641 1                         TWOPI
 0503                          35,3065   77605 1                DMP
 0504                          35,3066   41257 1                SL*      DMP
 0505                          35,3067   20176 0                         0 -3,1
 0506                          35,3070   51406 1                PUSH     ABS
 0507                          35,3071   50025 0                DSU      BMN
 0508   REF   2  LAST  669     35,3072   03574 1                         SECMAX
 0509   REF   1                35,3073   73077 0                         OKMAX
 0510                          35,3074   75345 1                DLOAD    SIGN             REPLACE TIME WITH MAX TIME SIGNED
 0511   REF   3  LAST  671     35,3075   03574 1                         SECMAX
 0512                          35,3076   77606 1                PUSH
 0513                          35,3077   51135 1   OKMAX        SLOAD    BPL             TEST FIRST ITERATION
 0514   REF   4  LAST  670     35,3100   03614 1                         TITER
 0515   REF   1                35,3101   73107 0                         REPETE
 0516                          35,3102   71331 0                SSP      DLOAD
 0517   REF   5  LAST  671     35,3103   03614 1                         TITER
 0518                          35,3104   37777 1                OCT      37777
 0519                          35,3105   77650 1                GOTO
 0520   REF   1                35,3106   73145 0                          STORDELT
 0521                          35,3107   41345 0   REPETE       DLOAD    DMP
 0522   REF   3  LAST  669     35,3110   03576 0                         DELEL
 0523   REF   2  LAST  669     35,3111   00033 1                         DELELD
 0524                          35,3112   71244 0                BPL      DLOAD
 0525   REF   1                35,3113   73123 0                         NEXTES
 0526   REF   4  LAST  671     35,3114   03574 1                         SECMAX
 0527                          35,3115   77605 1                DMP
 0528   REF   1                35,3116   33645 0                         THIRD
 0529   REF   5  LAST  671     35,3117   17574 1                STODL    SECMAX
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0530                      35,3120   70446 0              ABS      SR1          CROSSED OVER SOLUTION
0531                      35,3121   52076 1              DCOMP    GOTO         DT=(-SIGN(DTO)//DT//)/2
0532  REF   1             35,3122   73133 1                       RESIGN
0533                      35,3123   51545 1  NEXTES      DLOAD    ABS
0534  REF   4  LAST  671  35,3124   03576 0                       DELEL
0535                      35,3125   51525 1              PDDL     ABS
0536  REF   3  LAST  671  35,3126   00033 1                       DELELO
0537                      35,3127   77625 0              DSU
0538                      35,3130   71240 1              BMN      DLOAD
0539  REF   1             35,3131   73136 1                       REVERS        WRONG DIRECTION
0540                      35,3132   77646 0              ABS
0541                      35,3133   52165 1  RESIGN      SIGN     GOTO
0542  REF   1             35,3134   03606 1                       DELTEEO
0543  REF   2  LAST  671  35,3135   73145 0                       STORDELT
0544                      35,3136   57545 1  REVERS      DLOAD    DCOMP
0545  REF   2  LAST  672  35,3137   03606 1                       DELTEEO
0546                      35,3140   70406 1              PUSH     SR1
0547  REF   3  LAST  672  35,3141   03606 1              STORE    DELTEEO
0548                      35,3142   77615 0              DAD
0549                      35,3143   77650 1              GOTO
0550  REF   1             35,3144   73146 0                       ADTIME
0551  REF   4  LAST  672  35,3145   03606 1  STORDELT    STORE    DELTEEO
0552                      35,3146   77615 0  ADTIME      DAD
0553  REF   6  LAST  664  35,3147   02317 0                       NOMTPI       SUM OF DELTA T:S
0554  REF   7  LAST  672  35,3150   02317 0              STORE    NOMTPI
0555                      35,3151   63375 0              VLOAD    PDVL
0556  REF   2  LAST  669  35,3152   03506 1                       VAPREC
0557  REF   2  LAST  669  35,3153   03500 1                       RAPREC
0558                      35,3154   77624 1              CALL
0559  REF   1             35,3155   73372 0                       GOINT
0560                      35,3156   77624 1              CALL
0561  REF   3  LAST  642  35,3157   46425 0                       ACTIVE       STORE NEW RACT3 VACT3
0562                      35,3160   63375 0              VLOAD    PDVL
0563  REF   2  LAST  669  35,3161   03530 1                       VPPREC
0564  REF   2  LAST  669  35,3162   03522 1                       RPPREC
0565                      35,3163   77624 1              CALL
0566  REF   2  LAST  672  35,3164   73372 0                       GOINT
0567                      35,3165   77624 1              CALL
0568  REF   3  LAST  632  35,3166   46435 1                       PASSIVE      STORE NEW RPASS3 VPASS3
0569                      35,3167   77650 1              GOTO
0570  REF   1             35,3170   72714 0                       ELCALC
0571                      35,3171   43345 1  ELEX        DLOAD    DAD
0572  REF  18  LAST  665  35,3172   03636 1                       TTPI
0573  REF   8  LAST  672  35,3173   02317 0                       NOMTPI
0574  REF  19  LAST  672  35,3174   17636 1              STODL    TTPI
0575                      35,3175   77614 1              BON
0576  REF   5  LAST  664  35,3176   01310 1                       ETPIFLAG
0577  REF   2  LAST  670  35,3177   73201 0                       TIMEX
0578  REF  10  LAST  671  35,3200   02257 0              STORE    ELEV
0579                      35,3201   52145 0  TIMEX       DLOAD    GOTO
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 0580    REF    8  LAST  663    35,3202    06524 1                ZEROVECS
 0581    REF    8  LAST  670    35,3203    03463 0                NORMEX
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P0582    ..... S34/35.1  .....

R0583    COMPUTE UNIT NORMAL AND LINE OF SIGHT VECTORS GIVEN THE ACTIVE AND
R0584    PASSIVE POS AND VEL AT TIME T3
 0585                               35,3204    52375 1  S34/35.1 VLOAD   VSU
 0586    REF    9  LAST  670        35,3205    03552 0                   RPASS3
 0587    REF   14  LAST  670        35,3206    03536 1                   RACT3
 0588                               35,3207    41456 0           UNIT    PUSH
 0589    REF    4  LAST  669        35,3210    26311 0           STOVL   ULOS
 0590    REF   15  LAST  674        35,3211    03536 1                   RACT3
 0591                               35,3212    53435 0           VXV     UNIT
 0592    REF   10  LAST  670        35,3213    03544 1                   VACT3
 0593    REF    3  LAST  671        35,3214    02261 0           STORE   UNRM
 0594                               35,3215    77616 0           RVQ
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P0595    ooooo S34/35.2  ooooo

R0596    ADVANCE PASSIVE VEH TO RENOEZVOLS TIME ANO GET REQ VEL FROM LAMBEPT
 0597                          35,3216   77220 1  S34/35.2 STQ     VLOAO
 0598    REF  16  LAST  663    35,3217   03470 1                   SUBEXIT
 0599    REF   7  LAST  670    35,3220   03560 1                   VPASS3
 0600                          35,3221   65315 0           PDVL    POOL
 0601    REF  10  LAST  674    35,3222   03552 C                   RPASS3
 0602    REF   3  LAST  668    35,3223   03610 0                   INTIME
 0603                          35,3224   65325 0           PODL    POOL
 0604    REF   4  LAST  665    35,3225   03631 0                   TPASS4
 0605    REF   5  LAST  671    35,3226   33641 1                   TWOPI               CONIC
 0606                          35,3227   46125 0           POOL    BHIZ
 06061   REF   6  LAST  663    35,3230   03467 1                   NN
 06062   REF   1               35,3231   73235 1                   S3435.23
 06063                         35,3232   77745 1           DLCAO
 06064                         35,3233   41545 0           OLOAO   PUSH
 06065   REF   9  LAST  673    35,3234   06524 1                   ZEROVECS            PRECISION
 06066                         35,3235   77624 1  S3435.23 CALL
 0607    REF   5  LAST  649    35,3236   73376 1                   INTINT              GET TARGET VECTOP
 0608    REF   4  LAST  200    35,3237   27444 0  S3435.25 STCVL   RTARG
 0609    PEF  10  LAST  658    35,3240   00007 0                   VATT
 0610    REF   2  LAST  665    35,3241   27506 1           STOVL   VPASS4
 0611    REF   5  LAST  675    35,3242   03444 0                   RTARG
R0612    CCMPUTE PHI = PI +(ACCS(UNIT RA.UNIT RP)-PI)SIGN(RA*RP.U)
 0613                          35,3243   63256 0           UNIT    POVL                UNIT PP
 0614    REF  16  LAST  674    35,3244   03536 1                   RACT3
 0615                          35,3245   41456 0           UNIT    PUSH                UNIT RA
 0616                          35,3246   50235 0           VXV     OOT
 0617                          35,3247   00001 0                   00
 0618    REF   4  LAST  674    35,3250   02261 0                   UNRM                RA*RP.U
 0619                          35,3251   77715 1           PDVL
 0620                          35,3252   72441 0           OOT     SL1                 UNIT RA.UNIT RP
 0621                          35,3253   00001 0                   00
 0622                          35,3254   75326 1           ACOS    SIGN
 0623                          35,3255   43244 1           BPL     OAO
 0624    PEF   1               35,3256   73260 1                   NOPIE
 0625    REF   7  LAST  669    35,3257   06532 0                   OPPOSMAX            REASONABLE TWO PI
 0626    REF   2  LAST  316    35,3260   15756 1  NOPIE    STOOL   ACTCENT
 0627    REF   5  LAST  675    35,3261   03631 0                   TPASS4
 0628                          35,3262   77625 0           OSU
 0629    REF   4  LAST  675    35,3263   03610 0                   INTIME
 0630    REF   3  LAST  200    35,3264   03452 1           STORE   OELLT4
 0631                          35,3265   40335 0           SLOAO   SETPO
 0632    PEF   7  LAST  675    35,3266   03467 1                   NN                  NUMBER OF OFFSETS
 0633                          35,3267   00001 0                   00
 06331                         35,3270   63325 0           PODL    PDVL
 06332   REF   1               35,3271   33653 1                   EPSFCUR
 06333   REF  17  LAST  675    35,3272   03536 1                   RACT3
 06334   REF   1               35,3273   26323 1           STOVL   PINIT
 06335   REF   11   LAST   674     35,3274    03544 1                    VACT3
 06336   REF    1                  35,3275    36331 0            STCALL  VINIT
 06337   REF    1                  35,3276    22000 1                    INITVEL
 0634                              35,3277    77624 1            CALL
 0635    REF    1                  35,3300    73357 1                    LOMAT
 0636                              35,3301    64375 1            VLOAD   MXV
 0637    REF    4   LAST   665     35,3302    02366 0                    DELVEET3
 0638                              35,3303    00001 0                    0D
 0639                              35,3304    77772 0            VSL1
 0640    REF   15   LAST   650     35,3305    37434 0            STCALL  DELVLVC
 0641    REF   17   LAST   675     35,3306    03470 1                    SUBEXIT
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P0642    ..... S34/35.3  .....

 0643                           35,3307   45020 1  S34/35.3 STQ    CALL
 0644   REF   9  LAST  673      35,3310   03463 0                  NORMEX
 0645   REF   2  LAST  676      35,3311   73357 1                  LOMAT        GET MATRIX IN PUSH LIST
 0646                           35,3312   61375 1           VLCAD  VXM
 0647   REF  16  LAST  676      35,3313   03434 1                  DELVLVC      NEW DEL V TPI
 0648                           35,3314   00001 0                  0D
 0649                           35,3315   77772 0           VSL1
 0650   REF   5  LAST  676      35,3316   02366 0           STORE  DELVEET3     SAVE FOR TRANSFORM
 0651                           35,3317   63255 0           VAD    PDVL
 0652   REF  12  LAST  676      35,3320   03544 1                  VACT3        NEW V REQ
 0653   REF  18  LAST  675      35,3321   03536 1                  RACT3
 0654                           35,3322   65325 0           PDDL   PDDL
 0655   REF  17  LAST  668      35,3323   03442 0                  TIG
 0656   REF   6  LAST  675      35,3324   03631 0                  TPASS4
 0657                           35,3325   41525 0           PDDL   PUSH
 0658   REF   8  LAST  675      35,3326   06532 0                  DPPOSMAX
 0659                           35,3327   77624 1           CALL                INTEG. FOR NEW TARGET VEC
 0660  .REF   6  LAST  675      35,3330   73376 1                  INTINT
 0661                           35,3331   77775 1           VLDAD
 0662   REF  13  LAST  659      35,3332   00001 0                  RATT
 0663   REF   6  LAST  675      35,3333   03444 0           STORE  RTARG
 0664                           35,3334   41575 0  NOVRWRT  VLDAD  PUSH
 0665   REF   5  LAST  674      35,3335   02311 0                  ULOS
 0666                           35,3336   57435 1           VXV    VCOMP
 0667   REF   5  LAST  675      35,3337   02261 0                  UNRM
 0668                           35,3340   41456 0           UNIT   PUSH
 0669                           35,3341   76435 1           VXV    VSL1
 0670   REF   6  LAST  677      35,3342   02311 0                  ULOS
 0671                           35,3343   77715 1           PDVL
 0672                           35,3344   64315 1           PDVL   MXV
 0673   REF   6  LAST  677      35,3345   02366 0                  DELVEET3
 0674                           35,3346   00001 0                  0D
 0675                           35,3347   77772 0           VSL1
 0676   REF   4  LAST  217      35,3350   36303 1           STCALL DVLOS
 0677   REF  10  LAST  677      35,3351   03463 0                  NORMEX
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P0678    ..... S34/35.4  .....

 0679                             35,3352   40220 0  S34/35.4 STQ     SETPD          NO ASTRONAUT OVERWRITE
 0680    REF  11  LAST  677       35,3353   03463 0                   NORMEX
 0681                             35,3354   00001 0                   00
 0682                             35,3355   77650 1           GOTO
 0683    REF   1                  35,3356   73334 1                   NOVRWRT
```

```
P0684    ..... LOMAT     .....

 0685                              35,3357   57575 1  LOMAT     VLOAD   VCOMP
 0686    REF   6  LAST  677        35,3360   02261 0                    UNRM
 0687                              35,3361   24007 0            STOVL   60                Y
 0688    REF  19  LAST  677        35,3362   03536 1                    RACT3
 0689                              35,3363   57456 1            UNIT    VCOMP
 0690                              35,3364   00015 0            STORE   120
 0691                              35,3365   76435 1            VXV     VSL1
 0692    REF   7  LAST  679        35,3366   02261 0                    UNRM              Z*-Y
 0693                              35,3367   00001 0            STORE   00
 0694                              35,3370   43401 0            SETPD   PVQ
 0695                              35,3371   00023 0                    180
 0696                              35,3372   65325 0  GOINT     PDDL    PDDL              00
 0697    REF  10  LAST  675        35,3373   06524 1                    ZEROVECS            NOT
 0698    REF   9  LAST  672        35,3374   02317 0                    NOMTPI
 0699                              35,3375   41406 0            PUSH    PUSH                          CREEP OR INSERT BEFORE INTINT
 0700                              35,3376   45020 1  INTINT    STQ     CALL
 0701    REF   4  LAST  655        35,3377   03465 0                    RTRN
 0702    REF  19  LAST  657        35,3400   27410 1                    INTSTALL
 0703                              35,3401   71214 0            CLEAR   DLOAD
 0704    REF   7  LAST  657        35,3402   01673 1                    INTYPFLG
 0705                              35,3403   43054 1            BZE     SET
 0706                              35,3404   73406 1                    +2
 0707    REF   8  LAST  679        35,3405   01473 0                    INTYPFLG
 0708                              35,3406   45545 1            DLOAD   STADR
 0709    REF  27  LAST  668        35,3407   63736 0            STODL   TDEC1
 0710                              35,3410   73014 0            SET     LXA,2
 0711    REF   3  LAST  658        35,3411   00063 1                    MOONFLAG
 0712    REF   3  LAST  652        35,3412   02777 1                    RTX2
 0713                              35,3413   43014 0            BON     CLEAR
 0714    REF   3  LAST  640        35,3414   04303 0                    CMOONFLG
 0715    REF   1                   35,3415   73417 1                    ALLSET
 0716    REF   4  LAST  679        35,3416   00263 0                    MOONFLAG
 0717    REF   6  LAST  658        35,3417   25517 0  ALLSET    STOVL   TET
 0718                              35,3420   77657 0            VSR*
 0719                              35,3421   57176 0                    0,2
 0720    REF   6  LAST  658        35,3422   25535 0            STOVL   RCV
 0721                              35,3423   77657 0            VSR*
 0722                              35,3424   57176 0                    0,2
 0723    REF   5  LAST  658        35,3425   35543 0            STCALL  VCV
 0724    REF   2  LAST  658        35,3426   27106 0                    INTEGRVS
 0725                              35,3427   52175 0            VLOAD   GOTO
 0726    REF  14  LAST  677        35,3430   00001 0                    RATT
 0727    REF   5  LAST  679        35,3431   03465 0                    RTRN
```

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P0728     ..... S34/35.5  .....
R0729     SUBROUTINES USED

R0730            BANKCALL
R0731            GOFLASH
R0732            GOTOPOOH
R0733            S34/35.3
R0734            S34/35.4
R0735            VNPOOH

 0736                          35,3432   43020 1  S34/35.5 STO     BON
 0737    REF  18  LAST  676    35,3433   03470 1                   SUBEXIT
 0738    REF   4  LAST  633    35,3434   01311 0                   FINALFLG
 0739    REF   1               35,3435   73441 1                   FLAGON
 0740                          35,3436   52014 0           SET     GOTO
 0741    REF   9  LAST  634    35,3437   00470 1                   UPDATFLG
 0742    REF   1               35,3440   73505 0                   FLAGOFF
 0743                          35,3441   77214 0  FLAGON   CLEAR   VLOAD
 0744    REF   1               35,3442   03274 0                   NTARGFLG
 07441   REF  17  LAST  677    35,3443   03434 1                   DELVLVC
 07442   REF   2  LAST  105    35,3444   01236 1           STORE   GOT/2
 07443                         35,3445   77776 1           EXIT
 0745    REF   2  LAST  619    35,3446  3 3636 1    +5     CAF     V06N81
 0746    REF 172  LAST  664    35,3447  0 4616 1           TC      BANKCALL
 0747    REF  14  LAST  664    35,3450   20477 1           CADR    GOFLASH
 0748    REF  14  LAST  664    35,3451  0 6001 0           TC      GOTOPOOH
 0749                          35,3452  0 3454 1           TC      +2              PRO
 0750    REF   2  LAST  680    35,3453  0 3446 1           TC      FLAGON +5       LOAD
 0751    REF   4  LAST  568    35,3454  3 5016 0    +2     CA      EBANK7
 07511   REF  20  LAST  568    35,3455  54 003 0           TS      EBANK           TO BE SURE

 07512                         35,3456  22 007 0           ZL
 07513   REF  14  LAST  613    35,3457  3 4756 1           CA      FIVE
 07514   REF 185  LAST  613    35,3460  54 002 1  NTARGCHK TS      Q
 07515   REF 186  LAST  680    35,3461  50 002 0           INDEX   Q
 07516   REF  18  LAST  680    35,3462  4 1433 0           CS      DELVLVC
 07517   REF 187  LAST  680    35,3463  50 002 0           INDEX   Q
 07518   REF   3  LAST  680    35,3464  6 1235 1           AD      GOT/2
 07519   REF  97  LAST  617    35,3465  26 001 1           ADS     L
 0752    REF 188  LAST  680    35,3466  10 002 1           CCS     Q
 07521   REF   1               35,3467  1 3460 1           TCF     NTARGCHK
 07522   REF 217  LAST  617    35,3470  22 000 1           LXCH    A
 07523                         35,3471  0 0006 1           EXTEND
 07524                         35,3472  1 3475 0           BZF     +3
 07525   REF  41  LAST  634    35,3473  0 5504 0           TC      UPFLAG
 0753    REF   2  LAST  680    35,3474   00146 1           ADRES   NTARGFLG

 0754    REF  78  LAST  668    35,3475  0 6042 1           TC      INTPRET
 0755                          35,3476   45014 0           BOFF    CALL
 0756    REF   3  LAST  680    35,3477   03354 0                   NTARGFLG
 0757   REF    1                35,3500    73502 1                     NOCHG
 0758   REF    1                35,3501    73307 1                     S34/35.3
 0759                           35,3502    77775 1  NOCHG     VLOAD
 0761   REF    7  LAST   677    35,3503    02366 0                     DELVFET3
 0762   REF    9  LAST   650    35,3504    03656 1            STORE    DELVSIN
 0763                           35,3505    77624 1  FLAGOFF   CALL
 0764   REF    1                35,3506    73352 1                     S34/35.4
 0765                           35,3507    77776 1            EXIT
 0766   REF    1                35,3510  3 3635 1             CAF      V06N59
 0767   REF   13  LAST   665    35,3511  0 3621 1             TC       VNPOCH
 0768   REF   79  LAST   680    35,3512  0 6042 1             TC       INTPRET
 0769                           35,3513    77650 1            GOTO
 0770   REF   19  LAST   680    35,3514    03470 1                     SUBEXIT
```

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P0771     ..... VN1645     .....

R0772     SL8ROUTINES USEO

R0773            P3XORP7X
R0774            GET+MGA
R0775            8ANKCALL
R0776            CELAYJ08
R0777            COMPTGO
R0778            GOFLASHR
R0779            GCTCPCCH
R0780            FLAGUP

 0781                               35,3515   71220 1  VN1645   STQ    OLCAO
 0782  REF  20  LAST  681           35,3516   03470 1                  SU8EXIT
 0783  REF   1                      35,3517   33651 0                  DP-.01
 0784  REF   3  LAST  619           35,3520   02253 1           STORE  +MGA              MGA = -.01
 0785                               35,3521   71214 0           8OFF   OLOAO
 0786  REF   5  LAST  680           35,3522   01351 1                  FINALFLG
 0787  REF   1                      35,3523   73543 1                  GET45
 0788  REF   2  LAST  682           35,3524   33651 0                  OP-.01
 0789                               35,3525   77615 0           DAO
 0790  REF   3  LAST  682           35,3526   33651 0                  DP-.01
 0791  REF   4  LAST  682           35,3527   02253 1           STORE  +MGA              MGA = -.02
 0792                               35,3530   77414 0           8OFF   EXIT
 0793  REF   1                      35,3531   01742 1                  REFSMFLG
 0794  REF   2  LAST  682           35,3532   73543 1                  GET45
 0795  REF   1                      35,3533  0 3613 0           TC     P3XORP7X
 0796                               35,3534  0 3536 1           TC     +2                P3X
 0797  REF   3  LAST  682           35,3535  0 3544 1           TC     GET45 +1          P7X
 0798  REF  80  LAST  681           35,3536  0 6042 1           TC     INTPRET
 0799                               35,3537   41575 0           VLCAO  PUSH
 0800  REF  10  LAST  681           35,3540   03656 1                  OELVSIN
 0801                               35,3541   77624 1           CALL                     COMPUTE MGA
 0802  REF   1                      35,3542   15725 0                  GET+MGA
 0803                               35,3543   77776 1  GET45    EXIT
 0804  REF   1                      35,3544  0 2437 0           TC     COMPTGO           INITIATE TASK TO UPOATE TTOGO
 0805  REF  21  LAST  682           35,3545  3 1470 0           CA     SU8EXIT
 0806  REF   1                      35,3546  55'464 1           TS     QSAVEO
 0807  REF   6  LAST  609           35,3547  3 4777 1           CAF    1SEC
 0808  REF 173  LAST  680           35,3550  0 4616 1           TC     8ANKCALL
 0809  REF   9  LAST  520           35,3551   01736 1           CACR   OELAYJOB
 0810  REF   1                      35,3552  3 3637 0           CAF    V16N45            TRKMKCNT, TTOGO, +MGA
 0811  REF 174  LAST  682           35,3553  0 4616 1           TC     8ANKCALL
 0812  REF  15  LAST  680           35,3554   20477 1           CACR   GOFLASH
 0813  REF   1                      35,3555  0 3560 1           TC     KILCLCCK          TERMINATE
 0814  REF   1                      35,3556  0 3563 1           TC     N45PROC           PROCEEO
 0815  REF   1                      35,3557  0 3573 0           TC     CLUPCATE          RECYCLE - RETURN FOR INITIAL COMPUTATION
 0816  REF  13  LAST  434           35,3560  3 0005 1  KILCLOCK CA     Z
 0817  REF   3  LAST  655           35,3561  55'162 1           TS     OISPOEX
 0818    REF  15  LAST  680    35,3562  0 6001 0           TC       GOTOPOOH
 0819    REF  17  LAST  609    35,3563  4 0076 1 N45PROC   CS       FLAGWRD2
 0820    REF  40  LAST  565    35,3564  7 4746 1           MASK     BIT6
 0821                          35,3565  0 0006 1           EXTEND
 0822    REF   2  LAST  682    35,3566  1 3560 0           BZF      KILCLOCK      FINALFLG IS SET-FLASH V37-AWAIT NEW PGM
 0823    REF  25  LAST  523    35,3567  0 5353 1           TC       PHASCHNG
 0824                          35,3570   04024 0           OCT      04024
 0825    REF  42  LAST  680    35,3571  0 5504 0           TC       UPFLAG        SET
 0826    REF   6  LAST  682    35,3572   00047 1           ADRES    FINALFLG      FINALFLG
 0827    REF  14  LAST  682    35,3573  3 0005 1 CLUPDATE  CA       Z
 0828    REF   4  LAST  682    35,3574  5 5162 1           TS       DISPDEX
 0829    REF  26  LAST  683    35,3575  0 5353 1           TC       PHASCHNG
 0830                          35,3576   04024 0           OCT      04024
 0831    REF  81  LAST  682    35,3577  0 6042 1           TC       INTPRET
 0832                          35,3600   52014 0           CLEAR    GOTO
 0833    REF  10  LAST  680    35,3601   00670 0                    UPDATFLG
 0834    REF   2  LAST  682    35,3602   03464 1                    QSAVED
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L        P34-P35, P74-P75                                                                        USER'S PAGE NO. 25      E7 S3

P0835    ***** DISPLAYE *****

R0836    SUBROUTINES USED

R0837           BANKCALL
R0838           GOFLASHR
R0839           GOTOPOOH
R0840           BLANKET
R0841           ENDOFJOB

 0842                               35,3603  0 0006 1  DISPLAYE EXTEND
 0843    REF  12  LAST  678         35,3604  2 3463 1           QXCH    NORMEX
 0844    REF   2  LAST  627         35,3605  3 3633 1           CAF     V06N55
 0845    REF 175  LAST  682         35,3606  0 4616 1           TCR     BANKCALL
 0846    REF  16  LAST  682         35,3607   20477 1           CADR    GOFLASH
 0847    REF  16  LAST  683         35,3610  1 6001 1           TCF     GOTOPOOH
 0848    REF  13  LAST  684         35,3611  0 1463 1           TC      NORMEX
 0849                               35,3612  1 3605 0           TCF     -5
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P0853     ooooo P3XCRP7X  ooooo

 0854     REF    2   LAST   247     35,3613   3 7747 1  P3XORP7X CAF     HIGH9
 0855     REF   10   LAST   501     35,3614   7 1010 0           MASK    MODREG
 0856                               35,3615   0 0006 1           EXTEND
 0857                               35,3616   1 3620 1           BZF     +2
 0858     REF  189   LAST   680     35,3617   24 002 0           INCR    Q
 0859                               35,3620   0 0002 0           RETURN

R0860     ooooo VNPOOH     ooooo

R0861     SUBROUTINES USED

R0862           BANKCALL
R0863           GOFLASH
R0864           GOTOPOOH

 0865                               35,3621   0 0006 1  VNPOOH   EXTEND
 0866     REF    6   LAST   679     35,3622   23'465 1           QXCH    RTRN
 0867     REF    3   LAST   635     35,3623   55'615 0           TS      VERBNOUN
 0868     REF    4   LAST   685     35,3624   3 1615 1           CA      VERBNOUN
 0869     REF  176   LAST   684     35,3625   0 4616 1           TCR     BANKCALL
 0870     REF   17   LAST   684     35,3626    20477 1           CADR    GOFLASH
 0871     REF   17   LAST   684     35,3627   1 6001 1           TCF     GOTOPOOH
 0872     REF    7   LAST   685     35,3630   0 1465 1           TC      RTRN
 0873                               35,3631   1 3624 0           TCF     -5
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P0874    ..... CCNSTANTS .....

 0875                             35,3632   01445 0  V06N37    VN      0637
 0876                             35,3633   01467 0  V06N55    VN      0655
 0877                             35,3634   01472 1  V06N58    VN      0658
 0878                             35,3635   01473 0  V06N59    VN      0659
 0879                             35,3636   01521 0  V06N81    VN      0681
 0880                             35,3637   04055 0  V16N45    VN      1645
 0881                             35,3640   14441 0  TWCPI     2DEC    6.283185307 B-4
 0881                             35,3641   37325 1
 0882                             35,3642   00001 0  MAX250    2DEC    25 E3
 0882                             35,3643   20650 0
 0883                             35,3644   12525 0  THIRD     2DEC    .333333333
 0883                             35,3645   12525 0
 0884                             35,3646   00004 0  ELEPS     20EC    .27777777 E-3
 0884                             35,3647   21505 1
 0886                             35,3650   77777 0  OP-.01    CCT     77777               CONSTANTS
 0887                             35,3651   61337 1            OCT     61337               ADJACENT       -.01 FCR MGA DSP
 08871                            35,3652   01252 0  EPSFOUR   2DEC    .0416666666
 08871                            35,3653   25253 1
 08872                            35,3654   13434 0  1300EG    2DEC    .3611111111
 08872                            35,3655   16162 0
```

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P0888   ..... INITVEL .....

R0889   MOD NO -1        LOG SECTION - P34-P35, P74-P75
R0890   MOD BY WHITE.P   DATE  21NOV67

R0891   FUNCTIONAL DESCRIPTION

R0892          THIS SUBROUTINE COMPUTES THE REQUIRED INITIAL VELOCITY VECTOR FOR
R0893          A TRAJECTORY OF SPECIFIED TRANSFER TIME BETWEEN SPECIFIED INITIAL
R0894          AND TARGET POSITIONS.  THE TRAJECTORY MAY BE EITHER CONIC OR
R0895          PRECISION DEPENDING ON AN INPUT PARAMETER (NAMELY, NUMBER OF
R0896          OFFSETS).  IN ADDITION, IN THE PRECISION TRAJECTORY CASE, THE
R0897          SUBROUTINE ALSO COMPUTES AN OFFSET TARGET VECTOR, TO BE USED
R0898          DURING PURE-CONIC CROSS-PRODUCT STEERING.  THE OFFSET TARGET
R0899          VECTOR IS THE TERMINAL POSITION VECTOR OF A CONIC TRAJECTORY WHICH
R0900          HAS THE SAME INITIAL STATE AS A PRECISION TRAJECTORY WHOSE
R0901          TERMINAL POSITION VECTOR IS THE SPECIFIED TARGET VECTOR.

R0902          IN ORDER TO AVOID THE INHERENT SINGULARITIES IN THE 180 DEGREE
R0903          TRANSFER CASE WHEN THE (TRUE OR OFFSET) TARGET VECTOR MAY BE
R0904          SLIGHTLY OUT OF THE ORBITAL PLANE, THIS SUBROUTINE ROTATES THIS
R0905          VECTOR INTO A PLANE DEFINED BY THE INPUT INITIAL POSITION VECTOR
R0906          AND ANOTHER INPUT VECTOR (USUALLY THE INITIAL VELOCITY VECTOR),
R0907          WHENEVER THE INPUT TARGET VECTOR LIES INSIDE A CONE WHOSE VERTEX
R0908          IS THE ORIGIN OF COORDINATES, WHOSE AXIS IS THE 180 DEGREE
R0909          TRANSFER DIRECTION, AND WHOSE CONE ANGLE IS SPECIFIED BY THE USER.

R0910          THE LAMBERT SUBROUTINE IS UTILIZED FOR THE CONIC COMPUTATIONS AND
R0911          THE COASTING INTEGRATION SUBROUTINE IS UTILIZED FOR THE PRECISION
R0912          TRAJECTORY COMPUTATIONS.

R0913   CALLING SEQUENCE

R0914          L          CALL
R0915          L+1                INITVEL
R0916          L+2        (RETURN - ALWAYS)

R0917   INPUT

R0918          (1) RINIT     INITIAL POSITION RADIUS VECTOR
R0919          (2) VINIT     INITIAL POSITION VELOCITY VECTOR
R0920          (3) RTARG     TARGET POSITION RADIUS VECTOR
R0921          (4) DELLT4    DESIRED TIME OF FLIGHT FROM RINIT TO RTARG
R0922          (5) INTIME    TIME OF RINIT
R0923          (6) 00        NUMBER OF ITERATIONS OF LAMBERT/INTEGRVS
R0924          (7) 20        ANGLE TO 180 DEGREES WHEN ROTATION STARTS
R0925          (8) RTX1      -2 FOR EARTH, -10D FOR LUNAR
R09251         (9) RTX2      COORDINATE SYSTEM ORIGIN - 0 FOR EARTH, 2 FOR LUNAR
R0926          PUSHLOC SET AT 4D
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R0927   OUTPUT

R0928           (1) RTARG    OFFSET TARGET POSITION VECTOR
R0929           (2) VIPRIME  MANEUVER VELOCITY REQUIRED
R0930           (3) VTPRIME  VELOCITY AT TARGET AFTER MANEUVER
R0931           (4) DELVEET3 DELTA VELOCITY REQUIRED FOR MANEUVER

R0932   SUBROUTINES USED

R0933           LAMBERT
R0934           INTSTALL
R0935           INTEGRVS

 0936   REF   1               11,2000                           SETLOC  INTVEL
 0937                         11,2000                           BANK

 0938   REF   1                                                 COUNT*  $$/INITV
 0958                         11,2000   77614 1   INITVEL       SET                      COGA GUESS NOT AVAILABLE
 0959   REF   1               11,2001   00475 1                         GUESSW
 0960                         11,2002   44175 1   HAVEGUES      VLOAD   STQ
 0961   REF   7  LAST  677    11,2003   03444 0                         RTARG
 0962   REF  14  LAST  684    11,2004   03463 0                         NORMEX
 0963   REF   1               11,2005   03472 0                 STORE   RTARG1
 09631                        11,2006   77646 0                 ABVAL
 09632  REF   2  LAST  145    11,2007   03723 1                 STORE   RTMAG
 0964                         11,2010   46135 1                 SLOAD   BHIZ
 0965   REF   4  LAST  679    11,2011   03000 1                         RTX2
 0967   REF   1               11,2012   22026 0                         INITVEL1
 0968                         11,2013   72575 0                 VLOAD   VSL2
 0969   REF   2  LAST  675    11,2014   02323 1                         RINIT            B29
 0970   REF   3  LAST  688    11,2015   26323 1                 STOVL   RINIT            B27
 0971   REF   2  LAST  676    11,2016   02331 1                         VINIT            B7
 0972                         11,2017   77752 1                 VSL2
 0973   REF   3  LAST  688    11,2020   26331 1                 STOVL   VINIT            B5
 0974   REF   2  LAST  688    11,2021   03472 0                         RTARG1
 0975                         11,2022   77752 1                 VSL2
 0976   REF   3  LAST  688    11,2023   03472 0                 STORE   RTARG1
 09761                        11,2024   77646 0                 ABVAL
 09762  REF   3  LAST  688    11,2025   03723 1                 STORE   RTMAG
R0977          INITIALIZATION

 0978                         11,2026   71331 0   INITVEL1      SSP     DLOAD            SET ITCTR TO -1,LOAD MPAC WITH E4(PL 20)
 0979   REF   1               11,2027   03617 1                         ITCTR
 0980                         11,2030   77776 1                         0 -1
 0981                         11,2031   70546 1                 COSINE  SR1              CALCULATE COSINE (E4)  (+2)
 0982   REF   1               11,2032   17667 0                 STODL   COZY4            SET COZY4 TO COSINE(E4)          (PL 00)
 0983                         11,2033   67154 0                 LXA,2   SXA,2
 0984   REF 288  LAST  670    11,2034   00154 1                         MPAC
 0985   REF   2  LAST  126    11,2035   02701 0                         VTARGTAG         SET VTARGTAG TO 00 (SP)
 0986                         11,2036   77775 1                 VLOAD
 0987   REF   4  LAST  688    11,2037    02323 1                    RINIT
 0988   REF   3  LAST  126    11,2040    26655 0             STOVL  R1VEC          R1VEC EQ RINIT
 0989   REF   4  LAST  688    11,2041    03472 0                    RTARG1
 0990   REF   2  LAST  126    11,2042    16663 0             STODL  R2VEC          R2VEC EQ RTARG
 0991   REF   4  LAST  675    11,2043    03452 1                    DELLT4
 0992   REF   2  LAST  126    11,2044    02671 0             STORE  TDESIRED       TDESIRED EQ DELLT4
 0993                         11,2045    77201 1             SETPD  VLOAD
 0994                         11,2046    00001 0                    0D             INITIALIZE PL TO 0D
 0995   REF   5  LAST  689    11,2047    02323 1                    RINIT          MPAC EQ RINIT (+29)
 0996                         11,2050    41456 0             UNIT   PUSH           UNIT(RI)  (+1)                 (PL 6D)
 0997                         11,2051    53435 0             VXV    UNIT
 0998   REF   4  LAST  688    11,2052    02331 1                    VINIT          MPAC EQ UNIT(RI) X VI   (+8)
 0999   REF   2  LAST  126    11,2053    26674 0             STOVL  UN
 1000   REF   5  LAST  689    11,2054    03472 0                    RTARG1
 1001                         11,2055    50256 0             UNIT   DOT            TEMP=URT.URI  (+2)             (PL 0D)
 1002                         11,2056    43015 1             DAD    CLEAR
 1003   REF   2  LAST  688    11,2057    03667 0                    COZY4
 1004   REF   1               11,2060    03665 1                    NORMSW
 1005   REF   3  LAST  689    11,2061    03667 0             STORE  COZY4
 1006                         11,2062    43044 0   INITVEL2  BPL    SET
 1007   REF   1               11,2063    22105 0                    INITVEL3       UN CALCULATED IN LAMBERT
 1008   REF   2  LAST  689    11,2064    03465 0                    NORMSW
R1009      ROTATE  RC  INTO YC PLANE - SET UNIT NORMAL TO YC

 1010                         11,2065    41575 0             VLOAD  PUSH                                          (PL 6D)
 1011   REF   3  LAST  689    11,2066    02663 0                    R2VEC          RC TO 6D  (+29)
 1012                         11,2067    63246 1             ABVAL  PDVL           RC TO MPAC, ABVAL(RC) (+29) TO 0D(PL 2D)
 1013                         11,2070    46206 1             PUSH   VPROJ                                         (PL 8D)
 1014   REF   3  LAST  689    11,2071    02674 0                    UN
 1015                         11,2072    51352 1             VSL2   BVSU
 1016                         11,2073    74256 0             UNIT   VXSC                                          (PL 0D)
 1017                         11,2074    77772 0             VSL1
 1018   REF   4  LAST  689    11,2075    02663 0             STORE  R2VEC
 1019                         11,2076    67351 1             TLOAD  SLOAD
 1020   REF   2  LAST   37    11,2077    24007 0                    ZEROVEC
 1021   REF   2  LAST  688    11,2100    03617 1                    ITCTR
 1022                         11,2101    77244 0             BPL    VLOAD
 1023   REF   2  LAST  689    11,2102    22105 0                    INITVEL3
 1024   REF   5  LAST  689    11,2103    02663 0                    R2VEC
 1025   REF   6  LAST  689    11,2104    03472 0             STORE  RTARG1
 1026                         11,2105    63345 0   INITVEL3  DLOAD  PDVL                                          (PL 2D)
 1027   REF   1               11,2106    26007 1                    MUEARTH        POSITIVE VALUE
 1028   REF   6  LAST  689    11,2107    02663 0                    R2VEC
 102802                       11,2110    63256 0             UNIT   PDVL           2D = UNIT(R2VEC)               (PL 8D)
 102804 REF   4  LAST  689    11,2111    02655 0                    R1VEC
 102806                       11,2112    41456 0             UNIT   PUSH           8D = UNIT(R1VEC)               (PL14D)
 102808                       11,2113    57435 1             VXV    VCOMP          -N = UNIT(R2VEC) X UNIT(R1VEC)
 10281                        11,2114    00003 1                    2D
 10282                        11,2115    77606 1             PUSH                                                 (PL20D)
 10283                        11,2116    71350 1             LXA,1  DLOAD
 10284 REF   6  LAST  664   11,2117   02776 0                     PTX1
 10285                      11,2120   C0023 0                     180
 10286                      11,2121   62040 1            8MN      INCR ,1
 10287                      11,2122   22124 0                     +2
 10288                      11,2123   77767 1            DEC      -8
 10289                      11,2124   67310 1            INCR,1   SLOAO
 1029                       11,2125   00012 1                     100
 10291 REF  14  LAST  671   11,2126   0CC47 1                     X1
 10292                      11,2127   77230 0            BHIZ     VLOAO                                            (PL140)
 10293                      11,2130   22132 1                     +2
 10294                      11,2131   41476 1            VCOMP    PUSH                                             (PL200)
 10295                      11,2132   77775 1            VLOAO                                                     (PL140)
 10296                      11,2133   50235 0            VXV      OOT                                              (PL 20)
 1032                       11,2134   71244 0            8PL      OLOAO                                            (PL 00)
 1033  REF   1              11,2135   22137 1                     INITVEL4
 1034                       11,2136   41476 1            OCOMP    PUSH                                             (PL 20)
 1035                       11,2137   67154 0   INITVEL4 LXA,2    SXA,2
 1036                       11,2140   C0000 1                     00
 1037  REF   2  LAST  126   11,2141   C2672 0                     GECMSGN
R1038     SET INPLTS UP FCR LAMBERT

 1039                       11,2142   66350 1            LXA,1    SSP
 1040  REF   7  LAST  690   11,2143   02776 0                     PTX1
 10401 REF   1              11,2144   00027 1                     ITERCTR
 10402                      11,2145   C0024 1                     200
R1041      OPERATE THE LAMBERT CONIC RCUTINE (COASTFLT SU8ROUTINE)

 1042                       11,2146   77624 1            CALL
 1043  REF   1              11,2147   25212 1                     LAM8ERT

R1044   ARRIVEO AT SOLLTICN IS GOCD ENCUGH ACCOROING TO SLIGHTLY WIOER 8OUNOS.

 1045                       11,2150   77214 0            CLEAR    VLCAO
 1046  REF   2  LAST  688   11,2151   00675 0                     GUESSW
 1047  REF   8  LAST  665   11,2152   02744 1                     VVEC
R1048   STORE CALCULATEO INITIAL VELOCITY REQLIREO IN VIPRIME
R1049
 1050  REF   2  LAST  665   11,2153   16337 1            STOOL    VIPPIME         INITIAL VELOCITY REQUIREO  (+7)
R1051
R1052      IF NUMIT IS ZERC, CCNTINUE AT INITVEL8, CTHERWISE
R1053   SET UP INPUTS FOR ENCKE INTEGRATICN (INTEGRVS).

 1054  REF   3  LAST  688   11,2154   02702 0                     VTARGTAG
 1055                       11,2155   45030 0            BHIZ     CALL
 1056  REF   1              11,2156   22233 0                     INITVEL7
 1057  REF  20  LAST  679   11,2157   27410 1                     INTSTALL
 1061                       11,2160   43135 1            SLCAO    CLEAR
 1062  REF   5  LAST  688   11,2161   C3000 1                     PTX2
 1063  REF   5  LAST  679   11,2162   00263 0                     MOONFLAG
 1064                       11,2163   43030 0            8HIZ     SET
 1065   REF   1              11,2164   22166 0                    INITVEL5
 1066   REF   6  LAST  690   11,2165   00063 1                    MOONFLAG
 1067                        11,2166   77775 1  INITVEL5 VLOAD
 1068   REF   6  LAST  689   11,2167   02323 1                    RINIT
 1069   REF   5  LAST  689   11,2170   02655 0           STORE    R1VEC
 1070   REF   7  LAST  679   11,2171   25535 0           STOVL    RCV
 1071   REF   3  LAST  690   11,2172   02337 1                    VIPRIME
 1072   REF   6  LAST  679   11,2173   15543 1           STODL    VCV
 1073   REF   5  LAST  675   11,2174   03610 0                    INTIME
 1074   REF   7  LAST  679   11,2175   01517 0           STORE    TET
 1075                        11,2176   43015 1           DAD      CLEAR
 1076   REF   5  LAST  689   11,2177   03452 1                    DELLT4
 1077   REF   9  LAST  679   11,2200   01673 1                    INTYPFLG
 1078   REF  28  LAST  679   11,2201   34041 0           STCALL   TDEC1
 1079   REF   3  LAST  679   11,2202   27106 0                    INTEGRVS
 1080                        11,2203   77775 1           VLOAD
 1081   REF   8  LAST  658   11,2204   00025 0                    VATT1
 1082   REF   2  LAST  126   11,2205   02703 1           STORE    VTARGET
R1083     IF ITERATION COUNTER (ITCTR) EQ NO. ITERATIONS (NUMIT), CONTINUE AT
R1084   INITVELC, OTHERWISE REITERATE LAMBERT AND ENCKE

 1085                        11,2206   63154 1           LXA,2    INCR,2
 1086   REF   3  LAST  689   11,2207   03616 0                    ITCTR
 1087                        11,2210   00001 0                    1D               INCREMENT ITCTR
 1088                        11,2211   55134 1           SXA,2    XSU,2
 1089   REF   4  LAST  691   11,2212   03616 0                    ITCTR
 1090   REF   4  LAST  690   11,2213   02701 0                    VTARGTAG
 1091                        11,2214   46135 1           SLOAD    BHIZ             IF SP(MPAC) EQ 0, CONTINUE AT INITVELC
 1092   REF   9  LAST  658   11,2215   00050 1                    X2
 1093   REF   1              11,2216   22230 0                    INITVEL6
R1094
R1095     OFFSET CONIC TARGET VECTOR

 1096                        11,2217   52375 1           VLOAD    VSU
 1097   REF   7  LAST  689   11,2220   03472 0                    RTARG1
 1098   REF   5  LAST  658   11,2221   00017 1                    RATT1
 1099                        11,2222   77655 1           VAD
 1100   REF   7  LAST  689   11,2223   02663 0                    R2VEC
 1101   REF   8  LAST  691   11,2224   16663 0           STODL    R2VEC
 1102   REF   4  LAST  689   11,2225   03667 0                    COZY4
 1103                        11,2226   77650 1           GOTO
 1104   REF   1              11,2227   22062 0                    INITVEL2         CONTINUE ITERATING AT INITVEL2
R1105   COMPUTE THE DELTA VELOCITY

 1106                        11,2230   77775 1  INITVEL6 VLOAD
 1107   REF   9  LAST  691   11,2231   02663 0                    R2VEC
 1108   REF   8  LAST  691   11,2232   03472 0           STORE    RTARG1
 1109                        11,2233   52375 1  INITVEL7 VLOAD    VSU
 1110   REF   4  LAST  691   11,2234   02337 1                    VIPRIME
 1111   REF   5  LAST  689   11,2235   02331 1                    VINIT
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 1112    REF   8  LAST  681   11,2236   26366 0            STOVL  DELVEET3         DELVEET3 = VIPRIME-VINIT  (+7)
 1113    REF   3  LAST  691   11,2237   02703 1                   VTARGET
 1114    REF   2  LAST  665   11,2240   03566 1            STORE  VTPRIME
 1115                         11,2241   46135 1            SLOAD  BHIZ
 1116    REF   6  LAST  690   11,2242   03000 1                   PTX2
 1117    REF   1              11,2243   22260 0                   INITVELX
 11171                        11,2244   70575 1            VLOAD  VSR2
 11172   REF   3  LAST  692   11,2245   03566 1                   VTPRIME
 1118    REF   4  LAST  692   11,2246   27566 1            STOVL  VTPRIME
 1119    REF   5  LAST  691   11,2247   02337 1                   VIPRIME
 1120                         11,2250   77742 0            VSR2
 1121    REF   6  LAST  692   11,2251   26337 1            STOVL  VIPRIME
 1122    REF   9  LAST  691   11,2252   03472 0                   RTARG1
 1123                         11,2253   77742 0            VSR2
 1124    REF  10  LAST  692   11,2254   27472 0            STOVL  RTARG1
 1125    REF   9  LAST  692   11,2255   02366 0                   DELVEET3
 1126                         11,2256   77742 0            VSR2
 1127    REF  10  LAST  692   11,2257   02366 0            STORE  DELVEET3
 1128                         11,2260   70750 1  INITVELX  LXA,1  DLOAD*
 11281   REF   8  LAST  690   11,2261   02776 0                   RTX1
 11282   REF   1              11,2262   10003 0                   MUTABLE -2,1
 112825                       11,2263   41206 0            PUSH   DMP
 11283   REF   3  LAST  653   11,2264   02742 1                   R1A
 11284                        11,2265   56342 1            SR1    DDV
 11285   REF   4  LAST  653   11,2266   00041 1                   R1
 11286   REF   2  LAST  145   11,2267   17721 0            STODL  MU/A
 11287                        11,2270   77661 0            SR
 112871                       11,2271   20607 1                   6
 112875  REF   2  LAST  145   11,2272   03717 0            STORE  MUASTEER
 11288                        11,2273   77201 1            SETPD  VLOAD
 1129                         11,2274   00001 0                   0D
 1130    REF  11  LAST  692   11,2275   03472 0                   RTARG1
 1131    REF   8  LAST  688   11,2276   03444 0            STORE  RTARG
 1132                         11,2277   52014 0            CLEAR  GOTO
 1133    REF   3  LAST  647   11,2300   01267 0                   XDELVFLG
 1134    REF  15  LAST  688   11,2301   03463 0                   NORMEX
R1135
R1136     ..... END OF INITVEL ROUTINE .....
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P1137    ..... MIDGIM .....

R1138    MOD NO. 0, BY WILLMAN, SUBROUTINE RENDGUID, LOG P34-P35, P74-P75
R1139     REVISION 03, 17 FEB 67

R1140              IF THE ACTIVE VEHICLE IS DOING THE COMPUTATION, MIDGIM COMPUTES
R1141    THE POSITIVE MIDDLE GIMBAL ANGLE OF THE ACTIVE VEHICLE TO THE INPUT
R1142    DELTA VELOCITY VECTOR (0D IN PUSH LIST),  OTHERWISE
R1143    MIDGIM CONVERTS THE INPUT DELTA VELOCITY VECTOR FROM INERTIAL COORDIN-
R1144    ATES TO LOCAL VERTICAL COORDINATES OF THE ACTIVE VEHICLE.

R1145      .. INPUTS ..

R1146        NAME        MEANING                                  UNITS/SCALING/MODE

R1147       AVFLAG  INT FLAG - 0 IS CSM ACTIVE, 1 IS LEM ACTIVE             BIT
R1149       RINIT   ACTIVE VEHICLE RADIUS VECTOR              METERS/CSEC (+7) VT
R1150       VINIT   ACTIVE VEHICLE VELOCITY VECTOR            METERS/CSEC (+7) VT
R1151       0D (PL) ACTIVE VEHICLE DELTA VELOCITY VECTOR      METERS/CSEC (+7) VT

R1152      .. OUTPUTS ..

R1153        NAME        MEANING                                  UNITS/SCALING/MODE

R1154         +MGA   + MIDDLE GIMBAL ANGLE                   REVOLUTIONS (+0)  DP
R1155       DELVLVC DELTA VELOCITY VECTOR IN LV COORD.      METERS/CSEC (+7)  VT
R1156      MGLVFLAG INT FLAG - 0 IS +MGA COMPUTED, 1 IS DELVLVC COMP.  -    BIT

R1157      .. CALLING SEQUENCE ..

R1158    L          CALL
R1159    L+1              MIDGIM
R1160    L+2        (RETURN - ALWAYS)

R1161      .. NO SUBROUTINES CALLED ..

R1162      .. DEBRIS - ERASEABLE TEMPORARY USAGE

R1163           A,Q,L, PUSH LIST, MPAC.

R1164      .. ALARMS - NONE ..
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P1165    MIDDLE GIMBAL ANGLE COMPUTATION.

 1166    REF    1                06,2000                       SETLOC  MIDDGIM
 1167                            06,3723                       BANK

 1168    REF    1                                              COUNT*  $$/MIDG

 1169                            06,3723   20000 0   HALFREV   2DEC    1 B-1
 1169                            06,3724   00000 1
 1176                            06,3725   53575 0   GET+MGA   VLOAD   UNIT                 (PL 00) V (+7) TO MPAC, UNITIZE  UV (+1)
 11765                           06,3726   77656 1             UNIT
 1177                            06,3727   72441 0             DOT     SL1                  DOT UV WITH Y(STABLE MEMBER) AND RESCALE
 1178    REF   16  LAST  597     06,3730   01742 1                     REFSMMAT +6           FROM +2 TO +1 FOR ASIN ROUTINE
 1179                            06,3731   51136 1             ARCSIN  BPL
 1180    REF    1                06,3732   15736 1                     SETMGA
 1181                            06,3733   43215 0             DAD     DAD                  CONVERT -MGA TO +MGA BY
 1182    REF    1                06,3734   15724 1                     HALFREV              ADDING ONE REVOLUTION
 1183    REF    2  LAST  694     06,3735   15724 1                     HALFREV
 1184    REF    5  LAST  682     06,3736   02253 1   SETMGA    STORE   +MGA
 1185                            06,3737   43414 1             CLR     RVQ                  CLEAR MGLVFLAG TO INDICATE +MGA CALC
 1186    REF    1                06,3740   02675 1                     MGLVFLAG                 AND EXIT
 1191                            06,3741   53575 0   GET.LVC   VLOAD   UNIT                 (PL 6D)   R (+29) IN MPAC, UNITIZE  UR
 1192    REF    7  LAST  691     06,3742   02323 1                     RINIT
 1193                            06,3743   77676 0             VCOMP                        U(-R)
 1194                            06,3744   00023 0             STORE   18D                  U(-R) TO 18D
 1195                            06,3745   53435 0             VXV     UNIT                 U(-R)*V EQ V*U(R), U(V*R)
 1196    REF    6  LAST  691     06,3746   02331 1                     VINIT
 1197                            06,3747   00015 0             STORE   12D                  U(V*R) TO 12D
 1198                            06,3750   53435 0             VXV     UNIT                 U(V*R)*U(-R), U((V*R)*(-R))
 1199                            06,3751   00023 0                     18D
 1200                            06,3752   24007 0             STOVL   6D                   TRANSFORMATION MATRIX IS IN 6D (+1)
 1201                            06,3753   00001 0                     0D                   DELTA V (+7) IN 0D
 1202                            06,3754   76521 0             MXV     VSL1                 CONVERT FROM INER COOR TO LV COOR (+8)
 1203                            06,3755   00007 0                     6D                    AND SCALE +7 IN MPAC
 1204    REF   19  LAST  680     06,3756   03434 1             STORE   DELVLVC              STORE IN DELVLVC (+7)
 1205                            06,3757   43414 1             SET     RVQ                  SET MGLVFLAG TO INDICATE LVC CALC
 1206    REF    2  LAST  694     06,3760   02475 0                     MGLVFLAG                 AND EXIT
R1207      ..... END OF MIDGIM ROUTINE .....
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P1208
 12082                             10,2000                         BANK    10
 12084   REF    1                  10,2000                         SETLOC  SLCTMU
 12086                             10,2000                         BANK
 12088   REF    1                                                  COUNT*  $$/MIOG

 1209                              10,2000   77160 0  SELECTMU  AXC,1   AXT,2
 1210                              10,2001   00002 0                    2D
 1211                              10,2002   00000 1                    0D
 1212                              10,2003   77614 1            BOFF
 1213    REF    4  LAST   679      10,2004   04343 1                    CMOONFLG
 1214    REF    1                  10,2005   20011 0                    SETMUER
 1215                              10,2006   77160 0            AXC,1   AXT,2
 1216                              10,2007   00012 1                    10D
 1217                              10,2010   00002 0                    2D
 1218                              10,2011   66143 1  SETMUER   DLOAD*  SXA,1
 1219    REF    2  LAST   692      10,2012   10011 0                    MUTABLE +4,1
 1220    REF    9  LAST   692      10,2013   02776 0                    RTX1
 1221    REF    4  LAST   640      10,2014   22317 1            STODL*  RTSR1/MU
 1222    REF    3  LAST   695      10,2015   10003 0                    MUTABLE -2,1
 1223                              10,2016   54214 1            BOFF    SR
 1224    REF    5  LAST   695      10,2017   04343 1                    CMOONFLG
 1225    REF    1                  10,2020   20022 0                    RTRNMU
 1226                              10,2021   20607 1                    6D
 1227    REF    4  LAST   653      10,2022   02321 0  RTRNMU    STORE   RTMU
 1228                              10,2023   43134 0            SXA,2   CLEAR
 1229    REF    7  LAST   692      10,2024   02777 1                    RTX2
 1230    REF    7  LAST   683      10,2025   01271 1                    FINALFLG
 1234                              10,2026   77650 1            GOTO
 1235    REF    6  LAST   668      10,2027   73515 1                    VN1645
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P1236   ..... PERIAPO .....

R1237   MOD NO -1        LOG SECTION - P34-P35, P74-P75
R1238   MOD BY WHITE.P   DATE   18JAN68

R1239   FUNCTIONAL DESCRIPTION

R1240           THIS SUBROUTINE COMPUTES THE TWO BODY APOCENTER AND PERICENTER
R1241           ALTITUDES GIVEN THE POSITION AND VELOCITY VECTORS FOR A POINT ON
R1242           THE TRAJECTORY AND THE PRIMARY BODY.

R1243           SETRAD IS CALLED TO  DETERMINE THE RADIUS OF THE PRIMARY BODY.

R1244           APSIDES IS CALLED TO SOLVE FOR THE TWO BODY RADII OF APOCENTER AND
R1245           PERICENTER AND THE ECCENTRICITY OF THE TRAJECTORY.

R1246   CALLING SEQUENCE

R1247           L          CALL
R1248           L+1                PERIAPO
R1249           L+2        (RETURN - ALWAYS)

R1250   INPUT

R1251           (1) RVEC      POSITION VECTOR IN METERS
R1252                         SCALE FACTOR - EARTH +29, MOON +27
R1253           (2) VVEC      VELOCITY VECTOR IN METERS/CENTISECOND
R1254                         SCALE FACTOR - EARTH +7, MOON +5
R1255           (3) X1        PRIMARY BODY INDICATOR
R1256                         EARTH -2, MOON -10

R1257   OUTPUT

R1258           (1) 2D        APOCENTER RADIUS IN METERS
R1259                         SCALE FACTOR - EARTH +29, MOON +27
R1260           (2) 4D        APOCENTER ALTITUDE IN METERS
R1261                         SCALE FACTOR - EARTH +29, MOON P27
R1262           (3) 6D        PERICENTER RADIUS IN METERS
R1263                         SCALE FACTOR - EARTH +29, MOON +27
R1264           (4) 8D        PERICENTER ALTITUDE IN METERS
R1265                         SCALE FACTOR - EARTH +29, MOON +27
R1266           (5) ECC       ECCENTRICITY OF CONIC TRAJECTORY
R1267                         SCALE FACTOR - +3
R1268           (6) XXXALT    RADIUS OF THE PRIMARY BODY IN METERS
R1269                         SCALE FACTOR - EARTH +29, MOON +27
R1270           (7) PUSHLOC   EQUALS 10D

R1271   SUBROUTINES USED

R1272           SETRAD
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R1273          APSIDES

 1274   REF   1                 23,2000                       SETLOC APOPERI
 1275                           23,2337                       BANK

 1276   REF   1                                               COUNT* $$/PERAP

 1277                           23,2337   00302 0  RPAD       2DEC   6373338 B-29   STANDARD RADIUS  OF PAD 37-B.
 1277                           23,2340   17755 0
A1278                                                                               = 20 909 901.57 FT

 1279                           23,2341   53754 1  PERIAPO1   LXA,2  VSR*
 1280   REF   8  LAST  695      23,2342   02777 1                    RTX2
 1281                           23,2343   57176 0                    0,2
 1282   REF   9  LAST  690      23,2344   26744 1             STOVL  VVEC
 1283                           23,2345   53750 0             LXA,1  VSR*
 1284   REF  10  LAST  695      23,2346   02776 0                    RTX1
 1285                           23,2347   57176 0                    0,2
 1286   REF   7  LAST  664      23,2350   02655 0             STORE  RVEC
 1287                           23,2351   45020 1  PERIAPO    STQ    CALL
 1288   REF  16  LAST  692      23,2352   03463 0                    NORMEX
 1289   REF   1                 23,2353   46367 1                    SETRAD
 1290   REF   2  LAST  144      23,2354   37671 0             STCALL XXXALT
 1291   REF   1                 23,2355   25704 0                    APSIDES
 1292                           23,2356   41401 1             SETPD  PUSH           2D = APOCENTER RADIUS   B29 OR B27
 1293                           23,2357   00003 1                    2D
 1294                           23,2360   65225 1             DSU    PDDL           4D = APOGEE ALTITUDE    B29 OR B27
 1295   REF   3  LAST  697      23,2361   03671 1                    XXXALT
 1296                           23,2362   00001 0                    0D
 1297                           23,2363   45206 1             PUSH   DSU            6D = PERICENTER RADIUS  B29 OR B27
 1298   REF   4  LAST  697      23,2364   03671 1                    XXXALT
 1299                           23,2365   52006 0             PUSH   GOTO           8D = PERIGEE ALTITUDE   B29 OR B27
 1300   REF  17  LAST  697      23,2366   03463 0                    NORMEX
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P1301    SETRAD
 1302                            23,2367   41545 0  SETRAD   DLOAD    PUSH
 1303    REF   1                 23,2370   06340 0                    RPAD
 1304                            23,2371   63130 0           SXA,1    INCR,2
 1305    REF  10  LAST  691      23,2372   00047 1                    X2
 1306                            23,2373   00002 0                    2D
 1307                            23,2374   46135 1           SLOAD    BHIZ
 1308    REF  11  LAST  698      23,2375   00050 1                    X2
 1309    REF   1                 23,2376   46402 0                    SETRADX
 1310                            23,2377   51575 1           VLOAD    ABVAL
 1311    REF   3  LAST  202      23,2400   02023 1                    RLS
 1312                            23,2401   77725 1           PDDL
 1313                            23,2402   43545 1  SETRADX  DLOAD    RVQ
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P1314    PRECSET
 1315                            23,2403   77620 0  PRECSET  STQ
 1316    REF  18  LAST  697      23,2404   03463 0                   NORMEX
 1317    REF   2  LAST  627      23,2405   37574 0           STCALL  TOEC2
 1318    REF   4  LAST  621      23,2406   27056 1                   LEMPREC
 1319                            23,2407   77624 1           CALL
 1320    REF   1                 23,2410   46421 1                   LEMSTORE
 1321                            23,2411   77745 1           DLOAD
 1322    REF   3  LAST  699      23,2412   03574 1                   TOEC2
 1323    REF  29  LAST  691      23,2413   34041 0           STCALL  TOEC1
 1324    REF   3  LAST  209      23,2414   27042 1                   CSMPREC
 1325                            23,2415   77624 1           CALL
 1326    REF   1                 23,2416   46431 0                   CSMSTORE
 1327                            23,2417   77650 1           GOTO
 1328    REF  19  LAST  699      23,2420   03463 0                   NORMEX
 1329                            23,2421   43175 0  LEMSTORE VLOAD   BOFF
 1330    REF  15  LAST  679      23,2422   00001 0                   RATT
 1331    REF   3  LAST  634      23,2423   01352 1                   AVFLAG
 1332    REF   4  LAST  672      23,2424   46435 1                   PASSIVE
 1333    REF  20  LAST  679      23,2425   27536 1  ACTIVE   STOVL   RACT3
 1334    REF  11  LAST  675      23,2426   00007 0                   VATT
 1335    REF  13  LAST  677      23,2427   03544 1           STORE   VACT3
 1336                            23,2430   77616 0           RVQ
 1337                            23,2431   43175 0  CSMSTORE VLOAD   BOFF
 1338    REF  16  LAST  699      23,2432   00001 0                   RATT
 1339    REF   4  LAST  699      23,2433   01352 1                   AVFLAG
 1340    REF   4  LAST  672      23,2434   46425 0                   ACTIVE
 1341    REF  11  LAST  675      23,2435   27552 0  PASSIVE  STOVL   PPASS3
 1342    REF  12  LAST  699      23,2436   00007 0                   VATT
 1343    REF   8  LAST  675      23,2437   03560 1           STORE   VPASS3
 1344                            23,2440   77616 0           RVQ
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```
P1345    VECSHIFT
 1346                                23,2441   53754 1  VECSHIFT LXA,2  VSR*
 1347    REF   9  LAST  697          23,2442   02777 1                  RTX2
 1348                                23,2443   57176 0                  0,2
 1349                                23,2444   63350 1           LXA,1  PDVL
 1350    REF  11  LAST  697          23,2445   02776 0                  RTX1
 1351                                23,2446   63257 1           VSR*   PDVL
 1352                                23,2447   57176 0                  0,2
 1353                                23,2450   77616 0           RVQ
```

```
P1354   SHIFTR1
 1355                           23,2451   53754 1  SHIFTR1   LXA,2   SL*
 1356   REF  10   LAST  700     23,2452   02777 1                    RTX2
 1357                           23,2453   57576 1                    0,2
 1358                           23,2454   77616 0            RVQ
```

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P1359   PROGRAM DESCRIPTION
R1360   SUBROUTINE NAME        R36  OUT-OF-PLANE RENDEZVOUS ROUTINE
R1361   MOD NO.  0                       DATE      22 DECEMBER 67
R1362   MOD BY    N.M.NEVILLE            LOG SECTION  EXTENDED VERBS
R1363   FUNCTIONAL DESCRIPTION

R1364   TO DISPLAY AT ASTRONAUT REQUEST LGC CALCULATED RENDEZVOUS
R1365   OUT-OF-PLANE PARAMETERS (Y , YDOT , PSI). (REQUESTED BY DSKY).

R1366   CALLING SEQUENCE

R1367   ASTRONAUT REQUEST THROUGH DSKY  V 90 E

R1368   SUBROUTINES CALLED

R1369   EXDSPRET
R1370   GOMARKF
R1371   CSMPREC
R1372   LEMPREC
R1373   SGNAGREE
R1374   LOADTIME

R1375   NORMAL EXIT MODES

R1376   ASTRONAUT REQUEST THROUGH DSKY TO TERMINATE PROGRAM V 34 E

R1377   ALARM OR ABORT EXIT MODES

R1378   NONE

R1379   OUTPUT

R1380   DECIMAL DISPLAY OF TIME , Y , YDOT AND PSI

R1381   DISPLAYED VALUES Y , YDOT , AND PSI , ARE STORED IN ERASABLE
R1382   REGISTERS RANGE , RRATE AND RTHETA RESPECTIVELY.

R1383   ERASABLE INITIALIZATION REQUIRED

R1384   CSM AND LEM STATE VECTORS

R1385   DEBRIS

R1386   CENTRALS A,Q,L

R1387   OTHER THOSE USED BY THE ABOVE LISTED SUBROUTINES

 1388                          20,2115                 BANK    20
 1389   REF   1                04,2000                 SETLOC  R36LM
 1390                          04,2642                 BANK
 1391  REF  18  LAST  677   E7,1441                          EBANK= TIG
 1392  REF   1                                               COUNT* $$/R36

 1393                       04,2642  0 0006 1  R36           EXTEND
 1394  REF  19  LAST  703   04,2643  3 1442 1                DCA    TIG               SET TIME-OF-EVENT TO TIG FOR NOMINAL
 1395  REF   6  LAST  307   04,2644  53051 0                 DXCH   DSPTEMX           DISPLAY
 1396  REF   1              04,2645  3 2755 1                CAF    V06N16N
 1397  REF 177  LAST  685   04,2646  0 4616 1                TC     BANKCALL
 1398  REF   9  LAST  280   04,2647   20334 1                CADR   GOMARKF
 1399  REF  36  LAST  614   04,2650  1 5472 1                TCF    ENDEXT            TERMINATE
 1400                       04,2651  1 2653 1                TCF    +2                PROCEED
 1401                       04,2652  1 2645 0                TCF    -5                RECYCLE FOR ASTRONAUT INPUT TIME
 1402  REF  82  LAST  683   04,2653  0 6042 1                TC     INTPRET
 1403                       04,2654   53145 1                DLOAD  BZE
 1404  REF   7  LAST  703   04,2655   01051 1                       DSPTEMX
 1405  REF   1              04,2656   10752 0                       GETNOW            ASTRO-LOADED ZERO, GET PRES TIME
 1409  REF  30  LAST  699   04,2657   34041 0  R36INT        STCALL TOEC1
 1410  REF   1              04,2660   27042 1                       OTHPREC
 1411                       04,2661   63375 0                VLOAD  POVL
 1412  REF  13  LAST  699   04,2662   00007 0                       VATT
 1413  REF  17  LAST  699   04,2663   00001 0                       RATT               -
 1414  REF   2  LAST  118   04,2664   02207 0                STORE  RPASS36            R
 1415                       04,2665   63256 0                UNIT   PDVL                P
 1416                       04,2666   53435 0                VXV    UNIT               -
 1417                       04,2667   77626 0                STADR
 1418  REF   1              04,2670   61562 1                STODL  UNP36              U
 1419  REF   9  LAST  659   04,2671   00015 0                       TAT
 1420  REF  31  LAST  703   04,2672   34041 0                STCALL TOEC1
 1421  REF   1              04,2673   27056 1                       THISPREC
 1422                       04,2674   63375 0                VLOAD  POVL                                -
 1423  REF  14  LAST  703   04,2675   00007 0                       VATT               VELOCITY VECTOR  V               00D
 1424  REF  18  LAST  703   04,2676   00001 0                       RATT                                 A
 1428                       04,2677   41406 0                PUSH   PUSH               POSITION VECTOR  R   IN  060 AND 120
 1429                       04,2700   63245 1                BVSU   POVL                                 A  -   -
 1430  REF   3  LAST  703   04,2701   02207 0                       RPASS36            LINE OF SIGHT VECTOR R - R       120
 1431                       04,2702   72441 0                DOT    SL1                                   P   A
 1432  REF   2  LAST  703   04,2703   02215 0                       UNP36                  -  -
 1433  REF   9  LAST  319   04,2704   26201 0                STOVL  RANGE              Y = U .R
 1434                       04,2705   00001 0                       0D                        A
 1435                       04,2706   72441 0                DOT    SL1
 1436  REF   3  LAST  703   04,2707   02215 0                       UNP36              .   -  -
 1437  REF   5  LAST  319   04,2710   26203 1                STODL  RRATE              Y = U .V
 1438                       04,2711   00007 0                       06D                -       A   -
 1439                       04,2712   41456 0                UNIT   PUSH               U   = UNIT( R )                 180
 1440                       04,2713   47235 0                VXV    VXV                 RA          A
 1441                       04,2714   00001 0                       DOD                 -   -   -     -
 1442                       04,2715   00023 0                       18D                (U  XV )XU    =U
 1443                       04,2716   53552 0                VSL2   UNIT                 RA  A   RA     A
 144305                      04,2717   77656 1                UNIT
 1444                       04,2720   24001 0                STOVL  00D                UNIT HORIZONTAL IN FORWARD DIR.  000
 1445                           04,2721   00023 D                  18D
 1446                           04,2722   74241 D           DOT    VXSC            -
 1447                           04,2723   00015 D                  12D             U
 1448                           04,2724   77752 1           VSL2                    L
 1449                           04,2725   53445 1           BVSU   UNIT
 1449D5                         04,2726   77656 1           UNIT
 1450                           04,2727   50206 0           PUSH   DOT             LOS PROJECTED INTO HORIZONTAL     12D
 1451                           04,2730   00001 D                  00D             PLANE
 1452                           04,2731   65552 D           SL1    ARCCOS                      -   -
 1453    REF   5  LAST  319     04,2732   26205 1           STOVL  RTHETA          PSI= ARCCOS(U .U )
 1454                           04,2733   50235 0           VXV    DOT                         A  L
 1455                           04,2734   00001 0                  00D
 1456                           04,2735   71244 D           BPL    DLOAD
 1457    REF   1                04,2736   10743 D                  R36TAG2
 1458    REF   2  LAST   37     04,2737   24020 0                  LODPMAX
 1459                           04,2740   77625 D           DSU
 1460    REF   6  LAST  704     04,2741   02205 1                  RTHETA
 1461    REF   7  LAST  704     04,2742   02205 1           STORE  RTHETA
 1466                           04,2743   77776 1  R36TAG2  EXIT
 1467    REF   1                04,2744   3 2756 1          CAF    V06N90N         DISPLAY Y , YDOT , AND PSI
 1468    REF 178  LAST  703     04,2745   0 4616 1          TC     BANKCALL
 1469    REF  10  LAST  703     04,2746   20334 1           CADR   GOMARKF
 1470    REF  37  LAST  703     04,2747   1 5472 1          TCF    ENDEXT         TERMINATE
 1471    REF  38  LAST  704     04,2750   1 5472 1          TCF    ENDEXT         PROCEED , END OF PROGRAM
 1472    REF   2  LAST  286     04,2751   1 2642 1          TCF    R36            RECYCLE, TIG OR ASTRO-OPTION
 1473                           04,2752   52034 1  GETNOW   RTB    GOTO           ASTRO-SELECTED PRESENT TIME
 1474    REF  15  LAST  668     04,2753   21574 1                  LOADTIME
 1475    REF   1                04,2754   10657 1                  R36INT
 1482                           04,2755   01420 D  V06N16N  VN     00616
 1483                           04,2756   01532 1  V06N90N  VN     00690
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P0001
 0002                              40,3737                                BANK     40
 0003     REF   1                  40,2000                                SETLOC  R31LOC
 0004                              40,3737                                BANK

 0005     REF   1                                                         COUNT*  $$/R31

 0006     REF   9   LAST   261     40,3737  3 5015 0   R31CALL            CAF     PRIO3
 0007     REF  24   LAST   597     40,3740  0 5105 0                      TC      FINDVAC
 0008     REF  22   LAST   682     E7,1470                                EBANK=  SUBEXIT
 0009     REF   1                  40,3741   03121 0                      2CADR   V83CALL
 0009     REF   1                  40,3742   76067 1
 0010     REF  10   LAST   567     40,3743  0 5221 0   DSPDELAY           TC      FIXDELAY
 0011                              40,3744   00144 0                      DEC     100
 0012     REF  10   LAST   492     40,3745  3 1043 1                      CA      EXTVBACT
 0013     REF  24   LAST   602     40,3746  7 4740 1                      MASK    BIT12
 0014                              40,3747  0 0006 1                      EXTEND
 0015     REF   1                  40,3750  1 3743 0                      BZF     DSPDELAY

 0016     REF   5   LAST   492     40,3751  3 5017 1                      CAF     PRIO5
 0017     REF  14   LAST   610     40,3752  0 5072 1                      TC      NOVAC
 0018     REF   3   LAST   668     E7,1611                                EBANK=  TSTRT
 0019     REF   1                  40,3753   03113 1                      2CADR   DISPN5X
 0019     REF   1                  40,3754   76067 1
 0020     REF  30   LAST   610     40,3755  1 5261 0                      TCF     TASKOVER

 00202                             37,3113                                BANK    37
 00204    REF   1                  37,2000                                SETLOC  R31
 00206                             37,3113                                BANK
 00208    REF   1                                                         COUNT*  $$/R31

 0021     REF   1                  37,3113  3 3407 1   DISPN5X            CAF     V16N54
 0022     REF 179   LAST   704     37,3114  0 4616 1                      TC      BANKCALL
 0023     REF  11   LAST   704     37,3115   20334 1                      CADR    GOMARKF
 0024     REF   9   LAST   493     37,3116  0 5563 1                      TC      B5OFF
 0025     REF  10   LAST   705     37,3117  0 5563 1                      TC      B5OFF
 0026     REF   2   LAST   705     37,3120  1 3113 0                      TCF     DISPN5X

 0027     REF   4   LAST   282     37,3121  4 0103 1   V83CALL            CS      FLAGWRD7        TEST AVERAGE G FLAG
 0028     REF   2   LAST   188     37,3122  7 4747 0                      MASK    AVEGFBIT
 0029                              37,3123  0 0006 1                      EXTEND
 0030     REF   1                  37,3124  1 3377 0                      BZF     MUNG?           ON - TEST MUNFLAG

 0031     REF   8   LAST   543     37,3125  4 0104 0                      CS      FLAGWRD8
 0032     REF   7   LAST   543     37,3126  7 4744 0                      MASK    SURFFBIT
 0033                              37,3127  0 0006 1                      EXTEND
 0034     REF   1                  37,3130  1 3403 1                      BZF     ONEBASE         ON SURFACE - BYPASS LEMPREC

 0035     REF  83   LAST   703     37,3131  0 6042 1                      TC      INTPRET         EXTRAPOLATE BOTH STATE VECTORS
 0036                              37,3132   77634 0                      RTB
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L        R31                                                                       USER'S PAGE NO.   2      EO S3

 0037    REF  16  LAST  704    37,3133   21574 1                LOADTIME
 0038    REF  32  LAST  703    37,3134   34041 0          STCALL TDEC1
 0039    REF   5  LAST  699    37,3135   27056 1                LEMPREC          PRECISION BASE VECTOR FOR LM
 0040                          37,3136   77775 1          VLOAD
 0041    REF   6  LAST  691    37,3137   00017 1                RATT1
 0042    REF   1               37,3140   26170 0          STOVL  BASETHP
 0043    REF   9  LAST  691    37,3141   00025 0                VATT1
 0044    REF   1               37,3142   16105 1          STODL  BASETHV
 0045    REF  10  LAST  703    37,3143   00015 0                TAT
 0046    REF   1               37,3144   02114 1 DOCMBASE STORE  BASETIME         PRECISION BASE VECTOR FOR CM
 0047    REF  33  LAST  706    37,3145   34041 0          STCALL TDEC1
 0048    REF   4  LAST  699    37,3146   27042 1                CSMPREC
 0049                          37,3147   77775 1          VLOAD
 0050    REF   7  LAST  706    37,3150   00017 1                RATT1
 0051    REF   1               37,3151   26140 0          STOVL  BASEOTP
 0052    REF  10  LAST  706    37,3152   00025 0                VATT1
 0053    REF   1               37,3153   02120 0          STORE  BASEOTV
 0054                          37,3154   77776 1          EXIT

 0055    REF   5  LAST  705    37,3155 4 0103 1 REV83     CS     FLAGWRD7
 0056    REF   3  LAST  705    37,3156 7 4747 0           MASK   AVEGFBIT
 0057                          37,3157 0 0006 1           EXTEND
 0058    REF   1               37,3160 1 3326 1           BZF    GETRVN           IF AVEGFLAG SET, USE RN,VN

 0059    REF   9  LAST  705    37,3161 4 0104 0           CS     FLAGWRD8
 0060    REF   8  LAST  705    37,3162 7 4744 0           MASK   SURFFBIT
 0061                          37,3163 0 0006 1           EXTEND
 0062    REF   1               37,3164 1 3370 1           BZF    R31SURF          IF ON SURFACE,USE LEMPREC

 0063    REF  84  LAST  705    37,3165 0 6042 1           TC     INTPRET          DO CONIC EXTRAPOLATION FOR BOTH VEHICLES
 0064                          37,3166   77634 0          RTB
 0065    REF  17  LAST  706    37,3167   21574 1                LOADTIME
 0066    REF  34  LAST  706    37,3170   34041 0          STCALL TDEC1
 0067    REF  21  LAST  690    37,3171   27410 1                INTSTALL
 0068                          37,3172   43175 0          VLOAD  CLEAR
 0069    REF   2  LAST  706    37,3173   02170 0                BASETHP
 0070    REF   7  LAST  691    37,3174   00263 0                MOONFLAG
 0071    REF   8  LAST  691    37,3175   25535 0          STOVL  RCV
 0072    REF   2  LAST  706    37,3176   02105 1                BASETHV
 0073    REF   7  LAST  691    37,3177   15543 1          STODL  VCV
 0074    REF   2  LAST  706    37,3200   02114 1                BASETIME
 0075                          37,3201   43014 0          BOFF   SET              GET APPROPRIATE MOONFLAG SETTING
 0076    REF   2  LAST  299    37,3202   04344 0                MOONTHIS
 0077                          37,3203   77205 0                +2
 0078    REF   8  LAST  706    37,3204   00063 1                MOONFLAG
 0079                          37,3205   77614 1          SET
 0080    REF  10  LAST  691    37,3206   01473 0                INTYPFLG         CONIC EXTRAP.
 0081    REF   8  LAST  691    37,3207   35517 1          STCALL TET
 0082    REF   4  LAST  691    37,3210   27106 0                INTEGRVS         INTEGRATION --- AT LAST---
 0083                          37,3211   77775 1 OTHCONIC VLOAD
```

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0084   REF 19  LAST 703   37,3212   00001 0                     RATT
0085   REF  7  LAST 341   37,3213   26207 0            STOVL    RONE
0086   REF 15  LAST 703   37,3214   00007 0                     VATT
0087   REF  1             37,3215   36215 1            STCALL   VONE         GET SET FOR CONIC EXTRAP.,OTHER.
0088   REF 22  LAST 706   37,3216   27410 1                     INTSTALL
0089                      37,3217   71214 0            SET      OLCAO
0090   REF 11  LAST 706   37,3220   01473 0                     INTYPFLG
0091   REF 11  LAST 706   37,3221   00015 0                     TAT
0092   REF 35  LAST 706   37,3222   00041 1  OTHINT    STORE    TOEC1
0093                      37,3223   43175 0            VLOAO    CLEAR
0094   REF  2  LAST 706   37,3224   02140 0                     BASECTP
0095   REF  9  LAST 706   37,3225   00263 0                     MOONFLAG
0096   REF  9  LAST 706   37,3226   25535 0            STOVL    RCV
0097   REF  2  LAST 706   37,3227   02120 0                     BASECTV
0098   REF  8  LAST 706   37,3230   15543 1            STOOL    VCV
0099   REF  3  LAST 706   37,3231   02114 1                     BASETIME
0100                      37,3232   43014 0            BOF      SET
0101   REF  3  LAST 706   37,3233   04344 0                     MOONTHIS
0102                      37,3234   77236 0                     +2
0103   REF 10  LAST 707   37,3235   00063 1                     MOONFLAG
0104   REF  9  LAST 706   37,3236   35517 1            STCALL   TET
0105   REF  5  LAST 706   37,3237   27106 0                     INTEGRVS
0106                      37,3240   52375 1  COMPOISP  VLOAO    VSU
0107   REF 20  LAST 707   37,3241   00001 0                     RATT
0108   REF  8  LAST 707   37,3242   02207 0                     RONE
0109                      37,3243   65234 1            RTB      POOL
0110   REF  2  LAST 591   37,3244   21725 1                     NORMUNX1     UNIT(RANGE) TO PD 0-5
0111                      37,3245   00045 0                     36D
0112                      37,3246   77657 0            SL*                   RESCALE AFTER NORMUNIT
0113                      37,3247   20201 0                     0,1
0114   REF 10  LAST 703   37,3250   26201 0            STOVL    RANGE        SCALEO 2(29)M
0115   REF 16  LAST 707   37,3251   00007 0                     VATT
0116                      37,3252   50251 1            VSU      OOT          (VCM- VLM).UNIT(LCS), PD=0
0117   REF  2  LAST 707   37,3253   02215 0                     VONE
0118                      37,3254   77752 1            SL1                   SCALEO 2(7)M/CS
0119   REF  6  LAST 703   37,3255   26203 1            STOVL    RRATE
0120   REF  9  LAST 707   37,3256   02207 0                     RONE
0121                      37,3257   63256 0            UNIT     POVL         UNIT(R) TO PO 0-5
0122   REF  6  LAST 586   37,3260   06516 0                     UNITZ
0123                      37,3261   77624 1            CALL
0124   REF  1             37,3262   47663 1                     COL*N8SM
0125                      37,3263   41505 1            VXM      PUSH         UNIT (Z)/4 TO PO 6-11
0126   REF 17  LAST 694   37,3264   01734 0                     REFSMMAT
0127                      37,3265   72431 1            VPROJ    VSL2         UNIT(P)=UNIT(UZ -(UZ)PROJ(UR))
0128                      37,3266   00001 0                     00
0129                      37,3267   53445 1            BVSU     UNIT
0130                      37,3270   00007 0                     60
0131                      37,3271   47315 0            POVL     VXV          UNIT(P) TO PO 12-17
0132                      37,3272   00001 0                     00           UNIT(RL)
0133   REF  3  LAST 707   37,3273   02215 0                     VONE
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L        R31                                                                          USER'S PAGE NO.   4       EO S3

 0134                            37,3274   50235 0          VXV     DOT              (UR * VL)*UR . U(P)
 0135                            37,3275   00001 0                  00
 0136                            37,3276   00015 0                  12D
 0137                            37,3277   77715 1          PDVL                     SIGN TO 12-13 , LOAD U(P)
 0138                            37,3300   75241 1          DOT     SIGN
 0139                            37,3301   00007 0                  6D
 0140                            37,3302   00015 0                  12D
 0141                            37,3303   65512 1          SL2     ACOS             ARCCOS(UP.UZ(SIGN))
 0142    REF   8  LAST  704      37,3304   26205 1          STOVL   RTHETA
 0143                            37,3305   00001 0                  00
 0144                            37,3306   51041 0          DOT     BPL              IF UR.UZ NEG,
 0145                            37,3307   00007 0                  6D                 RTHETA = 1 - RTHETA
 0146                            37,3310   77315 0                  +5
 0147                            37,3311   45345 1          DLOAD   DSU
 0148    REF   9  LAST  677      37,3312   06532 0                  DPPOSMAX
 0149    REF   9  LAST  708      37,3313   02205 1                  RTHETA
 0150    REF  10  LAST  708      37,3314   02205 1          STORE   RTHETA
 0151                            37,3315   77776 1          EXIT

 0152    REF  30  LAST  618      37,3316   3 4747 1         CA      BIT5
 0153    REF  11  LAST  705      37,3317   7 1043 0         MASK    EXTVBACT
 0154                            37,3320   0 0006 1         EXTEND                   IF ANSWERED,
 0155    REF  39  LAST  704      37,3321   1 5472 1         BZF     ENDEXT                  TERMINATE

 0156    REF  12  LAST  708      37,3322   4 1043 0         CS      EXTVBACT
 0157    REF  25  LAST  705      37,3323   7 4740 1         MASK    BIT12
 0158    REF  13  LAST  708      37,3324   2 7043 0         ADS     EXTVBACT         SET BIT 12
 0159    REF   1                 37,3325   1 3155 1         TCF     REV83            AND START AGAIN.


 0160    REF   3  LAST  538      37,3326   3 7713 0  GETRVN  CA      PRIO22           INHIBIT SERVICER
 0161    REF  10  LAST  500      37,3327   0 5146 1         TC      PRIOCHNG
 0162    REF  85  LAST  706      37,3330   0 6042 1         TC      INTPRET
 0163                            37,3331   40375 1          VLOAD   SETPD
 0164    REF   5  LAST  322      37,3332   01220 0                  RN               LM STATE VECTOR IN RN,VN
 0165                            37,3333   00001 0                  0
 0166    REF  10  LAST  707      37,3334   26207 0          STOVL   RONE
 0167    REF   5  LAST  322      37,3335   01226 0                  VN
 0168    REF   4  LAST  707      37,3336   26215 0          STOVL   VONE             LOAD R(CSM),V(CSM) IN CASE MUNFLAG SET
 0169    REF   2  LAST  603      37,3337   01726 0                  V(CSM)           (TO INSURE TIME COMPATABILITY)
 0170                            37,3340   65315 0          PDVL    PDDL
 0171    REF   2  LAST  603      37,3341   01720 0                  R(CSM)
 0172    REF   5  LAST  602      37,3342   01234 0                  PIPTIME
 0173                            37,3343   77776 1          EXIT
 0174    REF  10  LAST  705      37,3344   3 5015 0         CA      PRIO3
 0175    REF  11  LAST  708      37,3345   0 5146 1         TC      PRIOCHNG
 0176    REF  86  LAST  708      37,3346   0 6042 1         TC      INTPRET
 0177                            37,3347   77214 0          BOFF    VLOAD
 0178    REF   2  LAST  231      37,3350   03347 1                  MUNFLAG
 0179    REF   1                 37,3351   77363 1                  GETRVN2          IF MUNFLAG RESET, DO CM DELTA PRECISION
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L        R31                                                                                    USER'S PAGE NO.  5      EO S3

 0180                             37,3352   60505 1            VXM     VSR4         CHANGE TO REFERENCE SYSTEM AND RESCALE
 0181    REF  18  LAST  707       37,3353   01734 0                    REFSMMAT
 0182                             37,3354   77715 1            PDVL                 R TO PD 0-5
 0183                             37,3355   76505 0            VXM     VSL1
 0184    REF  19  LAST  709       37,3356   01734 0                    REFSMMAT
 0185                             37,3357   40206 1            PUSH    SETPD        V TO PD 5-11
 0186                             37,3360   00001 0                    0
 0187                             37,3361   77650 1            GOTO
 0188    REF   1                  37,3362   77240 1                    COMPDISP


 0189                             37,3363   77624 1  GETRVN2   CALL
 0190    REF  23  LAST  707       37,3364   27410 1                    INTSTALL
 0191                             37,3365   52014 0            CLEAR   GDTC
 0192    REF  12  LAST  707       37,3366   01673 1                    INTYPFLG     PREC EXTRAP FOR OTHER
 0193    REF   1                  37,3367   77222 0                    OTHINT
 0194    REF  87  LAST  708       37,3370   0 6042 1  R31SURF  TC      INTPRET
 0195                             37,3371   77634 0            RTB                  LM IS ON SURFACE, SO PRECISION
 0196    REF  18  LAST  706       37,3372   21574 1                    LOADTIME     INTEGRATION USES PLANETARY INERTIAL
 0197    REF  36  LAST  707       37,3373   34041 0            STCALL  TDEC1        ORIENTATION SUBROUTINE
 0198    REF   6  LAST  706       37,3374   27056 1                    LEMPREC
 0199                             37,3375   77650 1            GOTO                 DO CSM CONIC
 0200    REF   1                  37,3376   77211 0                    OTHCONIC
 0201    REF   2  LAST  188       37,3377   4 0102 0  MUNG?    CS      FLAGWRD6
 0202    REF   2  LAST  188       37,3400   7 4744 0           MASK    MUNFLBIT
 0203                             37,3401   0 0006 1           EXTEND
 0204    REF   2  LAST  706       37,3402   1 3326 1           BZF     GETPVN       IF MUNFLAG SET, CSM BASE NOT NEEDED

 0205    REF  88  LAST  709       37,3403   0 6042 1  ONEBASE  TC      INTPRET      GET CSM BASE VECTOR
 0206                             37,3404   52034 1            RTB     GOTO
 0207    REF  19  LAST  709       37,3405   21574 1                    LOADTIME
 0208    REF   1                  37,3406   77144 0                    DOCMBASE

 0209                             37,3407   04066 0  V16N54    VN      1654
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L         P76                                                                                    USER'S PAGE NO.   1       EO S3

P5000    1) PROGRAM NAME - TARGET DELTA V PROGRAM (P76).
R5001    2) FUNCTIONAL DESCRIPTION - UPON ENTRY BY ASTRONAUT ACTION, P76 FLASHES DSKY REQUESTS TO THE ASTRONAUT
R5003             TO PROVIDE VIA DSKY (1) THE DELTA V TO BE APPLIED TO THE OTHER VEHICLE STATE VECTOR AND (2) THE
R5005             TIME (TIG) AT WHICH THE OTHER VEHICLE VELOCITY WAS CHANGED BY  EXECUTION OF A THRUSTING MANEUVER. THE
R5007             OTHER VEHICLE STATE VECTOR IS INTEGRATED TO TIG AND UPDATED BY THE ADDITION OF DELTA V (DELTA V HAVING
R5009             BEEN TRANSFORMED FROM LV TO REF COSYS). USING INTEGRVS, THE    PROGRAM THEN INTEGRATES THE OTHER
R5011    VEHICLE STATE VECTOR TO THE STATE VECTOR OF THIS VEHICLE, THUS INSURING THAT THE W-MATRIX AND BOTH VEHICLE
R5013    STATES CORRESPOND TO THE SAME TIME.
R5014    3) ERASABLE INITIALIZATION REQUIRED - NONE.
R5015    4) CALLING SEQUENCES AND EXIT MODES - CALLED BY ASTRONAUT REQUEST THRU DSKY V 37 F 76 E.
R5017             EXITS BY TCF ENDOFJOB.
R5018    5) OUTPUT - OTHER VEHICLE STATE VECTOR INTEGRATED TO TIG AND INCREMENTED BY DELTA V IN REF COSYS.
R5020             THE PUSHLIST CONTAINS THE MATRIX BY WHICH THE INPUT DELTA V MUST BE POST-MULTIPLIED TO CONVERT FROM LV
R5022             TO REF COSYS.
R5023    6) DEBRIS - OTHER VEHICLE STATE VECTOR.
R5024    7) SUBROUTINES CALLED - BANKCALL,GOXDSPF,CSMPREC (OR LEMPREC),ATOPCSM (OR ATOPLEM),INTSTALL,INTWAKE, PHASCHNG
R5026             INTPRET, INTEGRVS, AND MINIRECT.

R5027    8) FLAG USE - MOONFLAG,CMOONFLAG,INTYPFLG,RASFLAG, AND MARKCTR.

 5028                          30,2061                        BANK    30
 5029    REF   1               13,2000                        SETLOC  P76LOC
 5030                          13,2207                        BANK

 5031    REF   1                                              COUNT*  $$/P76

 5032    REF  20  LAST  703    E7,1441                        EBANK=  TIG

 5033    REF  43  LAST  683    13,2207  0 5504 0  P76         TC      UPFLAG
 5034    REF   6  LAST  634    13,2210   00031 0              ADRES   TRACKFLG

 50341   REF  89  LAST  709    13,2211  0 6042 1              TC      INTPRET
 50342                         13,2212   77775 1              VLOAD
 50343   REF  20  LAST  694    13,2213   03434 1                      DELVLVC
 50344   REF   4  LAST  318    13,2214   02223 0              STORE   DELVOV
 50345                         13,2215   77776 1              EXIT

 5035    REF   1               13,2216  3 2335 0              CAF     V06N84 +1        FLASH VERB 06 NOUN 33, DISPLAY LAST TIG,
 5040    REF 180  LAST  705    13,2217  0 4616 1              TC      BANKCALL         AND WAIT  FOR KEYBOARD ACTION.
 5041    REF  18  LAST  685    13,2220   20477 1              CADR    GOFLASH
 5042    REF   1               13,2221  1 2331 0              TCF     ENDP76
 5043                          13,2222  0 2224 1              TC      +2               PROCEED
 5044                          13,2223  0 2216 0              TC      -5               STORE DATA AND REPEAT FLASHING
 5045    REF   2  LAST  711    13,2224  3 2334 1              CAF     V06N84           FLASH LAST DELTA V,
 5046    REF 181  LAST  711    13,2225  0 4616 1              TC      BANKCALL         AND WAIT FOR KEYBOARD ACTION.
 5047    REF  19  LAST  711    13,2226   20477 1              CADR    GOFLASH
 5048    REF   2  LAST  711    13,2227  1 2331 0              TCF     ENDP76
 5049                          13,2230  0 2232 0              TC      +2
 5050                          13,2231  0 2224 1              TC      -5
 5051    REF  90  LAST  711    13,2232  0 6042 1              TC      INTPRET          RETURN TO INTERPRETIVE CODE
 5052                                13,2233    43145 0           DLOAD  SET
 5053    REF  21   LAST  711         13,2234    03442 0                  TIG
 50535   REF   4   LAST  238         13,2235    01076 1                  NODOFLAG
 5054    REF  37   LAST  709         13,2236    34041 0           STCALL TDEC1              SET TDEC1=TIG FOR ORBITAL INTEGRATION
 5055    REF   2   LAST  703         13,2237    27042 1                  OTHPREC
 5056                                13,2240    53575 0  COMPMAT  VLOAD  UNIT
 5057    REF  21   LAST  707         13,2241    00001 0                  RATT
 5058                                13,2242    77676 0           VCOMP                     U(-R)
 5059                                13,2243    00031 0           STORE  24D                U(-R) TO 24D
 5060                                13,2244    53435 0           VXV    UNIT               U(-R)XV = U(VXR)
 5061    REF  17   LAST  707         13,2245    00007 0                  VATT
 5062                                13,2246    00023 0           STORE  18D
 5063                                13,2247    53435 0           VXV    UNIT               U(VXR)XU(-R) = U((RXV)XR)
 5064                                13,2250    00031 0                  24D
 5065                                13,2251    24015 0           STOVL  12D
 5066    REF   5   LAST  711         13,2252    02223 0                  DELVOV
 5067                                13,2253    76505 0           VXM    VSL1               V(MPAC)=DELTA V IN REFCOSYS
 5068                                13,2254    00015 0                  12D
 5069                                13,2255    77655 1           VAD
 5070    REF  18   LAST  712         13,2256    00007 0                  VATT
 5071                                13,2257    00007 0           STORE  6                  V(PD6)=VATT + DELTA V
 5072                                13,2260    77624 1           CALL                      PREVENT WOULD-BE USER OF ORBITAL
 5073    REF  24   LAST  709         13,2261    27410 1                  INTSTALL           INTEG FROM INTERFERING WITH UPDATING
 5074                                13,2262    77624 1           CALL
 5075    REF   1                     13,2263    26336 0                  P76SUB1
 5076                                13,2264    53775 1           VLOAD  VSR*
 5077                                13,2265    00007 0                  6
 5078                                13,2266    57176 0                  0,2
 5079    REF   9   LAST  707         13,2267    25543 1           STOVL  VCV
 5080    REF  22   LAST  712         13,2270    00001 0                  RATT
 5081                                13,2271    77657 0           VSR*
 5082                                13,2272    57176 0                  0,2
 5083    REF  10   LAST  707         13,2273    15535 0           STODL  RCV
 5084    REF  22   LAST  712         13,2274    03442 0                  TIG
 5085    REF  10   LAST  707         13,2275    01517 0           STORE  TET
 5086                                13,2276    71214 0           CLEAR  DLOAD
 5087    REF  13   LAST  709         13,2277    01673 1                  INTYPFLG
 5088    REF   1                     13,2300    01643 1                  TETTHIS
 5089    REF  38   LAST  712         13,2301    34041 0  INTCTHIS STCALL TDEC1
 5090    REF   6   LAST  707         13,2302    27106 0                  INTEGRVS
 5091                                13,2303    77624 1           CALL
 5093    REF  25   LAST  712         13,2304    27410 1                  INTSTALL
 5094                                13,2305    77775 1           VLOAD
 5095    REF   8   LAST  706         13,2306    00017 1                  RATT1
 5096    REF   3   LAST  499         13,2307    01503 0           STORE  RRECT
 5097    REF  11   LAST  712         13,2310    15535 0           STODL  RCV
 5098    REF  12   LAST  707         13,2311    00015 0                  TAT
 5099    REF  11   LAST  712         13,2312    25517 0           STOVL  TET
 5100    REF  11   LAST  706         13,2313    00025 0                  VATT1
 5101                                13,2314    77624 1           CALL
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L         P76                                                                                     USER'S PAGE NO.   3      E7 S3

 5102    REF    2   LAST  499   13,2315    27705 0                    MINIRECT
 5103                           13,2316    77776 1            EXIT
 5104    REF   27   LAST  683   13,2317  0 5353 1            TC       PHASCHNG
 5105                           13,2320    04024 0            CCT      04024

 5106   *REF   91   LAST  711   13,2321  0 6042 1            TC       INTPRET
 5107   *                       13,2322    45014 0            SET      CALL
 5109   *REF    1               13,2323    05070 0                     REINTFLG
 5110   *REF    1               13,2324    26660 0                     ATOPOTH
 5111   *                       13,2325    77624 1            CALL
 5116   *REF    2   LAST  499   13,2326    27417 0                     INTWAKE0
 5119   *                       13,2327    77414 0  OUT       CLEAR    EXIT                ALLOW V37.  NO NEED TO CLEAR NODOFLAG AT
 5120   *REF    5   LAST  712   13,2330    01276 0                     NODOFLAG             ENDP76 SINCE FLAG NOT SET WHEN DISPLAY
A5121   *                                                                                    RESPONSES TRANSFER THERE FROM P76+.
 5125    REF  127   LAST  657   13,2331  3 4755 1  ENDP76    CAF      ZERO
 5126    REF    5   LAST  591   13,2332    55462 1            TS       MARKCTR             CLEAR RR TRACKING MARK COUNTER
 5129    REF   18   LAST  685   13,2333  1 6001 1            TCF      GOTOPOOH

 5130                           13,2334    01524 0  V06N84    NV       0684
 5131                           13,2335    01441 1            NV       0633
 5132                           13,2336    43174 1  P76SUB1   AXT,2    SET
 5133                           13,2337    00002 0                     2
 5134    REF   11   LAST  707   13,2340    00063 1                     MOONFLAG            SET MEANS MOON IS SPHERE OF INFLUENCE.
 5135                           13,2341    77014 1            BON      AXT,2
 5136    REF    6   LAST  695   13,2342    04303 0                     CMOONFLG            SET MEANS PERM CM STATE IN LUNAR SPHERE.
 5137    REF    3   LAST  615   13,2343    00052 0                     QPRET
 5138                           13,2344    00000 1                     0
 5139                           13,2345    43414 1            CLEAR    RVQ
 5140    REF   12   LAST  713   13,2346    00263 0                     MOONFLAG
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L         R30                                                                                      USER'S PAGE NO.   1       EG S3

R0001    SUBROUTINE NAME:     V82CALL
R0002    MOD NO:  0                                                                         DATE:              16 FEB 67
R0004    MOD BY:  RR BAIRNSFATHER                                                           LOG SECTION:       R30
R0006    MOD NO: 1               MOD BY: RR BAIRNSFATHER         DATE: 11 APR 67      SR30.1 CHANGED TO ALLOW MONITOR OPERN
R0008    MOD  NO: 2              MOD  BY ALONSO                  DATE : 11 DEC 67     VB82 PROGRAM REWRITTEN
R0010    MOD NO: 3               MOD  BY ALONSO                  DATE: 26 MAR 68      PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R0012     NEW FUNCTIONAL DESCRIPTION:     CALLED BY VERB 82 ENTER.  PRIORITY 10
R0013      USED THROUGHOUT.               CALCULATE AND DISPLAY ORBITAL PARAMETERS

R0014    1. IF AVERAGE G IS OFF:
R0015             FLASH DISPLAY V04N06. R2 INDICATES WHICH SHIP'S STATE VECTOR IS
R0016              TO BE UPDATED. INITIAL CHOICE IS THIS SHIP (R2=1). ASTRONAUT
R0017              CAN CHANGE TO OTHER SHIP BY V22EXE, WHERE X NOT EQ 1.
R0018             SELECTED STATE VECTOR UPDATED BY THISPREC (OTHPREC).
R0019             CALLS SR30.1 (WHICH CALLS TFFCONMU + TFFRP/RA) TO CALCULATE
R0020              RPER (PERIGEE RADIUS), RAPO (APOGEE RADIUS), HPER (PERIGEE
R0021              HEIGHT ABOVE LAUNCH PAD OR LUNAR LANDING SITE), HAPO (APOGEE
R0022              HEIGHT AS ABOVE), TPER (TIME TO PERIGEE), TFF (TIME TO
R0023              INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R0024             FLASH MONITOR V16N44 (HAPO, HPER, TFF).TFF IS -59M59S IF IT WAS
R0025              NOT COMPUTABLE, OTHERWISE IT INCREMENTS ONCE PER SECOND.
R0026              ASTRONAUT HAS OPTION TO MONITOR TPER BY KEYING IN N 32 E.
R0027              DISPLAY IS IN HMS, IS NEGATIVE (AS WAS TFF), AND INCREMENTS
R0028              ONCE PER SECOND ONLY IF TFF DISPLAY WAS -59M59S.

R0029    2. IF AVERAGE G IS ON:
R0030             CALLS SR30.1 APPROX EVERY TWO SECS.  STATE VECTOR IS ALWAYS
R0031              FOR THIS VEHICLE. V82 DOES NOT DISTURB STATE VECTOR.  RESULTS
R0032              OF SR30.1 ARE RAPO, RPER, HAPO, HPER, TPER, TFF.
R0033             FLASH MONITOR V16N44 (HAPO, HPER, TFF).
R0036    ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R0037              ABOVE REMARKS.

R0038    CALLING SEQUENCE:  VERB 82 ENTER.


R0039    SUBROUTINES CALLED:  SR30.1, GOXDSPF
R0040                         MAYBE - THISPREC , OTHPREC, LOADTIME, DELRSPL
R0041    NORMAL EXIT MODES:  TC ENDEXT

R0042    ALARMS:  NONE

R0043    OUTPUT:  HAPOX     (-29) M
R0044             HPERX     (-29) M
R0045             RAPO      (-29) M EARTH
R0046                       (-27) M MOON
R0047             RPER      (-29) M EARTH
R0048                       (-27) M MOON
R0049             TFF       (-28) CS      CONTAINS NEGATIVE QUANTITY
R0050             -TPER     (-28) CS      CONTAINS NEGATIVE QUANTITY
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L        R30                                                                               USER'S PAGE NO.  2        EO S3

R0051
R0052    ERASABLE INITIALIZATION REQUIRED: STATE VECTOR.

R0053    DEBRIS:  QPRET, RONE, VONE,TFF/RTMU, HPERMIN, RPADTEM, V82EMFLG.
R0054             MAYBE: TSTART32, V82FLAGS, TDEC1.


 0055    REF   3  LAST  316    E4,1517                        FBANK= HAPOX
 0056                          31,2144                        BANK   31
 0057    REF   2  LAST   44    22,2000                        SETLOC R30LOC
 0058                          22,3242                        BANK
 0059    REF   2 LAST    44 TU   44:      4      4*           COUNT* $$/R30

 0060    REF  92  LAST  713    22,3242  0 6042 1  V82CALL     TC     INTPRET
 0061                          22,3243   52014 0              BON    GOTO
 0062    REF   3  LAST  266    22,3244   03712 0                     AVEGFLAG
 0063    REF   1               22,3245   45465 1                     V82GON           IF AVERAGE G ON
 0064    REF   1               22,3246   45247 1                     V82GOFF          IF AVERAGE G OFF


 0065                          22,3247   77776 1  V82GOFF     EXIT                    ALLOW ASTRONAUT TO SELECT VEHICLE
 0066    REF  39  LAST  569    22,3250  3 4752 0              CAF    TWO              DESIRED FOR ORBITAL PARAMETERS
 0067    REF  11  LAST  341    22,3251  55'050 1              TS     OPTIONX          CALCULATION AND DISPLAY.
 0068    REF  81  LAST  657    22,3252  3 4753 1              CAF    ONE
 0069    REF  12  LAST  715    22,3253  55'051 0              TS     OPTIONX +1
 0070    REF   1               22,3254  3 3316 0              CAF    OPTIONVN         V 04 N 06
 0071    REF 182  LAST  711    22,3255  0 4616 1              TC     BANKCALL
 0072    REF   8  LAST  613    22,3256   20334 1              CADR   GOXDSPF
 0073    REF  40  LAST  708    22,3257  0 5472 0              TC     ENDEXT           TERMINATE
 0074                          22,3260  0 3262 1              TC     +2               PROCEED
 0075                          22,3261  0 3254 1              TC     -5               DATA IN. OPTION1+1 = 1 FOR THIS VEHICLE,
A0076                                                                                                       UNEQ 1 FOR OTHER VEHICLE.
 0077    REF  29  LAST  609    22,3262  3 4750 1              CAF    BIT4             80 MS
 0078    REF  30  LAST  655    22,3263  0 5203 0              TC     WAITLIST
 0079    REF   3  LAST  316    E4,1540                        EBANK= TFF
 0080    REF   1               22,3264   03430 0              2CADR  TICKTEST
 0080    REF   1               22,3265   44064 0
 0081                          22,3266  0 0003 1              RELINT
 0082    REF   1               22,3267  3 3320 0  V82GOFLP    CAF    TFFBANK          MAJOR RECYCLE LOOP ENTRY
 0083    REF  21  LAST  660    22,3270  54 003 0              TS     EBANK
 0084    REF 128  LAST  713    22,3271  3 4755 1              CAF    ZERO
 0085    REF   2  LAST  116    22,3272  55'537 0              TS     V82FLAGS         ZERO FLAGS FOR TICKTEST, INHIBITS
A0086                                                                                 DECREMENTING OF TFF AND -TPER.
 0087    REF   6  LAST  294    22,3273  3 5021 1              CAF    PRIO7
 0088    REF  25  LAST  705    22,3274  0 5105 0              TC     FINDVAC          V82GOFF1 WILL EXECUTE STATE VECTOR
 0089    REF   4  LAST  715    E4,1540                        EBANK= TFF              UPDATE AND ORBIT CALCULATIONS FOR
 0090    REF   1               22,3275   03321 1              2CADR  V82GOFF1         SELECTED VEHICLE ABOUT PROPER BODY.
 0090    REF   1               22,3276   44064 0
 0091                          22,3277  0 0003 1              RELINT
 0092    REF  20  LAST  606    22,3300  3 6250 0  V82STALL    CAF    THREE            STALL IN THIS LOOP AND WITHOLD V 16 N 44
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L        R30                                                                                         USER'S PAGE NO.   3        E4 S3

 0093    REF   3  LAST  715     22,3301  7 1537 0             MASK     V82FLAGS            UNTIL STATE VECTOR UPDATE SETS ONE OF
 0094    REF 218  LAST  680     22,3302  10 000 0             CCS      A                   OUR FLAG BITS.
 0095    REF   1                22,3303  0 3310 0             TC       FLAGGON             EXIT FROM STALL LOOP.
 0096    REF   7  LAST  682     22,3304  3 4777 1             CAF      1SEC
 0097    REF 183  LAST  715     22,3305  0 4616 1             TC       BANKCALL
 0098    REF  10  LAST  682     22,3306   01736 1             CADR     DELAYJOB
 0099    REF   1                22,3307  0 3300 1             TC       V82STALL

 0100    REF   1                22,3310  3 3317 1  FLAGGON    CAF      V16N44              MONITOR HAPO,HPER,TFF.
 0101    REF 184  LAST  716     22,3311  0 4616 1             TC       BANKCALL
 0102    REF   9  LAST  715     22,3312   20334 1             CADR     GOXDSPF
 0103    REF  11  LAST  705     22,3313  0 5563 1             TC       B5OFF               TERM  THIS TELLS TICKTEST TO KILL ITSELF
 0104    REF  12  LAST  716     22,3314  0 5563 1             TC       B5OFF               PROCEED  DITTO
 0105    REF   1                22,3315  0 3267 1             TC       V82GOFLP            RECYCLE  RECOMPUTE STATE VECT + DISPLAY

 0106                           22,3316   01014 0  OPTIONVN   VN       412
 0107                           22,3317   04054 1  V16N44     VN       1644
 0108    REF   5  LAST  715     22,3320   02140 0  TFFBANK    ECADR    TFF


 0109    REF  93  LAST  715     22,3321  0 6042 1  V82GOFF1   TC       INTPRET
 0110                           22,3322   77634 0             RTB
 0111    REF  20  LAST  709     22,3323   21574 1                      LOADTIME
 0112    REF  39  LAST  712     22,3324   00041 1             STORE    TDEC1               TIME FOR STATE VECTOR UPDATE
 0113    REF   3  LAST  341     22,3325   02205 1             STORE    TSTART82            TIME FOR INTERNAL USE.
 0114                           22,3326   77776 1             EXIT
 0115    REF  13  LAST  715     22,3327  4 1051 0             CS       OPTIONX +1          1 FOR THIS VEHICLE, NOT 1 FOR OTHER.
 0116    REF  82  LAST  715     22,3330  6 4753 1             AD       ONE
 0117                           22,3331  0 0006 1             EXTEND
 0118    REF   1                22,3332  1 3356 0             BZF      THISSHIP
 0119    REF  94  LAST  716     22,3333  0 6042 1  OTHSHIP    TC       INTPRET
 0120                           22,3334   77624 1             CALL                         CALL STATE VECTOR UPDATE FOR OTHER SHIP.
 0121    REF   3  LAST  712     22,3335   27042 1                      OTHPREC
 0122                           22,3336   77775 1  BOTHSHIP   VLOAD                        MOVE RESULTS INTO TFFCONIC STORAGE AREAS
 0123    REF  23  LAST  712     22,3337   00001 0                      RATT                 TO BE CALLED BY SR30.1.
 0124    REF  11  LAST  708     22,3340   26207 0             STOVL    RONE                RATT AT (-29)M FOR EARTH OR MOON
 0125    REF  19  LAST  712     22,3341   00007 0                      VATT
 0126    REF   5  LAST  708     22,3342   02215 0             STORE    VONE                 VATT AT (-7)M/CS FOR EARTH OR MOON
 0127                           22,3343   77743 1             DLOAD*
 0128    REF   1                22,3344   73774 1                      1/RTMUE,2            X2 IS 0 FOR EARTH CENTERED STATE VEC
 0129    REF   1                22,3345   00037 0             STORE    TFF/RTMU             X2 IS 2 FOR MOON
 0130                           22,3346   77743 1             DLOAD*                       AS LEFT BY THISPREC OR OTHPREC.
 0131    REF   1                22,3347   72411 0                      MINPERE,2
 0132    REF   2  LAST  116     22,3350   02201 0             STORE    HPERMIN                TFFRTMU, HPERMIN AND RPADTEM ARE ALL
 0133                           22,3351   46135 1             SLOAD    BHIZ                EARTH/MOON PARAMETERS AS SET HERE.
 0134    REF  12  LAST  698     22,3352   00050 1                      X2
 0135    REF   1                22,3353   45367 1                      EARTHPAD
 0136                           22,3354   77650 1             GOTO
 0137    REF   1                22,3355   45373 1                      MOONPAD
 0138   REF  55  LAST  716   22,3356  C 6042 1  THISSHIP TC      INTPRET
 0139                        22,3357   77624 1           CALL                     CALL STATE VECTOR UPDATE FOR THIS SHIP.
 0140   REF   2  LAST  703   22,3360   27056 1                   THISPREC
 0141                        22,3361   7765C 1           GCTO
 0142   REF   1              22,3362   45336 0                   ROTHSHIP

R0143   THE FCLLOWING CCNSTANTS ARE FAIRWISE INCEXEC. CO NOT SEPARATE PAIRS.

 0146                        22,3363   CC001 0  MINPERM  2DEC    10668 8-27       35 KFT MIN RERIGEE HEIGHT FOR MOON(-27)M
 0146                        22,3364   11530 1
 0147                        22,3365   00002 0  MINRERE  2DEC    91440 B-29       300 KFT (-29)M FOR EARTH
 0147                        22,3366   31230 1

 0148                        22,3367   43145 0  EARTHPAD CLOAD   CLRGO             PAD 37-8 RADIUS.  SCALFD AT (-29)M.
 0149   REF   2  LAST  698   22,3370   C6340 0                   RPAD
 0150   REF   1              22,3371   03635 1                   V82EMFLG          INDICATE EARTH SCALING FOR SR30.1
 0151   REF   1              22,3372   45377 0                   BOTHPAC

 0152                        22,3373   51575 1  MOONPAD  VLOAD   ABVAL            COMPUTE MOON PAD RADIUS FROM RLS VECTOR-
 0153   PEF   4  LAST  698   22,3374   02023 1                   RLS               SCALED AT (-27)M.
 0154                        22,3375   77614 1           SET
 0155   REF   2  LAST  717   22,3376   03475 1                   VB2FMFLG          INDICATE MCON  SCALING FCR SR30.1
 0156   REF   2  LAST  116   22,3377   36203 0  BOTHPAC  STCALL  FPADTFM
 0157   PFF   1              22,3400   45551 1                   SR30.1           CALCULATE ORBITAL PARAMETERS
 0158                        22,3401   45234 0           RTB     DSU
 0159   REF  21  LAST  716   22,3402   21574 1                   LOADTIME
 0160   REF   4  LAST  716   22,3403   C2205 1                   TSTART82         PRESENT TIME - TIME V82GOFF1 BEGAN
 0161   REF   5  LAST  717   22,3404   02205 1           STORF   TSTART82                           SAVE IT
 0162                        22,3405   53145 1           GLCAC   BZE              SR30.1 SETS -TPER=C IF HPER L/
 0163   REF   2  LAST  308   22,3406   02143 0                   -TPER             HPERMIN (300 OR 35) KFT.
 0164   REF   1              22,3407   45420 0                   TICKTFF          (-TRER = 0)
 0165                        22,3410   43345 1  TICKTPER DLOAD   DAD              (-TPER NON ZERO)  TFF WAS NOT COMPUTED,
 0166   REF   3  LAST  717   22,3411   02143 0                   -TPFR            BUT WAS SET TO 59M59S.DCNT TICK TFF, DO
 0167   KFF   6  LAST  717   22,3412   02205 1                   TSTART82         TICK -TPER. DISPLAY BOTH.
 0168   REF   4  LAST  717   22,3413   02143 0           STCRE   -TPER            -TPER CORRECTFC FOR TIME SINCE V82GOFF1
 0169                        22,3414   77776 1           FXIT                     8EGAN.
 0170   REF  34  LAST  578   22,3415  3 4753 1           CAF     BITI
 0171   REF   4  LAST  716   22,3416  55'537 0           TS      V82FLAGS         INFORMS TICKTEST TC INCREMENT ONLY -TPER
 0172   RFF 105  LAST  612   22,3417  0 5155 0           TC      ENDOFJO8

 0173                        22,3420   43345 1  TICKTFF  DLCAD   DAD              (-TPER=0)  TFF WAS COMPUTED.TICK TFF.
 0174   REF   6  LAST  716   22,3421   02141 1                   TFF              DO NOT TICK -TPER.DISPLAY TFF, 8UT NOT
 0175   REF   7  LAST  717   22,3422   C2205 1                   TSTART82         -TPER.
 0176   REF   7  LAST  717   22,3423   02141 1           STCRE   TFF              TFF CORRECTED FCR TIME SINCF VB2GOFF1
 0177                        22,3424   77776 1           EXIT                     8EGAN.
 0178   REF  37  LAST  657   22,3425  3 4752 0           CAF     BIT2
 0179   REF   5  LAST  717   22,3426  55'537 0           TS      VB2FLAGS         INFORMS TICKTEST TC INCREMENT ONLY TFF.
 0180   REF 106  LAST  717   22,3427  0 5155 0           TC      ENDOFJOB
 0181   REF  31  LAST  708   22,3430  3 4747 1  TICKTEST CAF     BIT5        THIS WAITLIST PROGRAM PERPETUATES ITSELF
 0182   REF  14  LAST  708   22,3431  7 1043 0           MASK    EXTVBACT    ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
 0183   REF 219  LAST  716   22,3432  10 000 0           CCS     A
 0184   REF   1              22,3433  0 3441 0           TC      OOTICK
 0185   REF   3  LAST  597   22,3434  3 7716 0           CAF     PRIO25
 0186   REF  15  LAST  705   22,3435  0 5072 1           TC      NOVAC       TERMINATE V 82.CANT CALL ENDEXT IN RUPT.
 0187   REF  15  LAST  718      1043                     EBANK=  EXTVBACT
 0188   REF  41  LAST  715   22,3436   05472 0           2CADR   ENDEXT
 0188                        22,3437   04062 1
 0189   REF  31  LAST  705   22,3440  0 5261 1           TC      TASKOVER
 0190   REF   8  LAST  716   22,3441  3 4777 1  OOTICK   CAF     1SEC        RE-REQUEST TICKTEST.
 0191   REF  31  LAST  715   22,3442  0 5203 0           TC      WAITLIST
 0192   REF   8  LAST  717   54,1540                     EBANK=  TFF
 0193   REF   2  LAST  715   22,3443   03430 0           2CADR   TICKTEST
 0193                        22,3444   44064 0
 0194   REF  21  LAST  715   22,3445  3 6250 0           CAF     THREE
 0195   REF   6  LAST  717   22,3446  7 1537 0           MASK    V82FLAGS
 0196   REF 220  LAST  718   22,3447  50 000 1           INDEX   A
 0197                        22,3450  0 3451 1           TC      +1
 0198   REF  32  LAST  718   22,3451  0 5261 1           TC      TASKOVER    IF NO FLAGBITS SET DONT CHANGE TFF OR
A0199                                                                        -TPER, BUT CONTINUE LOOP.
 0200   REF   1              22,3452  0 3460 0           TC      TPERTICK    ONLY BIT 1 SET. INCR -TPER BY 1 SEC.
 0201   REF   9  LAST  718   22,3453  3 4777 1  TFFTICK  CAF     1SEC        ONLY BIT 2 SET. INCR TFF BY 1 SEC.
 0202   REF  98  LAST  680   22,3454  54 001 1           TS      L
 0203   REF 129  LAST  715   22,3455  3 4755 1           CAF     ZERO
 0204   REF   9  LAST  718   22,3456  21'541 1           DAS     TFF
 0205   REF  33  LAST  718   22,3457  0 5261 1           TC      TASKOVER
 0206   REF  10  LAST  718   22,3460  3 4777 1  TPERTICK CAF     1SEC
 0207   REF  99  LAST  718   22,3461  54 001 1           TS      L
 0208   REF 130  LAST  718   22,3462  3 4755 1           CAF     ZERO
 0209   REF   5  LAST  717   22,3463  21'543 0           DAS     -TPER
 0210   REF  34  LAST  718   22,3464  0 5261 1           TC      TASKOVER
 0211                          22,3465   77776 1  V82GON    FXIT              AVERAGE G ON. USE CURRFNT STATE VECTOR
A0212                                                                         FOR ORBITAL PARAMETER CALCULATIONS.
 0213  REF   7  LAST  715     22,3466   3 5021 1            CAF      PRIO7     LESS THAN LAMBERT
 0214  REF  26  LAST  715     22,3467   C 5105 0            TC       FINCVAC   V82GON1 WILL PERFORM ORBIT CALCULATIONS
 0215  REF  1(  LAST  718     E4,1540                       EBANK=   TFF       ABCUT RRCPER BOOY ARPROX ONCE RER SEC.
 C216  REF   1                22,3470    03503 1            2CAOR    V82GCN1
 0216  RFF   1                22,3471    44064 C
 0217                         22,3472   C 0003 1            RELINT
 0218  REF   5  LAST  556     22,3473   10 067 1            CCS      NFWJCB    WITHOLO V16 N44 UNTIL FIRST ORBIT CALC
 0219  REF   4  LAST  556     22,3474   C 5122 0            TC       CHANG1    IS CONE. NOTE: V82GON1 (RRIO7, FINOVAC
AC220                                                                          JOB) IS COMRLETEO BEFOFF V82GON (RRIO7,
A0221                                                                          NOVAC JOB).
 0222  REF   2  LAST  716     22,3475   3 3317 1  V82REOSP  CAF      V16N44    MONITOR HARC, HRER, TFF
 0223  REF 185  LAST  716     22,3476   C 4616 1            TC       BANKCALL
 0224  REF  10  LAST  716     22,3477    20334 1            CAOR     GCXDSPF
 0225  REF  13  LAST  716     22,3500   C 5563 1            TC       85OFF     TERM THIS TELLS V82GON1 TO KILL ITSELF.
 0226  REF  14  LAST  719     22,3501   C 5563 1            TC       B5OFF     RROC OITTO.
 0227  REF   1                22,35C2   C 3475 1            TC       V82REOSP  RECYCLE

 0228  REF  96  LAST  717     22,3503   0 6042 1  V82GON1   TC       INTPRET   THIS EXEC RROGRAM RERRETUATES ITSELF
A0229                                                                          ONCE A SEC UNTIL BIT 5 OF EXTVBACT =0.
 0230                         22,3504    52175 0            VLOAO    GOTO      HCLOS CFF CCS NEWJCB BETWEEN RN AND
 0231  REF   6  LAST  708     22,3505    C1220 0                     RN          VN FETCH SO RN , VN ARE FROM SAME
 0232  REF   1                22,3506    45507 1                     NEXTLINE    STATE VECTOR UROATE.
 0233  REF  12  LAST  716     22,3507    26207 0  NEXTLINE  STOVL    RONE       RN AT (-29)M FOR EARTH CR MOON
 0234  REF   6  LAST  708     22,3510    01226 0                     VN
 0235  PEF   6  LAST  716     22,3511    02215 0            STCRE    VONE      VN AT (-7)M/CS FCR EARTH OR MOON
 0236                         22,3512    52014 0            BON      GOTO
 0237  REF   4  LAST  707     22,3513    04304 1                     MCCNTHIS  FLAG INOICATES BODY ABOUT WHICH ORBITAL
 0238  REF   1                22,3514    45516 1                     MOONGON      CALCULATIONS ARE TO BE RERFORMEO.
 0239  REF   1                22,3515    45527 0                     EARTHGON    IF SET - MOON , IF RESET - EARTH.

 0240                         22,3516    71214 0  MOONGON   SET      OLCAO
 0241  REF   3  LAST  717     22,3517    03475 1                     V82EMFLG  INOICATF MOON SCALING FCR SR30.1
 0242  REF   1                22,3520    04001 1                     1/RTMUM   LUNAR RARAMETERS LCAOEO HERE FOR SR30 1
 0243  REF   2  LAST  716     22,3521    14037 0            STCOL    TFF/RTML
 0244  REF   1                22,3522    05364 0                     MINRFRM
 0245  REF   3  LAST  716     22,3523    26201 0            STOVL    HRERMIN
 0246  REF   5  LAST  717     22,3524    02023 1                     RLS        SCALEO AT (-27)M.
 0247                         22,3525    52046 1            ABVAL    GOTO
 0248  REF   1                22,3526    45536 C                     V82GCN2
 0249                         22,3527    71214 0  EARTHGON  CLEAR    DLOAO
 0250  REF   4  LAST  719     22,3530    03675 0                     V82EMFLG  INOICATE EARTH SCALING FOR SR30.1
 0251  REF   2  LAST  716     22,3531    04003 0                     1/RTMUF   EARTH PARAMETERS LCAOEO HERE FOR SR30.1
 0252  REF   3  LAST  719     22,3532    14037 0            STOOL    TFF/RTMU
 0253  REF   2  LAST  716     22,3533    05366 1                     MINPERF
 0254  REF   4  LAST  719     22,3534    16201 0            STOOL    HPERMIN
 0255  REF   3  LAST  717     22,3535    06340 0                     RRAO
 0256  REF   3  LAST  717     22,3536    36203 0  V82GON2   STCALL   RRAOTEM   CCMMON COOE FOR EARTH & MOON.
 0257  REF   2  LAST  717     22,3537    45551 1                     SR30.1
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L        R30                                                                                        USER'S PAGE NO.   7      F4  S3

 0258                            22,3540    77776 1            EXIT
 0259    REF  32  LAST  718      22,3541  3 4747 1  V82GON3  CAF      BIT5               
 0260    REF  16  LAST  718      22,3542  7 1043 0           MASK     EXTVBACT          SEE IF ASTRONAUT HAS SIGNALLED TERMINATE
 0261                            22,3543  0 0006 1           EXTEND
 0262    REF  42  LAST  718      22,3544  1 5472 1           BZF      ENDEXT            YES, TERMINATE VB 82 LOOP
 0263    REF  11  LAST  718      22,3545  3 4777 1           CAF      1SEC
 0264    REF 186  LAST  719      22,3546  0 4616 1           TC       BANKCALL          WAIT ONE SECOND BEFORE REPEATING
 0265    REF  11  LAST  716      22,3547   01736 1           CADR     DELAYJOB            ORBITAL PARAMETER COMPUTATION.
 0266    REF   2  LAST  719      22,3550  0 3503 1           TC       V82GON1

 0267    REF   1                 22,3541            SPLRET   =        V82GON3
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R0268    SUBROUTINE NAME:     SR30.1
R0269    MOD NO:  0                                                                          DATE:            16 FEB 67
R0271    MOD BY:  RR BAIRNSFATHER                                                            LOG SECTION:     R30
R0273    MOD NO:  1                MOD BY:  RR BAIRNSFATHER        DATE: 11 APR 67          SR30.1 CHANGED TO ALLOW MONITOR OPERN
R0275    MOD NO:  2                MOD BY:  RR BAIRNSFATHER        DATE:  14 APR 67         ADD OVFL CK FOR RAPO
R0277    MOD NO:  3                MOD BY ALONSO                   DATE: 11 DEC 67          SUBROUTINE REWRITTEN
R0279    MOD NO: 4                 MOD BY ALONSO                   DATE: 26 MAR 68          PROG MOD TO HANDLE DIF EARTH/MOON SCALE
R0281    MOD NO:  5                MOD BY:  RR BAIRNSFATHER        DATE:  6 AUG 68          OVFL CK FOR HAPO & HPER.VOIDS MOD #2.
R0283

R0284    NEW FUNCTIONAL DESCRIPTION:     ORBITAL PARAMETERS DISPLAY FOR NOUNS 32  AND 44.
R0286    SR30.1 CALLS TFFCONMU AND TFFRP/RA TO CALCULATE RPER (PERIGEE RADIUS),
R0287    RAPO (APOGEE RADIUS), HPER (PERIGEE HEIGHT ABOVE LAUNCH PAD OR LUNAR
R0288    LANDING SITE), HAPO (APOGEE HEIGHT AS ABOVE), TPER (TIME TO PERIGEE),
R0289    TFF (TIME TO INTERSECT 300 KFT ABOVE PAD OR 35KFT ABOVE LANDING SITE).
R0290    IF HPER IS GREATER THAN OR EQUAL TO HPERMIN, CALCULATES TPER AND STORES
R0291    NEGATIVE    IN -TPER. OTHERWISE STORES +0 IN -TPER. WHENEVER TPER IS
R0292    CALCULATED, TFF IS NOT COMPUTABLE AND DEFAULTS TO -59MIN 59SEC. IF HAPO
R0293    WOULD EXCEED 9999.9 NM, IT IS LIMITED TO THAT VALUE FOR DISPLAY.

R0294    ADDENDUM: HAPO AND HPER SHOULD BE CHANGED TO READ HAPOX AND HPERX IN THE
R0295              ABOVE REMARKS.

R0296    CALLING SEQUENCE:          CALL
R0297                                             SR30.1
R0298    SUBROUTINES CALLED:        TFFCONMU, TFFRP/RA, CALCTPER, CALCTFF
R0299    NORMAL EXIT MODE:          CALLING LINE +1 (STILL IN INTERPRETIVE MODE)
R0300    ALARMS:                    NONE
R0301    OUTPUT:  RAPO    (-29) M EARTH    APOGEE RADIUS    EARTH CENTERED COORD.
R0302                     (-27) M MOON                      MOON CENTERED COORD.
R0303             RPER    (-29) M EARTH    PERIGEE RADIUS   EARTH CENTERED COORD.
R0304                     (-27) M MOON                      MOON  CENTERED COORD.
R0305             HAPOX   (-29) M          APOGEE ALTITUDE ABOVE PAD OR LAND. SITE MAX VALUE LIMITED TO 9999.9 NM.
R0307             HPERX   (-29) M          PERIGEE ALT. ABOVE PAD OR LAND. SITE    MAX VALUE LIMITED TO 9999.9 NM.
R0309             TFF     (-28) CS         TIME TO 300KFT OR 35KFT ALTITUDE
R0310             -TPER   (-28) CS         TIME TO PERIGEE
R0311    ERASABLE INITIALIZATION REQUIRED-
R0312             TFF/RTMU (+17) EARTH     RECIPROCAL OF PROPER GRAV CONSTANT FOR
R0313                      (+14) MOON      EARTH OR MOON = 1/SQRT(MU).
R0314             RONE     (-29) M         STATE VECTOR
R0315             VONE     (-7)  M/CS      STATE VECTOR
R0316             RPADTEM (-29) M EARTH    RADIUS OF LAUNCH PAD OR LUNAR LANDING
R0317                     (-27) M MOON     SITE.
R0318             HPERMIN (-29) M EARTH    (300 OR 35)KFT MINIMUM PERIGEE ALTITUDE
R0319                     (-27) M MOON     ABOVE LAUNCH PAD OR LUNAR LANDING SITE.
R0320             V82EMFLG (INT SW BIT) RESET FOR EARTH, SET FOR MOON.

R0321    DEBRIS:  QPRET, PDL, S2
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 0322   REF    1                                               COUNT*  $$/SR30S

 0323                      22,3551   44001 0  SR30.1   SETPD   STQ               INITIALIZE PUSHDOWN LIST.
 0324                      22,3552   00001 0                   0
 0325   REF    7  LAST 615  22,3553   00051 0                   S2
A0326                                                                            SR30.1 INPUT: RONE AT (-29)M EARTH/MOON
A0327                                                                                         VONE AT (-7)M/CS
A0328                                                                             TFFCONMU,TFFRP/RA,CALCTPER AND CALCTFF
A0329                                                                             CALLS REQUIRE :
A0330                                                                             EARTH CENTERED (NO RESCALING REQUIRED)
A0331                                                                                            RONE SCALED TO B-29 M
A0332                                                                                            VONE SCALED TO B-7 M/CS
A0333                                                                             MOON CENTERED  (RESCALING REQUIRED)
A0334                                                                                            RONE SCALED TO B-27 M
A0335                                                                                            VONE SCALED TO B-5  M/CS
 0336                      22,3554   77214 0           BOFF    VLOAD
 0337   REF    5  LAST 719  22,3555   03755 0                   V82EMFLG              OFF FOR EARTH ,  ON FOR MOON.
 0338   REF    1            22,3556   45565 0                   TFFCALLS
 0339   REF   13  LAST 719  22,3557   02207 0                   RONE
 0340                      22,3560   77752 1           VSL2
 0341   REF   14  LAST 722  22,3561   26207 0           STOVL   RONE
 0342   REF    7  LAST 719  22,3562   02215 0                   VONE
 0343                      22,3563   77752 1           VSL2
 0344   REF    8  LAST 722  22,3564   02215 0           STORE   VONE
 0345                      22,3565   77624 1  TFFCALLS CALL
 0346   REF    1            22,3566   57362 1                   TFFCONMU
 0347                      22,3567   77624 1           CALL                      TFFRP/RA COMPUTES RAPO,RPER.
 0348   REF    1            22,3570   57430 1                   TFFRP/RA
A0349                                                                            RETURNS WITH RAPO IN 0(MPAC).
 0350                      22,3571   77625 0           DSU
 0351   REF    4  LAST 719  22,3572   02203 1                   RPADTEM
 0352                      22,3573   64414 1           BOFF    SR2R              NEED HAPO AT (-29)M FOR DISPLAY.
A0353                                                                            IF MOON CENTERED, RESCALE FROM (-27)M.
A0354                                                                             IF EARTH CENTERED ALREADY AT (-29)M.
 0355   REF    6  LAST 722  22,3574   03755 0                   V82EMFLG          OFF FOR EARTH , ON FOR MOON.
 0356                      22,3575   45576 1                   +1
 0357                      22,3576   77624 1           CALL                      IF HAPO > MAXNM, SET HAPO =9999.9 NM.
 0358   REF    3  LAST 622  22,3577   45636 0                   MAXCHK            OTHERWISE STORE (RAPO-RPADTEM) IN HAPO.
 0359   REF    4  LAST 715  22,3600   16120 0  STORHAPO STODL   HAPOX
 0360   REF    1            22,3601   00017 1                   RPER
 0361                      22,3602   77625 0           DSU
 0362   REF    5  LAST 722  22,3603   02203 1                   RPADTEM           GIVES HPER AT (-29)M EARTH, (-27)M MOON.
 0363   REF  289  LAST 688  22,3604   00161 1           STORE   MPAC +4           SAVE THIS FOR COMPARISON TO HPERMIN.
 0364                      22,3605   64414 1           BOFF    SR2R              NEED HPER AT (-29)M FOR DISPLAY.
A0365                                                                            IF MOON CENTERED, RESCALE FROM (-27)M.
A0366                                                                            IF EARTH CENTERED ALREADY AT (-29)M.
 0367   REF    7  LAST 722  22,3606   03755 0                   V82EMFLG          OFF FOR EARTH,  ON FOR MOON.
 0368                      22,3607   45610 1                   +1
 0369                      22,3610   77624 1           CALL                      IF HPER > MAXNM, SET HPER = 9999.9 NM.
 0370   REF    4  LAST 722  22,3611   45636 0                   MAXCHK
 0371   REF   2  LAST  316   22,3612   16122 1  STORHPER STCDL   HPERX            STCRE (RPER - RPADTEM) INTD HPERX.
 0372   REF 290  LAST  722   22,3613.  00161 1                   MPAC +4
 0373                        22,3614   51025 1           OSU     8PL              HPERMIN AT (-29)M FOR EARTH, (-27)M MOON
 0374   REF   5  LAST  719   22,3615   02201 0                   HPERMIN          IF HPER L/   HPERMIN (300 OR 35)KFT,
 0375   REF   1              22,3616   45622 0                   DOTPFR            THEN ZERD INTO -TPER.
 0376                        22,3617   52145 0           CLCAC   GCTE               OTHERWISE CALCULATE TPER.
 0377   REF   4  LAST  598   22,3620   06524 1                   H16ZEROS
 C378   REF   1              22,3621   45626 1                   SK1PTPER
 0379                        22,3622   45145 0  OOTPER   OLOAD   CALL
 0380   REF   2  LAST  722   22,3623   00017 1                   RPER
 0381   REF   1              22,3624   57466 1                   CALCTPER
 0382                        22,3625   77676 0           OCOMP                    TPER IS PUT NEG 1NTC -TPER.
 0383   REF   6  LAST  718   22,3626   16143 0  SK1PTPER STDOL   -TPER
 0384   REF   6  LAST  723   22,3627   02201 0                   HPERMIN          HPERMIN AT (-29)M FOR EARTH, (-27)M MDDN
 0385                        22,3630   45015 1           OAD     CALL
 0386   REF   6  LAST  722   22,3631   02203 1                   RPADTFM          RPADTEM AT (-29)M FOR EARTH, (-27)M MOON
 0387   REF   1              22,3632   57471 1                   CALCTFF          GIVFS 59M59S FOP TFF 1F RPER G/
 0388                        22,3633   77676 0           OCOMP                      HPERM1N + PPADTFM. (TPFR WAS NON ZERD)
 0389   REF  11  LAST  719   22,3634   36141 0           STCALL TFF               DTHFRWISF COMPUTFS TFF.       (GDTD)
 0390   REF   8  LAST  722   22,3635   00051 0                   S2

 0391                        22,3636   51025 1  MAXCHK   CSU     BPL              IF C(MPAC) > 9999.9 NM, MPAC = 9999.9 NM
 0392   RFF   1              22,3637   05646 0                   MAXNM
 0393                        22,3640   45643 1                   +3               CTHERWISE C(MPAC) = B(MPAC).
 0394                        22,3641   43415 0           DAC     RVQ
 0395   REF   2  LAST  723   22,3642   05646 0                   MAXNM
 0396                        22,3643   43545 1  +3       DLOAD   RVQ              (USED BY P30 - P37 ALSC)
 0397   REF   3  LAST  723   22,3644   05646 0                   MAXNM

 0398                        22,3645   01065 0  MAXNM    2DCT    01065 05603
 0398                        22,3646   05603 1
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*** END OF KISSING.055 ***
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L        BURN, BABY, BURN -- MASTER IGNITION ROUTINE                                       USER'S PAGE NO.   1       ED 53

 0001                             36,2024                           BANK    36
 0002   REF    3  LAST   40       36,2000                           SETLOC  P40S
 0003                             36,2024                           BANK
 0004   REF    3  LAST  655       E7,1455                           EBANK=  WHICH
 0005   REF    3 LAST   40 TO   40:      2     20*.                 COUNT*  $$/P40
R0006        THE MASTER IGNITION ROUTINE IS DESIGNED FOR USE BY THE FOLLOWING LEM PROGRAMS:  P12, P40, P42, P61, P63.
R0008   IT PERFORMS ALL FUNCTIONS IMMEDIATELY ASSOCIATED WITH APS OR DPS IGNITION:  IN PARTICULAR, EVERYTHING LYING
R0010   BETWEEN THE PRE-IGNITION TIME CHECK -- ARE WE WITHIN 45 SECONDS OF TIG? -- AND TIG + 26 SECONDS, WHEN DPS
R0012   PROGRAMS THROTTLE UP.

R0013        VARIATIONS AMONG PROGRAMS ARE ACCOMODATED BY MEANS OF TABLES CONTAINING CONSTANTS (FOR AVEGEXIT, FOR
R0015   WAITLIST, FOR PINBALL) AND TCF INSTRUCTIONS.   USERS PLACE THE ADRES OF THE HEAD OF THE APPROPRIATE TABLE
R0017   (OF P61TABLE FOR P61LM, FOR EXAMPLE) IN ERASABLE REGISTER 'WHICH' (E4).   THE IGNITION ROUTINE THEN INDEXES BY
R0019   WHICH TO OBTAIN OR EXECUTE THE PROPER TABLE ENTRY.   THE IGNITION ROUTINE IS INITIATED BY A TCF BURNBABY,
R0021   THROUGH BANKJUMP IF NECESSARY.   THERE IS NO RETURN.

R0022        THE MASTER IGNITION ROUTINE WAS CONCEIVED AND EXECUTED, AND (NOTA BENE) IS MAINTAINED BY ADLER AND EYLES.


R0024                                                    HONI SOIT QUI MAL Y PENSE


R0025                                             ***************************************
R0026                                             TABLES FOR THE IGNITION ROUTINE
R0027                                             ***************************************

R0028                                                          NOLI SE TANGERE

 0029                             36,2024   01512 0  P12TABLE VN      0674            (0)
 0030   REF    1                  36,2025  1 2327 1           TCF     ULLGNCT         (1)
 0031   REF    1                  36,2026  1 2616 0           TCF     COMFAIL3        (2)
 0032   REF    1                  36,2027  1 3066 0           TCF     GOCUTOFF        (3)
 0033   REF   35  LAST  718       36,2030  1 5261 0           TCF     TASKOVER        (4)
 0034   REF    1                  36,2031  1 2150 0           TCF     P12SPOT         (5)
 0035                             36,2032   00000 1           DEC     0               (6)        NO ULLAGE
 0036   REF    4  LAST  725       E7,1455                     EBANK=  WHICH
 0037   REF    1                  36,2033   03746 1           2CADR   SERVEXIT        (7)
 0037   REF    1                  36,2034   64067 1
 0038   REF    1                  36,2035  1 2402 1           TCF     DISPCHNG        (11)
 0039   REF    1                  36,2036  1 2567 0           TCF     WAITABIT        (12)
 0040   REF    1                  36,2037  1 2525 0           TCF     P12IGN          (13)
R0043


 0044                             36,2040   01450 1  P40TABLE VN      0640            (0)
 0045   REF    2  LAST  725       36,2041  1 2327 1           TCF     ULLGNCT         (1)
 0046   REF    1                  36,2042  1 2620 0           TCF     COMFAIL4        (2)
 0047   REF    1                  36,2043  1 3053 0           TCF     GOPOST          (3)
 0048   REF   36  LAST  725       36,2044  1 5261 0           TCF     TASKOVER        (4)
 0049   REF    1                  36,2045  1 2150 0           TCF     P40SPOT         (5)
 0050                           36,2046   04300 0              DEC     2240          (6)
 0051   REF    1                E6,1422                        EBANK=  OMEGA0
 0052   REF    1                36,2047   03672 1              2CADR   STEERING      (7)
 0052   REF    1                36,2050   74066 1
 0053   REF    1                36,2051  1 2372 1              TCF     P40SJUNK      (11)
 0054   REF    2   LAST   725   36,2052  1 2567 0              TCF     WAITABIT      (12)
 0055   REF    1                36,2053  1 2510 0              TCF     P40IGN        (13)
 0056   REF    1                36,2054  1 3127 1              TCF     REP40ALM      (14)
R0058


 0060   REF    1                36,2055  1 2153 0  P41TABLE TCF     P41SPOT       (5)
 0061                           36,2056   77776 1              DEC     -1            (6)
 0062   REF    2   LAST   726   E6,1422                        EBANK=  OMEGA0
 0063   REF    1                36,2057   03402 1              2CADR   CALCN85       (7)
 0063   REF    1                36,2060   74066 1
 0064   REF    1                36,2061  1 2404 1              TCF     COMMON        (11)
 0065   REF    1                36,2062  1 2573 0              TCF     TIGTASK       (12)
R0066


 0067                           36,2063   01450 1  P42TABLE VN      0640          (0)
 0068   REF    1                36,2064  1 2324 1              TCF     WANTAPS       (1)
 0069   REF    2   LAST   725   36,2065  1 2620 0              TCF     COMFAIL4      (2)
 0070   REF    2   LAST   725   36,2066  1 3053 0              TCF     GOPOST        (3)
 0071   REF   37   LAST   725   36,2067  1 5261 0              TCF     TASKOVER      (4)
 0072   REF    1                36,2070  1 2150 0              TCF     P42SPOT       (5)
 0073                           36,2071   05120 1              DEC     2640          (6)
 0074   REF    3   LAST   726   E6,1422                        EBANK=  OMEGA0
 0075   REF    2   LAST   726   36,2072   03672 1              2CADR   STEERING      (7)
 0075                           36,2073   74066 1
 0076   REF    2   LAST   726   36,2074  1 2372 1              TCF     P40SJUNK      (11)
 0077   REF    3   LAST   726   36,2075  1 2567 0              TCF     WAITABIT      (12)
 0078   REF    1                36,2076  1 2545 0              TCF     P42IGN        (13)
 0079   REF    1                36,2077  1 3424 1              TCF     P42STAGE      (14)
R0081


 0082                           36,2100   01476 0  P63TABLE VN      0662          (0)
 0083   REF    3   LAST   725   36,2101  1 2327 1              TCF     ULLGNOT       (1)
 0084   REF    2   LAST   725   36,2102  1 2616 0              TCF     COMFAIL3      (2)
 0085   REF    1                36,2103  1 3003 0              TCF     V99RECYC      (3)
 0086   REF   38   LAST   726   36,2104  1 5261 0              TCF     TASKOVER      (4)
 0087   REF    1                36,2105  1 2153 0              TCF     P63SPOT       (5)
 0088                           36,2106   04300 0              DEC     2240          (6)
 0089   REF    5   LAST   725   E7,1455                        EBANK=  WHICH
 0090   REF    2   LAST   725   36,2107   03746 1              2CADR   SERVEXIT      (7)
 0090                           36,2110   64067 1
 0091   REF    2   LAST   725   36,2111  1 2402 1              TCF     DISPCHNG      (11)
 0092   REF    4   LAST   726   36,2112  1 2567 0              TCF     WAITABIT      (12)
 0093   REF   1                 36,2113  1 2464 1            TCF     P63IGN           (13)
R0096


 0112                           36,2114   01477 1  ABRTABLE VN      0663             (0)
 0113   REF   4  LAST  726      36,2115  1 2327 1            TCF     ULLGNOT          (1)
 0114   REF   3  LAST  726      36,2116  1 2616 0            TCF     COMFAIL3         (2)
 0115   REF   2  LAST  725      36,2117  1 3066 0            TCF     GOCUTOFF         (3)
 0116   REF  39  LAST  726      36,2120  1 5261 0            TCF     TASKOVER         (4)
 0117                           36,2121  12 122 0            NOOP                     (5)
 0118                           36,2122  12 123 1            NOOP                     (6)
 0119                           36,2123  12 124 0            NOOP                     (7)
 0120                           36,2124  12 125 1            NOOP
 0121   REF   3  LAST  726      36,2125  1 2402 1            TCF     DISPCHNG         (11)
 0122   REF   5  LAST  726      36,2126  1 2567 0            TCF     WAITABIT         (12)
 0123   REF   1                 36,2127  1 2535 1            TCF     ABRTIGN          (13)
R0126


R0127                                              *****************************************
R0128                                              GENERAL PURPOSE IGNITION ROUTINES
R0129                                              *****************************************

 0130   REF  28  LAST  713      36,2130  0 5353 1  BURNBABY TC       PHASCHNG         GROUP 4 RESTARTS HERE
 0131                           36,2131   04024 0           OCT      04024

 0132   REF 131  LAST  718      36,2132  3 4755 1           CAF      ZERO             EXTIRPATE JUNK LEFT IN DVTOTAL
 0133   REF   4  LAST  317      36,2133  55'507 0           TS       DVTOTAL
 0134   REF   5  LAST  727      36,2134  55'510 0           TS       DVTOTAL +1

 0135   REF 187  LAST  720      36,2135  0 4616 1           TC       BANKCALL         P40AUTO MUST BE BANKCALLED EVEN FROM ITS
 0136   REF   1                 36,2136   73707 0           CADR     P40AUTO            OWN BANK TO SET UP RETURN PROPERLY

 0141                           36,2137  0 0006 1  B*RNB*B* EXTEND
 0142   REF  23  LAST  712      36,2140  3 1442 1           DCA      TIG              STORE NOMINAL TIG FOR OBLATENESS COMP.
 0143   REF   2  LAST  149      36,2141  53'512 1           DXCH     GOBLTIME         AND FOR P70 OR P71.

 0173                           36,2142  0 0004 0           INHINT
 0174   REF  24  LAST  560      36,2143  0 4674 0           TC       IBNKCALL
 0175   REF   1                 36,2144   75570 1           CADR     ENGINOF3
 0176                           36,2145  0 0003 1           RELINT

 0179   REF   6  LAST  726      36,2146  51'455 1           INDEX    WHICH
 0180                           36,2147  1 0005 0           TCF      5


 0182   REF   2  LAST  725      36,2150            P42SPOT  =        P40SPOT          (5)
 0183   REF   3  LAST  727      36,2150            P12SPOT  =        P40SPOT          (5)
 0185   REF   2  LAST  726      36,2153            P63SPOT  =        P41SPOT          (5)       IN P63 CLOKTASK ALREADY GOING
 0186   REF   1                 36,2150  4 4762 1  P40SPOT  CS       CNTDNDEX         (5)
 01861  REF 188  LAST  727    36,2151  0 4616 1            TC      BANKCALL        MUST BE BANKCALLED FOR GENERALIZED
 01862  REF   1               36,2152   74670 0            CADR    STCLCK2               RETURN
 0187   REF  97  LAST  719    36,2153  0 6042 1  P41SPOT   TC      INTPRET         (5)
 01871                        36,2154   45345 1            DLOAD   DSU
 0188   REF  24  LAST  727    36,2155   03442 0                    TIG
 0189   REF   1               36,2156   35147 0                    D29.9SEC
 01891  REF  40  LAST  716    36,2157   34041 0            STCALL  TDEC1
 01892  REF   1               36,2160   61071 0                    INITCDUW
 0190                         36,2161   45014 0            BOFF    CALL
 0191   REF   3  LAST  708    36,2162   03347 1                    MUNFLAG
 0192   REF   1               36,2163   74202 1                    GOMIDAV
 0193   REF   5  LAST  706    36,2164   27042 1                    CSMPREC
 0194                         36,2165   64375 1            VLOAD   MXV
 0195   REF  12  LAST  712    36,2166   00025 0                    VATT1
 0196   REF  20  LAST  709    36,2167   01734 0                    REFSMMAT
 0197                         36,2170   77762 1            VSR1
 0198   REF   3  LAST  708    36,2171   25726 0            STOVL   V(CSM)          CSM VELOCITY - M/CS*2(7)
 0199   REF   9  LAST  712    36,2172   00017 1                    RATT1
 0200                         36,2173   64312 0            VSL4    MXV
 0201   REF  21  LAST  728    36,2174   01734 0                    REFSMMAT
 0202   REF   3  LAST  708    36,2175   35720 1            STCALL  R(CSM)          CSM POSITION - M*2(24)
 0203   REF   1               36,2176   67067 1                    MUNGRAV
 0204   REF   2  LAST  121    36,2177   16317 0            STODL   G(CSM)          CSM GRAVITY VEC. - M/CS*2(7)
 02042  REF  13  LAST  712    36,2200   00015 0                    TAT
 02044  REF  41  LAST  728    36,2201   00041 1            STORE   TDEC1           RELOAD TDEC1 FOR MIDTOAV.
 0205                         36,2202   77624 1  GOMIDAV   CALRB
 0206   REF   1               36,2203   27553 1                    MIDTOAV1
 0207   REF   1               36,2204  1 2213 1            TCF     CALLT-35        MADE IT IN TIME.

 0208                         36,2205  0 0006 1            EXTEND                  TIG WAS SLIPPED, SO RESET TIG TO 29.9
 0209   REF   3  LAST  197    36,2206  3 1561 1            DCA     PIPTIME1        SECONDS AFTER THE TIME TO WHICH WE DID
 0210   REF  25  LAST  728    36,2207  53 442 0            DXCH    TIG             INTEGRATE.
 0211                         36,2210  0 0006 1            EXTEND
 0212   REF   2  LAST  728    36,2211  3 3147 0            DCA     D29.9SEC
 0213   REF  26  LAST  728    36,2212  21 442 0            DAS     TIG

 0214   REF 291  LAST  723    36,2213  52 155 1  CALLT-35  DXCH    MPAC
 0215   REF   5  LAST  242    36,2214  53 500 1            DXCH    SAVET-30        DELTA-T UNTIL TIG-30
 0216                         36,2215  0 0006 1            EXTEND
 0217   REF   1               36,2216  4 3762 0            DCS     5SECDP
 0218   REF   6  LAST  728    36,2217  21 500 1            DAS     SAVET-30        DELTA-T UNTIL TIG-35
 0219                         36,2220  0 0006 1            EXTEND
 0220   REF   7  LAST  728    36,2221  3 1500 0            DCA     SAVET-30
 0221   REF   3  LAST  515    36,2222  0 5277 0            TC      LONGCALL
 0222   REF  17  LAST  559    E7,1453                      EBANK=  TTOGO
 0223   REF   3  LAST  242    36,2223   02242 1            2CADR   TIG-35
 0223                         36,2224   74067 0
 0224   REF  29  LAST  727    36,2225  0 5353 1            TC      PHASCHNG
 0225                         36,2226   20254 0            OCT     20254           4.25SPOT FOR TIG-35 RESTART.
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L        BURN, BABY, BURN -- MASTER IGNITION ROUTINE                              USER'S PAGE NO.   5      E7 S3

 0226   REF   2  LAST  266    36,2227  0 5321 1                TC       CHECKMM
 0227                         36,2230   00077 1                DEC      63
 0228   REF 107  LAST  717    36,2231  1 5155 1                TCF      ENDOFJOB            NOT P63
 0229   REF   2  LAST  727    36,2232  4 4762 1                CS       CNTDNDEX            P63 CAN START DISPLAYING NOW.
 0230   REF   5  LAST  683    36,2233  55'162 1                TS       DISPDEX
 0231   REF  98  LAST  728    36,2234  0 6042 1                TC       INTPRET
 0232                         36,2235   51575 1                VLOAD    ABVAL
 0233   REF   2  LAST  149    36,2236   03553 1                         VN1
 0234   REF   4  LAST  317    36,2237   03472 0                STORE    ABVEL               INITIALIZE ABVEL FOR P63 DISPLAY
 0235                         36,2240   77776 1                EXIT
 0236   REF 108  LAST  729    36,2241  1 5155 1                TCF      ENDOFJOB


R0237                                           ************************************


 0238   REF   1               36,2242  3 3762 1  TIG-35        CAF      5SEC
 0239   REF   9  LAST  523    36,2243  0 5173 1                TC       TWIDDLE
 0240   REF   2  LAST  242    36,2244   02300 0                ADRES    TIG-30

 0241   REF  30  LAST  728    36,2245  0 5353 1                TC       PHASCHNG
 0242                         36,2246   40154 0                OCT      40154               4.15SPOT FOR TIG-30 RESTART

 0243   REF   1               36,2247  4 4752 1                CS       BLANKDEX            BLANK DSKY FOR 5 SECONDS
 0244   REF   6  LAST  729    36,2250  55'162 1                TS       DISPDEX

 0245   REF   7  LAST  727    36,2251  51'455 1                INDEX    WHICH
 0246                         36,2252  4 0006 0                CS       6                   CHECK ULLAGE TIME.
 0247                         36,2253  0 0006 1                EXTEND
 0248   REF  40  LAST  727    36,2254  6 5261 1                BZMF     TASKOVER
 0249   REF   1               36,2255  3 3151 1                CAF      4.9SEC              SET UP TASK TO RESTORE DISPLAY AT TIG-30
 0250   REF  10  LAST  729    36,2256  0 5173 1                TC       TWIDDLE
 0251   REF   1               36,2257   02270 0                ADRES    TIG-30.1

 0252   REF   1               36,2260  3 5027 1                CAF      PRIO17              A NEGATIVE ULLAGE TIME INDICATES P41, IN
 0253   REF  16  LAST  718    36,2261  0 5072 1                TC       NOVAC               WHICH CASE WE HAVE TO SET UP A JOB TO
 0254   REF  18  LAST  728    E7,1453                          EBANK=   TTOGO               BLANK THE DSKY FOR FIVE SECONDS, SINCE
 0255   REF   1               36,2262   02265 1                2CADR    P41BLANK            CLOKJOB IS NOT RUNNING DURING P41.
 0255   REF   1               36,2263   74067 0
 0256   REF  41  LAST  729    36,2264  1 5261 0                TCF      TASKOVER

 0257   REF 189  LAST  728    36,2265  0 4616 1  P41BLANK      TC       BANKCALL            BLANK DSKY.
 0258   REF   1               36,2266   20457 0                CADR     CLEANDSP
 0259   REF 109  LAST  729    36,2267  1 5155 1                TCF      ENDOFJOB

 0260   REF   2  LAST  729    36,2270  3 5027 1  TIG-30.1      CAF      PRIO17              SET UP JOB  TO RESTORE DISPLAY AT TIG-30
 0261   REF  17  LAST  729    36,2271  0 5072 1                TC       NOVAC
 0262   REF  19  LAST  729    E7,1453                          EBANK=   TTOGO
 0263   REF   1               36,2272   02275 0                2CADR    TIG-30A
 0263   REF   1               36,2273   74067 0
 0264   REF  42  LAST  729    36,2274  1 5261 0                TCF      TASKOVER
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L        BURN, BABY, BURN -- MASTER IGNITION ROUTINE                                          USER'S PAGE NO.   6       E7 S3

 0265   REF   1              36,2275   3 3765 0  TIG-30A  CAF     V16N85B
 0266   REF 190   LAST  729  36,2276   0 4616 1           TC      BANKCALL        RESTORE DISPLAY.
 0267   REF   1              36,2277    20466 1           CADR    REGODSP         REGODSP DOES A TCF ENDOFJOB

R0268                                          *****************************************


 0269   REF   1              36,2300   3 3150 0  TIG-30   CAF     S24.9SEC
 0270   REF  11   LAST  729  36,2301   0 5173 1           TC      TWIDDLE
 0271   REF   3   LAST  242  36,2302    02354 1           ADRES   TIG-5

 0272   REF   3   LAST  729  36,2303   4 4762 1           CS      CNTDNDEX        START UP CLOCKTASK AGAIN
 0273   REF   7   LAST  729  36,2304   55'162 1           TS      DISPDEX

 0274   REF   8   LAST  729  36,2305   51'455 1           INDEX   WHICH           PICK UP APPROPRIATE ULLAGE-ON TIME
 0275                        36,2306   3 0006 1           CAF     6
 0276                        36,2307   0 0006 1           EXTEND
 0277   REF   5   LAST  727  36,2310   6 2327 0           BZMF    ULLGNOT         DON'T SET UP ULLAGE IF DT IS NEG OR ZERO
 0278   REF   8   LAST  728  36,2311   55'477 0           TS      SAVET-30        SAVE DELTA-T FOR RESTART
 0279   REF  12   LAST  730  36,2312   0 5173 1           TC      TWIDDLE
 0280   REF   2   LAST  240  36,2313    02350 0           ADRES   ULLGTASK

 0281   REF  22   LAST  718  36,2314   3 6250 0           CA      THREE           RESTART PROTECT ULLGTASK (1.3SPOT)
 0282   REF 100   LAST  718  36,2315   54 001 1           TS      L
 0283   REF  23   LAST  730  36,2316   4 6250 1           CS      THREE
 0284   REF   3   LAST  218  36,2317   52 752 0           DXCH    -PHASE1
 0285   REF   5   LAST  369  36,2320   4 0025 1           CS      TIME1
 0286   REF   1              36,2321   55'052 0           TS      TBASE1

 02861  REF   9   LAST  730  36,2322   51'455 1           INDEX   WHICH
 02862                       36,2323   1 0001 1           TCF     1

 02863  REF  11   LAST  297  36,2324   4 0106 1  WANTAPS  CS      FLGWRD10        (1) FOR P42 ENSURE APSFLAG IS SET  IF IT
 02864  REF   7   LAST  297  36,2325   7 4737 1           MASK    APSFLBIT        WASN'T SET, DAP WILL BE INITIALIZED TO
 02865  REF  12   LAST  730  36,2326   26 106 1           ADS     FLGWRD10        ASCENT VALUES BY 1/ACCS IN 2 SECONDS.

 0287                        36,2327   0 0006 1  ULLGNOT  EXTEND                  (1)
 0288   REF  10   LAST  730  36,2330   5 1455 1           INDEX   WHICH
 0289                        36,2331   3 0010 0           DCA     7               LOAD AVEGEXIT WITH APPROPRIATE 2CADR
 0290   REF   3   LAST  105  36,2332   53'252 1           DXCH    AVEGEXIT

 0291   REF  40   LAST  715  36,2333   3 4752 0           CAF     TWO             4.2SPOT RESTARTS IMMEDIATELY AT REDO4.2
 0292   REF 101   LAST  730  36,2334   54 001 1           TS      L
 0293   REF  41   LAST  730  36,2335   4 4752 1           CS      TWO             AND ALSO AT TIG-5 AT THE CORRECT TIME.
 0294   REF   3   LAST  226  36,2336   52 760 1           DXCH    -PHASE4

 0295   REF   6   LAST  730  36,2337   4 0025 1           CS      TIME1
 0296   REF   2   LAST  235  36,2340   55'060 1           TS      TBASE4          SET TBASE4 FOR TIG-5 RESTART

 02961                       36,2341   0 0006 1  REDO2.17 EXTEND
 02962  REF  10  LAST  540   36,2342  3 4755 1            DCA    NEGO       CLEAR OUT GROUP 2 SO LAMBERT CAN START
 02963  REF   4  LAST  233   36,2343  52 754 0            CXCH   -PHASE2         IF NEEOEO.

 0297   REF   1              36,2344  10 762 0  RED04.2   CCS    PHASE5     IS SERVICER GOING?
 0298   REF  43  LAST  729   36,2345  1 5261 0            TCF    TASKOVER   YES, DON'T START IT UP AGAIN.

 0299   REF  41  LAST  616   36,2346  C 4635 0            TC     PCSTJUMP
 0300   REF   1              36,2347   77410 1            CAOR   PREREAO    PREREAO ENCS THIS TASK


R0301                                          ***************************************

 0302   REF   1              36,2350  C 2663 0  ULLGTASK  TC     ONULLAGE   THIS COMES AT TIG-7.5 OR TIG-3.5
 0303   REF  31  LAST  729   36,2351  C 5353 I            TC     PHASCHNG
 0304                        36,2352   00001 C            OCT    1
 0305   REF  44  LAST  731   36,2353  1 5261 0            TCF    TASKOVER


R0306                                          ***************************************

 0307                        36,2354  C 0006 1  TIG-5     EXTENO
 03072  REF  11  LAST  731   36,2355  3 4755 1            OCA    NEGO       INSURE THAT GROUP 3 IS INACTIVE.
 03074  REF   2  LAST  216   36,2356  52 756 1            DXCH   -PHASE3

 03076  REF   2  LAST  729   36,2357  3 3762 1            CAF    5SEC
 0308   REF  13  LAST  730   36,2360  0 5173 1            TC     TWIDOLE
 0309   REF   2  LAST  242   36,2361   02407 0            AORES  TIG-0

 0310   REF  66  LAST  634   36,2362  0 5516 0            TC     OOWNFLAG   RESET IGNFLAG ANO ASTNFLAG
 0311   REF   1              36,2363   00153 0            ACRES  IGNFLAG      FOR LIGHT-UP LOGIC
 0312   REF  67  LAST  731   36,2364  0 5516 C            TC     OOWNFLAG
 0313   REF   1              36,2365   00154 1            ADRES  ASTNFLAG
 0314   REF  68  LAST  731   36,2366  0 5516 0            TC     DOWNFLAG
 0315   REF   1              36,2367   C0122 0            AORES  ZOCMFLAG

 0318   REF  11  LAST  730   36,2370  51'455 1            INOEX  WHICH
 0319                        36,2371  1 rC11 0            TCF    11

 0320   REF   1              36,2372  10 756 1  P40SJUNK  CCS    PHASE3     (11) P40 ANO P42.  S40.13 IN PROGRESS?
 03202  REF   4  LAST  727   36,2373  1 2402 1            TCF    OISPCHNG   YES

 03204  REF   4  LAST  386   36,2374  3 4736 1            CAF    PRIC20
 0321   REF  27  LAST  719   36,2375  0 5105 0            TC     FINOVAC
 0322   REF  20  LAST  729   E7,1453                      EBANK= TTCGO
 0323   REF   2  LAST  241   36,2376   02540 1            2CAOR  S40.13
 0323                        36,2377   56067 0


 03232  REF  32  LAST  731   36,240C  0 5353 1            TC     PHASCHNG   3.5SPOT FOR S40.13
 03234                       36,2401   00053 1            OCT    00053
 0324   REF    1              36,2402   4 4760 0  DISPCHNG CS       V99NDEX           (11)
 0325   REF    8   LAST  730  36,2403  55'162 1            TS       DISPDEX
 03252  REF   33   LAST  731  36,2404   0 5353 1  COMMON   TC       PHASCHNG          RESTART TIG-0 (4.7SPOT)
 03254                        36,2405    40074 0           OCT      40074
 0326   REF   45   LAST  731  36,2406   1 5261 0           TCF      TASKOVER


R0327                                               ****************************************

 0328   REF    6   LAST  706  36,2407   4 0103 1  TIG-0    CS       FLAGWRD7          SET IGNFLAG SINCE TIG HAS ARRIVED
 0329   REF    1              36,2410   7 4737 1           MASK     IGNFLBIT
 0330   REF    7   LAST  732  36,2411  26 103 1            ADS      FLAGWRD7

 0331   REF    3   LAST  729  36,2412   0 5321 1           TC       CHECKMM           IN P63 CASE, THROTTLE-UP IS ZOOMTIME
 0332                         36,2413    00077 1           DEC      63                  AFTER NOMINAL IGNITION, NOT ACTUAL
 0333   REF    1              36,2414   1 2425 1           TCF      IGNYET?
 0334   REF    2   LAST  241  36,2415   3 1422 1           CA       ZOOMTIME
 0335   REF   32   LAST  718  36,2416   0 5203 0           TC       WAITLIST
 0336   REF   21   LAST  244  E7,1515                      EBANK=   OVCNTR
 03365  REF    2   LAST  241  36,2417    03667 0           2CADR    ZOOM
 03365                        36,2420    72067 0
 0337   REF    4   LAST  655  36,2421   0 5327 1           TC       2PHSCHNG
 0338                         36,2422    40033 0           OCT      40033

 0339                         36,2423    05014 1           OCT      05014
 0340                         36,2424    77777 0           OCT      77777

 0341   REF    1              36,2425   3 4740 0  IGNYET?  CAF      ASTNBIT           CHECK ASTNFLAG:  HAS ASTRONAUT RESPONDED
 0342   REF    8   LAST  732  36,2426   7 0103 1           MASK     FLAGWRD7            TO OUR ENGINE ENABLE REQUEST?
 0343                         36,2427   0 0006 1           EXTEND
 0344   REF   12   LAST  731  36,2430   5 1455 1           INDEX    WHICH
 0345                         36,2431   1 0012 0           BZF      12                BRANCH IF HE HAS NOT RESPONDED YET

 0346   REF   19   LAST  611  36,2432   4 0101 0  IGNITION CS       FLAGWRD5          INSURE ENGONFLG IS SET.
 03461  REF    3   LAST  218  36,2433   7 4745 1           MASK     ENGONBIT
 03462  REF   20   LAST  732  36,2434  26 101 0            ADS      FLAGWRD5
 03463  REF    6   LAST  258  36,2435   4 4355 1           CS       PRIO30            TURN ON THE ENGINE.
 0347                         36,2436   0 0006 1           EXTEND
 0348   REF   22   LAST  474  36,2437  02 011 0            RAND     DSALMOUT
 0349   REF   27   LAST  568  36,2440   6 4737 0           AD       BIT13
 0350                         36,2441   0 0006 1           EXTEND
 0351   REF   23   LAST  732  36,2442  01 011 0            WRITE    DSALMOUT
 0352                         36,2443   0 0006 1           EXTEND                     SET TEVENT FOR DOWNLINK
 0353   REF   17   LAST  602  36,2444   3 0025 0           DCA      TIME2
 0354   REF    4   LAST  202  36,2445  53'342 1            DXCH     TEVENT

 03542  REF    1              36,2446   4 4735 0           CS       PULSES            MAKE SURE THAT DAP IS NOT IN MINIMUM
 03544  REF   12   LAST  297  36,2447   7 0111 1           MASK     DAPBOOLS          IMPULSE MODE IN P12,P40,P42,AND P63
 03546  REF   13   LAST  732  36,2450  54 111 1            TS       DAPBOOLS
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L        BURN, BABY, BURN -- MASTER IGNITION ROUTINE                                     USER'S PAGE NO.   9       E7 S3

 0355                           36,2451   0 0006 1             EXTEND              UPDATE TIG USING TGO FROM S40.13
 0356    REF   4  LAST  242     36,2452   3 1517 0             DCA      TGO
 0357    REF  27  LAST  728     36,2453  53'442 0              DXCH     TIG
 0358                           36,2454   0 0006 1             EXTEND
 0359    REF  18  LAST  732     36,2455   3 0025 0             DCA      TIME2
 0360    REF  28  LAST  733     36,2456  21'442 0              DAS      TIG

 03601   REF   1                36,2457   4 4742 0             CS       FLUNDBIT     PERMIT GUIDANCE LOOP DISPLAYS
 03602   REF  10  LAST  706     36,2460   7 0104 0             MASK     FLAGWRD8
 03603   REF  11  LAST  733     36,2461  54 104 0              TS       FLAGWRD8

 0361    REF  13  LAST  732     36,2462  51'455 1              INDEX    WHICH
 0362                           36,2463   1 0013 1             TCF      13

 0363                           36,2464   0 0006 1   P63IGN    EXTEND                (13)      INITIATE BURN DISPLAYS
 0364    REF   1                36,2465   3 3143 1             DCA      LUNLANAD
 0366    REF   1                36,2466  53'252 1              DXCH     AVGEXIT

 03661   REF  15  LAST  683     36,2467   3 0005 1             CA       Z            ASSASSINATE CLOKTASK
 03662   REF   9  LAST  732     36,2470  55'162 1              TS       DISPDEX

 0370    REF   1                36,2471   4 0105 1             CS       FLAGWRD9     SET FLAG FOR P70-P71
 0371    REF   1                36,2472   7 4743 1             MASK     LETABBIT
 0372    REF   2  LAST  733     36,2473  26 105 1              ADS      FLAGWRD9

 0373    REF   9  LAST  732     36,2474   4 0103 1             CS       FLAGWRD7     SET SWANDISP TO ENABLE R10.
 0374    REF   1                36,2475   7 4741 0             MASK     SWANDBIT
 0375    REF  10  LAST  733     36,2476  26 103 1              ADS      FLAGWRD7

 03754                          36,2477   0 0006 1             EXTEND                INITIALIZE TIG FOR P70 AND P71.
 03755   REF  19  LAST  733     36,2500   3 0025 0             DCA      TIME2
 03756   REF  29  LAST  733     36,2501  53'442 0              DXCH     TIG

 0376    REF 132  LAST  727     36,2502   3 4755 1             CAF      ZERO         INITIALIZE WCHPHASE AND FLPASS0
 0377    REF   1                36,2503  55'346 0              TS       WCHPHASE
 03771   REF   2  LAST  151     36,2504  55'621 1              TS       WCHPHOLD     ALSO WHCPHOLD
 0378    REF  42  LAST  730     36,2505   3 4752 0             CA       TWO
 0379    REF   2  LAST  151     36,2506  55'623 0              TS       FLPASS0

 0380    REF   2  LAST  726     36,2507   1 2545 0             TCF      P42IGN
 0381    REF  21  LAST  732     36,2510   4 0101 0   P40IGN    CS       FLAGWRD5     (13)
 0382    REF   1                36,2511   7 4740 1             MASK     NOTHRBIT
 0383                           36,2512   0 0006 1             EXTEND
 0384    REF   3  LAST  733     36,2513   1 2545 0             BZF      P42IGN
 0385    REF   3  LAST  732     36,2514   3 1422 1             CA       ZOOMTIME
 0386    REF  33  LAST  732     36,2515   0 5203 0             TC       WAITLIST
 0387    REF  22  LAST  732     E7,1515                        EBANK=   OVCNTR
 03875   REF   3  LAST  732     36,2516    03667 0             2CADR    ZOOM
 03875                          36,2517    72067 0
 0388    REF   5  LAST  732     36,2520   0 5327 1   P63IGN1   TC       2PHSCHNG
 0389                          36,2521   40033 0            OCT     40033          3.5SPOT FOR ZOOM RESTART.
 0390                          36,2522   05014 1            OCT     05014          TYPE C    RESTARTS HERE IMMEDIATELY
 0391                          36,2523   77777 0            OCT     77777

 0392    REF   4  LAST  733    36,2524  1 2545 0            TCF     P42IGN
 0398    REF   6  LAST  524    36,2525  3 5015 0  P12IGN    CAF     EBANK6
 0398C5  REF  22  LAST  715    36,2526  54 003 0            TS      EBANK
 03981   REF   7  LAST  225    E6,1536                      EBANK=  AOSQ

 039814  REF   1               36,2527  3 1412 1            CA      IGNAOSQ        INITIALIZE DAP BIAS ACCELERATION
 039815  REF   8  LAST  734    36,2530  55'536 1            TS      AOSQ                ESTIMATES AT P12 IGNITION.
 03982   REF   1               36,2531  3 1413 0            CA      IGNAOSR
 039825  REF   1               36,2532  55'540 0            TS      AOSR

 03983   REF   5  LAST  680    36,2533  3 5016 0            CAF     EBANK7
 039835  REF  23  LAST  734    36,2534  54 003 0            TS      EBANK
 03984   REF  23  LAST  733    E7,1515                      EBANK=  DVCNTR

 0399    REF  16  LAST  733    36,2535  3 0005 1  ABRTIGN   CA      Z              (13) KILL CLOKTASK
 0400    REF  10  LAST  733    36,2536  55'162 1            TS      DISPDEX

 04001                         36,2537  0 0006 1            EXTEND                 CONNECT ASCENT GYIDANCE TO SERVICER.
 04002   REF   1               36,2540  3 3145 1            DCA     ATMAGADR
 04003   REF   2  LAST  733    36,2541  53'252 1            DXCH    AVGEXIT

 0401    REF  11  LAST  733    36,2542  4 0103 1            CS      FLAGWRD7       ENABLE R10.
 0402    REF   2  LAST  733    36,2543  7 4741 0            MASK    SWANDBIT
 0403    REF  12  LAST  734    36,2544  26 103 1            ADS     FLAGWRD7

 0405    REF   1               36,2545  4 4744 0  P42IGN    CS      DRIFTBIT       ENSURE THAT POWERED-FLIGHT SWITCHING
 0409    REF  14  LAST  732    36,2546  7 0111 1            MASK    DAPBOOLS         CURVES ARE USED.
 0410    REF  15  LAST  734    36,2547  54 111 1            TS      DAPBOOLS
 0411    REF   1               36,2550  3 4743 0            CAF     IMPULBIT       EXAMINE IMPULSE SWITCH
 0412    REF  18  LAST  683    36,2551  7 0076 1            MASK    FLAGWRD2
 0413    REF 221  LAST  718    36,2552  10 000 0            CCS     A
 0414    REF   1               36,2553  1 3526 1            TCF     IMPLBURN

 0415    REF  69  LAST  731    36,2554  0 5516 0  DVMONCON  TC      DOWNFLAG
 0416    REF   2  LAST  731    36,2555   00153 0            ADRES   IGNFLAG        CONNECT DVMON
 0417    REF  70  LAST  734    36,2556  0 5516 0            TC      DOWNFLAG
 0418    REF   2  LAST  731    36,2557   00154 1            ADRES   ASTNFLAG
 0419    REF  71  LAST  734    36,2560  0 5516 0            TC      DOWNFLAG
 0420    REF   1               36,2561   00161 1            ADRES   IDLEFLAG

 0421    REF  34  LAST  732    36,2562  0 5353 1            TC      PHASCHNG
 0422                          36,2563   40054 1            OCT     40054

 0423    REF  11  LAST  705    36,2564  0 5221 0            TC      FIXDELAY       TURN ULLAGE OFF HALF A SECOND AFTER
 0424                          36,2565   00062 0            DEC     50             LIGHT UP.
 0425    REF   1                 36,2566  0 2657 1  ULLAGOFF TC      NOULLAGE

 0426                            36,2567  0 0006 1  WAITABIT EXTEND                   KILL GROUP 4
 0427    REF  12  LAST  731      36,2570  3 4755 1           OCA     NEGO
 0428    REF   4  LAST  730      36,2571  52 760 1           DXCH    -PHASE4

 0429    REF  46  LAST  732      36,2572  1 5261 0           TCF     TASKOVER


 04292   REF  42  LAST  731      36,2573  0 4635 0  TIGTASK  TC      POSTJUMP         (12)
 04293   REF   1                 36,2574   73656 0           CADR    TIGTASK1

R0430                                        *************************************

 04302                           31,2144                     BANK    31
 04303   REF   1                 35,2000                     SETLOC  P40S3
 04304                           35,3656                     BANK
 04305   REF   1                                             COUNT*  $$/P40

 0431    REF   6  LAST  474      35,3656  3 5026 0  TIGTASK1 CAF     PRIO16
 0432    REF  18  LAST  729      35,3657  0 5072 1           TC      NOVAC
 0433    REF   6  LAST  611      E7,1462                     EBANK=  TRKMKCNT
 0434    REF   1                 35,3660   03245 1           2CADR   TIGNOW
 0434    REF   1                 35,3661   74067 0
 04342   REF  72  LAST  734      35,3662  0 5516 0           TC      DOWNFLAG
 04344   REF   3  LAST  287      35,3663   00303 1           ADRES   PULSEFLG

 0435    REF  35  LAST  734      35,3664  0 5353 1           TC      PHASCHNG
 0436                            35,3665   00006 1           OCT     6                KILL GROUP 6.

 0437    REF  47  LAST  735      35,3666  1 5261 0           TCF     TASKOVER


R0438                                        *************************************

 0439    REF   4  LAST  732      35,3667  0 5321 1  ZOOM     TC      CHECKMM          P40 OR P63?
 0440                            35,3670   00077 1           DEC     63
 0441    REF   1                 35,3671  1 3677 0           TCF     P40ZOOM

 0442    REF  44  LAST  711      35,3672  0 5504 0  P63ZOOM  TC      UPFLAG           INDICATE THAT THROTTLE-UP HAS COME
 0443    REF   2  LAST  731      35,3673   00122 0           ADRES   ZOOMFLAG

 0445    REF  25  LAST  727      35,3674  0 4674 0           TC      IBNKCALL
 0446    REF   1                 35,3675   62327 0           CADR    FLATOUT
 04462   REF   1                 35,3676  1 3704 0           TCF     P40ZOOMA

 04463   REF  28  LAST  722      35,3677  3 4737 0  P40ZOOM  CAF     BIT13
 04464   REF   2  LAST  213      35,3700  54 055 0           TS      THRUST
 04465   REF  30  LAST  715      35,3701  3 4750 1           CAF     BIT4
 04466                         35,3702  0 0006 1                EXTEND
 04467  REF   8  LAST  540     35,3703  05 014 1                WOR     CHAN14

 0447   REF  36  LAST  735     35,3704  0 5353 1  P40ZOCMA TC      PHASCHNG
 0448                          35,3705   00003 1                DCT     3
 0449   REF  48  LAST  735     35,3706  1 5261 0                TCF     TASKOVER


 04493                         36,2575                          BANK    36
 04494  REF   4  LAST  725     36,2000                          SETLOC  P40S
 04495                         36,2575                          BANK
 04496  REF   4 LAST  725 TO  735:   361    381*                COUNT*  $$/P40

R0450                                     *************************************
.
 0451   REF  45  LAST  735     36,2575  0 5504 0  COMFAIL  TC      UPFLAG              (15)
 0452   REF   2  LAST  734     36,2576   00161 1           ADRES   IDLEFLAG
 0453   REF  46  LAST  736     36,2577  0 5504 0           TC      UPFLAG              SET FLAG TO SUPPRESS CONFLICTING DISPLAY
 0454   REF   1                36,2600   00175 1           ADRES   FLUNDISP
 0455   REF  10  LAST  447     36,2601  3 4751 0           CAF     FOUR                RESET DVMON
 0456.  REF  24  LAST  734     36,2602  55'515 0           TS      DVCNTR
 0457   REF   1                36,2603  10 764 0           CCS     PHASE4              CLOCKTASK ACTIVE?
 0458                          36,2604  1 2607 0           TCF     +3                  YES
 0460   REF 191  LAST  730     36,2605  0 4616 1           TC      BANKCALL            OTHERWISE, START IT UP
 0461   REF   1                36,2606   74667 0           CADR    STCLOK1
 0462   REF   1                36,2607  4 4765 0     +3    CS      V8970EX
 0463   REF  11  LAST  734     36,2610  55'162 1           TS      DISPDEX
 0464   REF  37  LAST  736     36,2611  0 5353 1           TC      PHASCHNG            TURN OFF GROUP 4.
 0465                          36,2612   00004 0           DCT     00004
 04655  REF 110  LAST  729     36,2613  1 5155 1           TCF     ENDOFJOB

 0466   REF  14  LAST  733     36,2614  51'455 1  COMFAIL1 INDEX   WHICH
 0467                          36,2615  1 0002 1           TCF     2

 0468   REF  17  LAST  734     36,2616  3 0005 1  COMFAIL3 CA      Z                   (15)       KILL CLCKTASK USING Z
 0469                          36,2617  1 2621 1           TCF      +2

 0470   REF   4  LAST  730     36,2620  4 4762 1  COMFAIL4 CS      CNTDNDEX
 0471   REF  12  LAST  736     36,2621  55'162 1           TS      DISPDEX

 0472   REF  73  LAST  735     36,2622  0 5516 0           TC      DOWNFLAG            RECONNECT DV MONITOR
 0473   REF   3  LAST  736     36,2623   00161 1           ADRES   IDLEFLAG
 0474   REF  74  LAST  736     36,2624  0 5516 0           TC      DOWNFLAG            PERMIT GUIDANCE LOOP DISPLAYS
 0475   REF   2  LAST  736     36,2625   00175 1           ADRES   FLUNDISP
 0476   REF 111  LAST  736     36,2626  1 5155 1           TCF     ENDOFJOB


 0477   REF  38  LAST  736     36,2627  0 5353 1  COMFAIL2 TC      PHASCHNG            KILL ZOOM RESTART PROTECTION
 0478                          36,2630   00003 1           DCT     00003
 0479                             36,2631  0 0004 0            INHINT
 0480   REF  10  LAST  598        36,2632  0 6032 0            TC       KILLTASK          KILL ZOOM, IN CASE IT'S STILL TO COME
 0481   REF   4  LAST  733        36,2633   73667 1            CADR     ZOOM
 0482   REF  26  LAST  735        36,2634  0 4674 0            TC       IBNKCALL          COMMAND ENGINE OFF
 0483   REF   1                   36,2635   75565 0            CADR     ENGINOF4
 04832  REF  47  LAST  736        36,2636  0 5504 0            TC       UPFLAG            SET THE DRIFT BIT FOR THE DAP.
 04834  REF   1                   36,2637   00312 1            ADRES    DRIFTDFL
 0484   REF   1                   36,2640  0 2651 1            TC       INVFLAG           USE OTHER RCS SYSTEM
 0485   REF   1                   36,2641   00310 0            ADRES    ACRBTFLG
 0486   REF  48  LAST  737        36,2642  0 5504 0            TC       UPFLAG            TURN ON ULLAGE
 0487   REF   2  LAST  226        36,2643   00314 1            ADRES    ULLAGFLG
 0488   REF  35  LAST  737        36,2644  3 4753 1            CAF      BIT1
 0489                             36,2645  0 0004 0            INHINT
 0490   REF  14  LAST  731        36,2646  0 5173 1            TC       TWIDDLE
 0491   REF   4  LAST  730        36,2647   02354 1            ADRES    TIG-5
 0492   REF 112  LAST  736        36,2650  1 5155 1            TCF      ENDOFJOB


R0493                                                 ****************************************
R0494                                                 SUBROUTINES OF THE IGNITION ROUTINE
R0495                                                 ****************************************

 0496   REF 190  LAST  685        36,2651  3 0002 0  INVFLAG   CA       Q
 0497   REF   1                   36,2652  0 5522 1            TC       DEBIT
 0498                             36,2653  4 0000 0            COM
 0499                             36,2654  0 0006 1            EXTEND
 0500   REF  14  LAST  562        36,2655  06 001 0            RXOR     LCHAN
 0501   REF   1                   36,2656  1 5511 0            TCF      COMFLAG

R0502                                                 ****************************************

 0503   REF   1                   36,2657  4 4746 1  NOULLAGE  CS       ULLAGER           MUST BE CALLED IN A TASK OR UNDER INHINT
 0504   REF  16  LAST  734        36,2660  7 0111 1            MASK     DAPBOOLS
 0505   REF  17  LAST  737        36,2661  54 111 1            TS       DAPBOOLS
 0506   REF 191  LAST  737        36,2662  0 0002 0            TC       Q

R0507                                                 ****************************************

 0508   REF  18  LAST  737        36,2663  4 0111 1  ONULLAGE  CS       DAPBOOLS          TURN ON ULLAGE.  MUST BE CALLED IN
 0509   REF   2  LAST  737        36,2664  7 4746 1            MASK     ULLAGER           A TASK OR WHILE INHINTED.
 0510   REF  19  LAST  737        36,2665  26 111 1            ADS      DAPBOOLS
 0511   REF 192  LAST  737        36,2666  0 0002 0            TC       Q

R0512                                                 ****************************************

 0513   REF 133  LAST  733        36,2667  3 4755 1  STCLOK1   CA       ZERO              THIS ROUTINE STARTS THE COUNT-DOWN
 0514   REF  13  LAST  736        36,2670  55 162 1  STCLOK2   TS       DISPDEX             (CLOCKTASK AND CLOCKJOB).   SETTING
 0515    REF   9  LAST  578   36,2671  0 4645 1  STCLOK3  TC     MAKECADR      SETTING DISPDEX POSITIVE KILLS IT.
 0516    REF   9  LAST  730   36,2672  55'060 1           TS     TBASE4        RETURN SAVE (NOT FOR RESTARTS)
 0517                         36,2673  0 0006 1           EXTEND
 0518    REF  30  LAST  733   36,2674  3 1442 1           DCA    TIG
 0519    REF 292  LAST  728   36,2675  52 155 1           DXCH   MPAC
 0520                         36,2676  0 0006 1           EXTEND
 0521    REF  20  LAST  733   36,2677  4 0025 1           DCS    TIME2
 0522    REF 293  LAST  738   36,2700  20 155 1           DAS    MPAC          HAVE TIG - TIME2, UNDOUBTEDLY A + NUMBER
 0523    REF   7  LAST  438   36,2701  0 7262 0           TC     TPAGREE       POSITIVE, SINCE WE PASSED THE
 0524    REF  12  LAST  720   36,2702  3 4777 1           CAF    1SEC            45 SECOND CHECK
 0525    REF 193  LAST  737   36,2703  54 002 1           TS     Q
 0526    REF 294  LAST  738   36,2704  52 155 1           DXCH   MPAC
 0527    REF  10  LAST  565   36,2705  7 4346 0           MASK   LOW5          RESTRICT MAGNITUDE OF NUMBER IN A
 0528                         36,2706  0 0006 1           EXTEND
 0529    REF 194  LAST  738   36,2707  10 002 1           DV     Q
 0530    REF 102  LAST  730   36,2710  3 0001 0           CA     L             GET REMAINDER
 0531    REF  43  LAST  733   36,2711  6 4752 0           AD     TWO
 0532                         36,2712  0 0004 0           INHINT
 0533    REF  15  LAST  737   36,2713  0 5173 1           TC     TWIDDLE
 0534    REF   3  LAST  655   36,2714   02723 0           ADRES  CLOKTASK
 0535    REF   6  LAST  733   36,2715  0 5327 1           TC     2PHSCHNG
 0536                         36,2716   40036 0           OCT    40036         6.3SPOT FOR CLOKTASK
 0537                         36,2717   05024 1           OCT    05024
 0538                         36,2720   13000 0           OCT    13000

 0539    REF   4  LAST  738   36,2721  3 1060 0           CA     TBASE4
 0540    REF  12  LAST  579   36,2722  0 4640 1           TC     BANKJUMP


 0541    REF   7  LAST  730   36,2723  4 0025 1  CLOKTASK CS     TIME1         SET TBASE6 FOR GROUP 6 RESTART
 0542    REF   1              36,2724  55'064 0           TS     TBASE6

 0543    REF  14  LAST  737   36,2725  11'162 1           CCS    DISPDEX
 0544    REF   1              36,2726  1 2737 1           TCF    KILLCLOK
 0545                         36,2727  12 730 0           NOOP
 0546    REF   3  LAST  510   36,2730  3 7720 0           CAF    PRIO27
 0547    REF  19  LAST  735   36,2731  0 5072 1           TC     NOVAC
 0548    REF  21  LAST  731   E7,1453                     EBANK= TTOGO
 0549    REF   1              36,2732   02743 0           2CADR  CLOKJOB
 0549    REF   1              36,2733   74067 0


 0550    REF  12  LAST  734   36,2734  0 5221 0           TC     FIXDELAY      WAIT A SECOND BEFORE STARTING OVER
 0551                         36,2735   00144 0           DEC    100
 0552    REF   4  LAST  738   36,2736  1 2723 1           TCF    CLOKTASK


 0553                         36,2737  0 0006 1  KILLCLOK EXTEND               KILL RESTART
 0554    REF  13  LAST  735   36,2740  3 4755 1           DCA    NEG0
 0555    REF   2  LAST  216   36,2741  52 764 0           DXCH   -PHASE6
 0556   REF  49  LAST  736    36,2742  1 5261 0             TCF     TASKOVER


 0557                         36,2743  0 0006 1  CLOKJOB    EXTEND
 0558   REF  31  LAST  738    36,2744  4 1442 0             DCS     TIG
 0559   REF  22  LAST  738    36,2745  53'454 1             DXCH    TTOGO
 0560                         36,2746  0 0006 1             EXTEND
 0561   REF  21  LAST  738    36,2747  3 0025 0             DCA     TIME2
 0562   REF  23  LAST  739    36,2750  21'454 1             DAS     TTOGO
 0563                         36,2751  0 0004 0             INHINT
 0564   REF  15  LAST  738    36,2752  11'162 1             CCS     DISPDEX         IF DISPDEX HAS BEEN SET POSITIVE BY A
 0565   REF 113  LAST  737    36,2753  1 5155 1             TCF     ENDOFJOB        TASK OR A HIGHER PRIORITY JOB SINCE THE
 0566   REF 114  LAST  739    36,2754  1 5155 1             TCF     ENDOFJOB        LAST CLOKTASK, AVOID USING IT AS AN
 0567                         36,2755  4 0000 0             COM                     INDEX.
 0568                         36,2756  0 0003 1             RELINT                  *****  DISPDEX MUST NEVER BE -0  *****
 0569   REF 222  LAST  734    36,2757  50 000 1             INDEX   A
 0570   REF   1               36,2760  1 3015 1             TCF     DISPNOW -1      ( -1 DUE TO EFFECT OF CCS )

 0571   REF   1                  4765            V97DEX     =       OCT35           NEGATIVE OF THIS IS PROPER FOR DISPDEX

 05711  REF 134  LAST  737    36,2761  4 4755 0   -35       CS      ZERO            INDICATE VERB 97 PASTE
 05712  REF   1               36,2762  55'066 1             TS      NVWORD1
 0572   REF   1               36,2763  3 0371 1             CA      NVWORD +2       NVWORD+2 CONTAINS V06 & APPROPRIATE NOUN
 0573   REF 192  LAST  736    36,2764  0 4616 1             TC      BANKCALL
 0574   REF   1               36,2765   20474 1             CADR    CLOCPLAY
 0575   REF   1               36,2766  1 3017 0             TCF     STOPCLOK        TERMINATE CLOKTASK ON THE WAY TO POOH
 0576   REF   1               36,2767  1 2614 1             TCF     COMFAIL1
 0577   REF   1               36,2770  1 2627 1             TCF     COMFAIL2

A0583                                                                               THIS DISPLAY IS CALLED VIA ASTNCLOK
 0584   REF   1               36,2771  3 3152 1   -25       CAF     V06N61          IT IS PRIMARILY USED BY THE CREW IN P63
 0585   REF 193  LAST  739    36,2772  0 4616 1             TC      BANKCALL        TO RESET HIS EVENT TIMER TO AGREE WITH
 0586   REF   1               36,2773   20460 1             CADR    REFLASH         TIG.
 0587   REF   2  LAST  739    36,2774  1 3017 0             TCF     STOPCLOK
 0588   REF   1               36,2775  1 3034 1             TCF     ASTNRETN
 0589                         36,2776  1 2771 0             TCF     -5

 0590   REF   1                  4762            CNTDNDEX   =       LOW4            OCT17; NEGATIVE PROPER FOR DISPDEX

 0591   REF  15  LAST  736    36,2777  51'455 1   -17       INDEX   WHICH           THIS DISPLAY COMES UP AT ONE SECOND
 0592                         36,3000  3 0000 1             CAF     0               INTERVALS.  IT IS NORMALLY OPERATED
 0593   REF 194  LAST  739    36,3001  0 4616 1             TC      BANKCALL        BETWEEN TIG-30 SECONDS AND TIG-5 SECONDS
 0594   REF   2  LAST  730    36,3002   20466 1             CADR    REGODSP         REGODSP DOES ITS OWN TCF ENDOFJOB

 0595   REF   2  LAST  471       4760            V99DEX     =       ELEVEN          OCT13; NEGATIVE PROPER FOR DISPDEX

 05955                        36,3003            V99RECYC   EQUALS

 05956  REF  19  LAST  561    36,3003  4 4743 1   -13       CS      BIT9            INDICATE VERB 99 PASTE
 05957  REF   2  LAST  739    36,3004  55'066 1             TS      NVWORD1
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L        BURN, BABY, BURN -- MASTER IGNITION ROUTINE                                     USER'S PAGE NO. 16      E7 S3

 0596   REF  16  LAST  739   36,3005  51'455 1            INDEX   WHICH            THIS IS THE "PLEASE ENABLE ENGINE"
 0597                        36,3006  3 0000 1            CAF     0                DISPLAY; IT IS INITIATED AT TIG-5 SEC
 0598   REF 195  LAST  739   36,3007  0 4616 1            TC      BANKCALL         THE DISPLAY IS A V99NXX, WHERE XX IS THE
 0599   REF   2  LAST  739   36,3010   20474 1            CADR    CLOCPLAY         NOUN THAT HAD PREVIOUSLY BEEN DISPLAYED
 0600   REF   3  LAST  739   36,3011  1 3017 0            TCF     STOPCLOK         TERMINATE  GOTOPOOH TURNS OFF ULLAGE.
 0601   REF   1              36,3012  1 3045 1            TCF     *PROCEED
 0602   REF   1              36,3013  1 3050 0            TCF     *ENTER

 0606   REF  44  LAST  736      4752          BLANKDEX =          TWO              NEGATIVE OF THIS IS PROPER FOR DISPDEX

 0607   REF 196  LAST  740   36,3014  0 4616 1  -2        TC      BANKCALL         BLANK DSKY.  THE DSKY IS BLANKED FOR
 0608   REF   2  LAST  729   36,3015   20457 0            CADR    CLEANDSP         5 SECONDS AT TIG-35 TO INDICATE THAT
 0609   REF 115  LAST  739   36,3016  1 5155 1  DISPNOT   TCF     ENDOFJOB         AVERAGE G IS STARTING.


 0610   REF   1              36,3017  0 3021 1  STOPCLOK  TC      NULLCLOK         STOP CLOKTASK & TURN OFF ULLAGE ON THE
 0611   REF  19  LAST  713   36,3020  1 6001 1            TCF     GOTOPOOH             WAY TO P00  (GOTOPOOH RELINTS)

 0612                        36,3021  0 0004 0  NULLCLOK  INHINT
 0613                        36,3022  0 0006 1            EXTEND
 0614   REF   1              36,3023  23'141 1            QXCH    P40/RET
 0615   REF   2  LAST  735   36,3024  0 2657 1            TC      NOULLAGE         TURN OFF ULLAGE...
 0616   REF  11  LAST  737   36,3025  0 6032 0            TC      KILLTASK            DON'T LET IT COME ON, EITHER...
 0617   REF   3  LAST  730   36,3026   74350 1            CADR    ULLGTASK
 0618   REF  39  LAST  736   36,3027  0 5353 1            TC      PHASCHNG                NOT EVEN IF THERE'S A RESTART.
 0619                        36,3030   00001 0            OCT     1
 0620   REF  18  LAST  736   36,3031  3 0005 1            CA      Z                KILL CLOKTASK
 0621   REF  16  LAST  739   36,3032  55'162 1            TS      DISPDEX
 0622   REF   2  LAST  740   36,3033  0 1141 1            TC      P40/RET


 06222  REF  40  LAST  740   36,3034  0 5353 1  ASTNRETN  TC      PHASCHNG
 06224                       36,3035   04024 0            OCT     04024
 0623   REF 135  LAST  739   36,3036  3 4755 1            CAF     ZERO             STOP DISPLAYING BUT KEEP RUNNING.
 06231  REF  17  LAST  740   36,3037  55'162 1            TS      DISPDEX
 06232  REF   1              36,3040  3 5023 0            CAF     PRIO13
 0625   REF  28  LAST  731   36,3041  0 5105 0            TC      FINDVAC
 0626   REF   2  LAST  125   E5,1757                      EBANK=  STARIND
 0627   REF   1              36,3042   03212 0            2CADR   ASTNRET
 0627   REF   1              36,3043   64065 0
 0628   REF 116  LAST  740   36,3044  1 5155 1            TCF     ENDOFJOB


 0629   REF  49  LAST  737   36,3045  0 5504 0  *PROCEED  TC      UPFLAG
 0630   REF   3  LAST  734   36,3046   00154 1            ADRES   ASTNFLAG

 0631   REF   1              36,3047  1 3106 1            TCF     IGNITE


 0632                        36,3050  0 0004 0  *ENTER    INHINT
 0633   REF  17  LAST  740    36,3051  51'455 1            INDEX   WHICH
 0634                         36,3052  1 0003 0            TCF     3

 0635   REF   2  LAST  213    36,3053  3 4644 0  GOPOST    CAF     PRIO12          (3)  MUST BE LOWER PRIORITY THAN CLOKJOB
 0636   REF  29  LAST  740    36,3054  0 5105 0            TC      FINDVAC
 0637   REF  24  LAST  739    E7,1453                      EBANK=  TTOGO
 0638   REF   2  LAST  242    36,3055   03227 0            2CADR   POSTBURN
 0638                         36,3056   74067 0
 06382                        36,3057  0 0004 0            INHINT                  SET UP THE DAP FOR COASTING FLIGHT.
 06383  REF  27  LAST  737    36,3060  0 4674 0            TC      IBNKCALL
 06384  REF   2  LAST  232    36,3061   40205 1            CADR    ALLCOAST
 0639   REF   2  LAST  740    36,3062  0 3021 1            TC      NULLCLOK
 0640   REF  41  LAST  740    36,3063  0 5353 1            TC      PHASCHNG        4.13 RESTART FOR POSTBURN
 0641                         36,3064   00134 1            OCT     00134

 0642   REF 117  LAST  740    36,3065  1 5155 1            TCF     ENDOFJOB

 0643   REF   3  LAST  729    36,3066  3 5027 1  GOCUTOFF  CAF     PRIO17          (3)
 0644   REF  30  LAST  741    36,3067  0 5105 0            TC      FINDVAC
 0645   REF   5  LAST  733    E7,1516                      EBANK=  TGO
 0646   REF   1               36,3070   02416 0            2CADR   CUTOFF
 0646   REF   1               36,3071   30067 0
 0649   REF  75  LAST  736    36,3072  0 5516 0            TC      DOWNFLAG
 0650   REF   3  LAST  736    36,3073   00175 1            ADRES   FLUNDISP

 06502                        36,3074  0 0004 0            INHINT                  SET UP THE DAP FOR COASTING FLIGHT.
 06504  REF  28  LAST  741    36,3075  0 4674 0            TC      IBNKCALL
 06506  REF   3  LAST  741    36,3076   40205 1            CADR    ALLCOAST
 0651   REF   3  LAST  741    36,3077  0 3021 1            TC      NULLCLOK
 0652   REF  42  LAST  741    36,3100  0 5353 1            TC      PHASCHNG
 0653                         36,3101   07024 0            OCT     07024
 0654                         36,3102   17000 1            OCT     17000
 0655   REF   6  LAST  741    E7,1516                      EBANK=  TGO
 0656   REF   2  LAST  741    36,3103   02416 0            2CADR   CUTOFF
 0656                         36,3104   30067 0
 0657   REF 118  LAST  741    36,3105  1 5155 1            TCF     ENDOFJOB

 0658   REF  13  LAST  734    36,3106  4 0103 1  IGNITE    CS      FLAGWRD7        (2)
 0659   REF   2  LAST  732    36,3107  7 4737 1            MASK    IGNFLBIT
 0660   REF 223  LAST  739    36,3110  1 0000 0            CCS     A
 0661   REF   1               36,3111  1 3122 1            TCF     IGNITE1
 0662   REF  36  LAST  737    36,3112  3 4753 1            CAF     BIT1
 0663                         36,3113  0 0004 0            INHINT
 0664   REF  16  LAST  738    36,3114  0 5173 1            TC      TWIDDLE
 0665   REF   2  LAST  242    36,3115   02432 0            ADRES   IGNITION

 0666   REF   1               36,3116  3 4360 0            CAF     OCT23           IMMEDIATE RESTART AT IGNITION.
 0667   REF 103  LAST  738   36,3117  54 001 1            TS       L
 0668                        36,3120  4 0000 0            COM
 0669   REF   5  LAST  735   36,3121  52 760 1            DXCH     -PHASE4

 0670   REF   5  LAST  726   36,3122  4 4762 1  IGNITE1   CS       CNTDNDEX        RESTORE OLD DISPLAY.
 0671   REF  18  LAST  740   36,3123  55'162 1            TS       DSPDEX

 0672   REF 119  LAST  741   36,3124  1 5155 1            TCF      ENDOFJOB

R0673                                         **********************************************

 0674   REF  29  LAST  664   36,3125  0 5567 0  P40ALM    TC       ALARM           PROGRAM SELECTION NOT CONSISTENT WITH
 0675                        36,3126   01706 1            OCT      1706            VEHICLE CONFIGURATION

 0676   REF   4  LAST  664   36,3127  3 5006 1  REP40ALM  CAF      V05N09          (14)
 0677   REF 197  LAST  740   36,3130  0 4616 1            TC       BANKCALL
 0678   REF  20  LAST  711   36,3131   20477 1            CADR     GOFLASH

 0679   REF  20  LAST  740   36,3132  1 6001 1            TCF      GOTOPOOH        V34E  TERMINATE
 0680                        36,3133  1 3135 1            TCF      +2              PROCEED  CHECK FOR P42
 0681   REF   2  LAST  726   36,3134  1 3127 1            TCF      REP40ALM        V32E  REDISPLAY ALARM

 0682   REF  18  LAST  741   36,3135  51'455 1            INDEX    WHICH           FOR P42, ALLOW CREW TO PROCEED EVEN
 0683                        36,3136  1 0014 0            TCF      14              THOUGH VEHICLE IS UNSTAGED

R0684                                         **********************************************


 0685                        31,2144                      BANK     31
 0686   REF   1              35,2000                      SETLOC   P40S2
 0687                        35,3707                      BANK

 0688   REF   2 LAST  735 TO  736:    25     25*          COUNT*   $$/P40

 0689   REF  10  LAST  738   35,3707  0 4645 1  P40AUTO   TC       MAKECADR        HELLO THERE.
 0690   REF   4  LAST  478   35,3710  55'163 0            TS       TEMPR60         FOR GENERALIZED RETURN TO OTHER BANKS
 0691   REF 198  LAST  742   35,3711  0 4616 1  P40A/P    TC       BANKCALL        SUBROUTINE TO CHECK PGNCS CONTROL
 0692   REF   3  LAST  522   35,3712   54261 0            CADR     G+N,AUTO        AND AUTO STABILIZATION MODES
 0693   REF 224  LAST  741   35,3713  10 000 0            CCS      A               +0  INDICATES IN PGNCS, IN AUTO
 0694   REF   1              35,3714  1 3726 0            TCF      TURNITON        + INDICATES NOT IN PGNCS AND/OR AUTO
 0695   REF   8  LAST  730   35,3715  3 4737 0            CAF      APSFLBIT        ARE WE ON THE DESCENT STAGE?
 0696   REF  13  LAST  730   35,3716  7 0106 1            MASK     FLGWRD10
 0697   REF 225  LAST  742   35,3717  10 000 0            CCS      A
 0698   REF   1              35,3720  1 3733 1            TCF      GOBACK          RETURN
 0699   REF  33  LAST  720   35,3721  3 4747 1            CAF      BIT5            YES, CHECK FOR AUTOTHROTTLE MODE
 0700                        35,3722  0 0006 1            EXTEND
 0701   REF   4  LAST  480   35,3723  02 0030 0           RAND     CHAN30
 0702                        35,3724  0 0006 1            EXTEND
 0703   REF   2  LAST  742   35,3725  1 3733 1            BZF      GOBACK          IN AUTOTHROTTLE MODE -- RETURN
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L        BURN, BABY, BURN -- MASTER IGNITION ROUTINE                                        USER'S PAGE NO. 19       E7 S3

 0704   REF   1                35,3726  3 3735 0  TURNITON CAF       P40A/PMD        DISPLAY V50N25 R1=203  PLEASE PERFORM
 0705   REF 199  LAST  742     35,3727  0 4616 1           TC        BANKCALL        CHECKLIST 203   TURN ON PGNCS ETC.
 0706   REF   3  LAST  517     35,3730   20624 0           CADR      GOPERF1
 0707   REF  21  LAST  742     35,3731  1 6001 1           TCF       GOTOPOOH        V34E  TERMINATE
 0708   REF   1                35,3732  1 3711 1           TCF       P40A/P          RECYCLE
 0709   REF   5  LAST  742     35,3733  3 1163 1  GOBACK   CA        TEMPR60
 0710   REF  13  LAST  738     35,3734  0 4640 1           TC        BANKJUMP        GOODBYE.  COME AGAIN SOON.


 0711                          35,3735   00203 0  P40A/PMD OCT       00203

 0712                          36,3137                     BANK      36
 0713   REF   5  LAST  736     36,2000                     SETLOC    P40S
 0714                          36,3137                     BANK

 0715   REF   5 LAST  736 TO  742:   226   607*            COUNT*    $$/R40

R0716                                            ************************************
R0717                                            CONSTANTS FOR THE IGNITION ROUTINE
R0718                                            ************************************

 0719   REF   1                36,2107            SERVCADR =         R63TABLE  +7

 0720   REF   1                36,3137   02040 1  P40ADRES ADRES     P40TABLE

 0721   REF   1                36,3140   02050 0  R41ADRES ADRES     R41TABLE -5

 0722   REF   1                36,3141   02063 0  P42ADRES ADRES     P42TABLE

 0723   REF  25  LAST  736     E7,1515                     EBANK=    OVCNTR
 0724   REF   1                36,3142   02423 0  LUNLANAD 2CADR     LUNLAND
 0724   REF   1                36,3143   62067 1


 0727   REF  26  LAST  743     E7,1515                     EBANK=    OVCNTR
 0728   REF   1                36,3144   03372 1  ATMAGADR 2CADR     ATMAG
 0728   REF   1                36,3145   70067 1
 0729   REF  22  LAST  743       6001             ?        =         GOTOPOOH

 0730                          36,3146   00000 1  D29.9SEC 2DEC      2990
 0730                          36,3147   05656 1


 0731                          36,3150   04672 0  S24.9SEC DEC       2490


 0732                          36,3151   00752 1  4.9SEC   DEC       490

 0733   REF  34  LAST  742       4747             OCT20    =         BIT5
 07331                         36,3152   01475 0  VC6N61    VN      0661
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P0735              KILLTASK
R0736     MOD NO: NEW PROGRAM
R0737     MOD BY: COVELLI

R0738     FUNCTIONAL DESCRIPTION:

R0739        KILLTASK IS USED TO REMOVE A TASK FROM THE WAITLIST BY SUBSTITUTING ANULL TASK CALLED 'NULLTASK' (OF COURSE),
R0741     WHICH MERELY DOES A TC TASKOVER. IF THE SAME TASK IS SCHEDULED MORE THAN ONCE, ONLY THE ONE WHICH WILL OCCUR
R0743     FIRST IS REMOVED. IF THE TASK IS NOT SCHEDULED, KILLTASK TAKES NO ACTION AND RETURNS WITH NO ALARM. KILLTASK
R0745     LEAVES INTERRUPTS INHIBITED SO CALLER MUST RELINT

R0746     CALLING SEQUENCE:

A0748                                               L         TC       KILLTASK        IN FIXED-FIXED
A0749                                               L+1       CADR     ????????        CADR (NOT 2CADR) OF TASK TO BE REMOVED.
A0750                                               L+2      (RELINT)                  RETURN

R0751     EXIT MODE:  AT L+2 OF CALLING SEQUENCE.

R0752     ERASABLE INITIALIZATION=  NONE.

R0753     OUTPUT:  2CADR OF NULLTASK IN LST2

R0754     DEBRIS:  ITEMP1 - ITEMP4, A,L,Q.

 0755     REF  19  LAST  223   E3,1410                               EBANK= LST2
 0756                             6032                               BLOCK  3               KILLTASK MUST BE IN FIXED-FIXED.
 0757     REF   3  LAST  566      6100                               SETLOC FFTAG6
 0758                             6032                               BANK
 0759     REF   1                                                    COUNT* $$/KILL
 0760     REF   1                 6032  3 6041 1  KILLTASK CA       KILLBB
 07605                            6033  0 0004 0           INHINT
 0761     REF 226  LAST  742      6034  22 000 1           LXCH     A
 0762     REF 195  LAST  738      6035  50 002 0           INDEX    Q
 0763                             6036  3 0000 1           CA       0                     GET CADR.
 0764     REF  17  LAST  590      6037  22 006 1           LXCH     BBANK
 0765     REF   1                 6040  1 2200 0           TCF      KILLTSK2              CONTINUE IN SWITCHED FIXED

 0766     REF  20  LAST  745   E3,1410                     EBANK= LST2
 0767     REF   2  LAST  745      6041    56063 1 KILLBB   BBCON    KILLTSK2


 0768                          27,2200                     BANK     27

 0769     REF   3  LAST   44   27,2000                     SETLOC P40S1
 0770                          27,2200                     BANK
 0771     REF   1                                          COUNT* $$/KILL

 0772     REF  10  LAST  548   27,2200  22 062 0  KILLTSK2 LXCH     ITEMP2                SAVE CALLER'S BBANK
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034928

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 0773   REF 196   LAST  745    27,2201  24 002 0            INCR     Q
 0774                          27,2202  0 0006 1            EXTEND
 0775   REF  29   LAST  617    27,2203  22 061 0            QXCH     ITEMP1          RETURN 2CADR IN ITEMP1,ITEMP2

 0776   REF  15   LAST  563    27,2204  54 063 0            TS       ITEMP3          CADR IS IN A
 0777   REF   5   LAST  459    27,2205  7 5012 0            MASK     LOW10
 0778   REF  21   LAST  435    27,2206  6 4741 1            AD       BIT11
 0779   REF   6   LAST  561    27,2207  54 064 1            TS       ITEMP4          GENADR OF TASK

 0780   REF   6   LAST  746    27,2210  4 5012 0            CS       LOW10
 0781   REF  16   LAST  746    27,2211  7 0063 0            MASK     ITEMP3
 0782   REF  17   LAST  746    27,2212  54 063 0            TS       ITEMP3          FBANK OF TASK

 0783                          27,2213  22 007 0            ZL
 0784   REF 104   LAST  742    27,2214  50 001 0  ADRSCAN   INDEX    L
 0785   REF  21   LAST  745    27,2215  4 1410 1            CS       LST2
 0786   REF   7   LAST  746    27,2216  6 0064 0            AD       ITEMP4          COMPARE GENADRS
 0787                          27,2217  0 0006 1            EXTEND
 0788   REF   1                27,2220  1 2232 1            BZF      TSTFBANK        IF THEY MATCH, COMPARE FBANKS
 0789   REF   1                27,2221  4 4747 0  LETITLIV  CS       LSTLIM
 0790   REF 105   LAST  746    27,2222  6 0001 0            AD       L
 0791                          27,2223  0 0006 1            EXTEND                   ARE WE DONE?
 0792   REF   1                27,2224  1 2230 0            BZF      DEAD            YES - DONE, SO RETURN
 0793   REF 106   LAST  746    27,2225  24 001 0            INCR     L
 0794   REF 107   LAST  746    27,2226  24 001 0            INCR     L
 0795   REF   1                27,2227  1 2214 0            TCF      ADRSCAN         CONTINUE LOOP.

 0796   REF  30   LAST  746    27,2230  52 062 1  DEAD      DXCH     ITEMP1
 0797                          27,2231  52 006 0            DTCB

 0798   REF   7   LAST  746    27,2232  4 5012 0  TSTFBANK  CS       LOW10
 0799   REF 108   LAST  746    27,2233  50 001 0            INDEX    L
 0800   REF  22   LAST  746    27,2234  7 1411 0            MASK     LST2 +1         COMPARE FBANKS ONLY.
 0801                          27,2235  0 0006 1            EXTEND
 0802   REF  18   LAST  746    27,2236  60 063 1            SU       ITEMP3
 0803                          27,2237  0 0006 1            EXTEND
 0804   REF   1                27,2240  1 2242 0            BZF      KILLDEAD        MATCH - KILL IT.
 0805   REF   1                27,2241  1 2221 0            TCF      LETITLIV        NO MATCH - CONTINUE.

 0806   REF   1                27,2242  3 4353 0  KILLDEAD  CA       TCTSKOVR
 0807   REF 109   LAST  746    27,2243  50 001 0            INDEX    L
 0808   REF  23   LAST  746    27,2244  55 1410 1           TS       LST2            REMOVE TASK BY INSERTING TASKOVER
 0809   REF   2   LAST  746    27,2245  1 2230 0            TCF      DEAD

 0810   REF  35   LAST  743       4747            LSTLIM    EQUALS   BIT5            DEC 16
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R0001    PROGRAM DESCRIPTION  P40BOTH     DECEMBER 22, 1966
R0002    MOD 03 BY PETER ADLER            MARCH 3, 1967
R0003    CALLED VIA JOB FROM V37E

R0004    FUNCTIONAL DESCRIPTION

R0005             1)  TO COMPUTE A PREFERRED IMU ORIENTATION AND A PREFERRED VEHICLE ATTITUDE FOR A LM DPS
R0007                 THRUSTING MANEUVER.

R0008             3)  TO DO THE VEHICLE MANEUVER TO THE THRUSTING ATTITUDE.

R0009             4)  TO CONTROL THE PGNCS DURING COUNTDOWN, IGNITION, THRUSTING, AND THRUST TERMINATION OF A
R0011                 PGNCS CONTROLLED DPS MANEUVER.

R0012             5)  IN POSTBURN--ZERO RENDEZVOUS COUNTER, MAINTAIN VG CALCULATIONS FOR POSSIBLE RCS MANEUVER,
R0014                         SET MAXIMUM DEADBAND IN DAP, RESET STEERLAW CSTEER TO ZERO.

R0016             NOTE:  P42, WHICH IS IN THIS LOG SECTION, DOES THE SAME FOR AN APS BURN, AND P41 DOES 1-3 FOR
R0018                    RCS PLUS DISPLAYS PARAMETERS FOR MANUAL CONTROL.

R0019    SUBROUTINES USED

R0020             R02       IMU STATUS CHECK
R0021             S40.1     COMPUTATION OF THRUST DIRECTION
R0022             S40.13    LENGTH OF BURN
R0023             S40.2,3   PREFERRED IMU ORIENATTION
R0024             S40.8     X PRODUCT STEERING
R0025             S40.9     LAMBERT VTOGAIN
R0026             R60LEM    ATTITUDE MANEUVER
R0027             LEMPREC   EXTRAPOLATE STATE VECTOR
R0028             PREREAD   AVERAGE G, SERVICER
R0029             ALLCOAST  DAP COASTING INITIALIZATION
R0030             CLOKTASK  ERGO CLOCKJOB--COUNT DOWN
R0031             PHASCHNG, INTPRET, FLAGUP, FLAGDOWN, WAITLIST, LONGCALL, GOFLASH, GOFLASHR, GOPERF1, ALARM,
R0033             PRIOLARM, GOTOPOOH, ENDOFJOB, BANKCALL, SETMAXDB, SETMINDB, CHECKMM, FLATOUT, OUTFLAT,
R0035             KILLTASK, SGNAGREE, TPAGREE, ETC.

R0036    RESTARTS VIA GROUP 4

R0037    DISPLAYS

R0038             V50N25  203 A/P TO PGNCS, AUTO THROTTLE MODE, AUTO ATTITUDE CONTROL
R0040             V06N40  TTI, VG, DELTAVM (DISPLAYED ONCE/SECOND BY CLOKTASK)
R0041             V50N99  PLEASE PERFORM ENGINE ON ENABLE
R0042             V06N40  TG (TIME TO GO TO CUTOFF), VG, DELTAVM--ONCE/SECOND
R0043             V16N40  FINAL VALUES OF TG, VG, DELTAVM
R0044             V16N85  COMP OF VG (BODY AXES) FOR POSS. RCS MANUAL MANEUVER
R0045             V05N09  POSSIBLE ALARMS
R0046             V50N07  PLEASE SELECT P00
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R0047              VIA R30

R0048              V06N44  HAPO, PERI, TFF
R0049              V06N35  TIME TO PERIGEE, HMS

R0050    ALARM OR ABORT EXIT MODES

R0051              PROGRAM ALARM, FLASHING DISPLAY OF ALARM CODE 1706 IF P40 SELECTED WITH DESCENT UNIT STAGED.
R0053              V34E (TERMINATE) IS THE ONLY RESPONSE ACCEPTED. TC GOTOPOOH.

R0054              PROGRAM ALARM, FLASH CODE 1703:  TIG LESS THAN 45 SECS AWAY.  V34E=  GOTOPOOH OR V33E=  SLIP
R0056              TIG BY 45 SECS.

R0057    ERASABLE INITIALIZATION
R0058    DEBRIS
R0059    OUTPUT

R0060              SEE SUBROUTINES E.G.:  S40.1, S40.2,3, S40.13, S40.8, S40.9, TRIMGIMB
R0062              XDELVFLG = 1 FOR EXT DELV COMPUTATION
R0063                       = 0 FOR AIMPT (LAMBERT) COMP

 0064    REF   2 LAST   38 TO   39:    10    10*            COUNT* $$/P40
 0065    REF  19  LAST  742   E7,1455                       EBANK= WHICH

 0066                         36,3153                       BANK    36
 0067    REF   6  LAST  743   36,2000                       SETLOC  P40S
 0068                         36,3153                       BANK

 0069    REF  43  LAST  741   36,3153  0 5353 1   P40LM     TC      PHASCHNG
 00692                        36,3154   04024 0             OCT     04024

 00694   REF   1              36,3155  3 3137 1             CAF     P40ADRES          INITIALIZATION FOR BURNBABY.
 0070    REF  20  LAST  748   36,3156  55'455 0             TS      WHICH

 0071    REF  14  LAST  742   36,3157  3 0106 0             CA      FLGWRD10
 0072    REF   9  LAST  742   36,3160  7 4737 1             MASK    APSFLBIT
 0073    REF 227  LAST  745   36,3161  10 000 0             CCS     A
 0074    REF   1              36,3162  1 3125 0             TCF     P40ALM
 0079    REF 200  LAST  743   36,3163  0 4616 1             TC      BANKCALL          GO DO IMU STATUS CHECK ROUTINE
 0080    REF   4  LAST  506   36,3164   11233 0             CADR    R02BOTH

 00801   REF  20  LAST  737   36,3165  4 0111 1             CS      DAPBOOLS          INITIALIZE DVMON
 00802   REF   5  LAST  257   36,3166  7 4737 1             MASK    CSMDOCKD
 00803   REF 228  LAST  748   36,3167  10 000 0             CCS     A
 00804   REF   1              36,3170  3 2022 0             CAF     THRESH1
 00805   REF   1              36,3171  6 2023 1             AD      THRESH3
 00806   REF   2  LAST  105   36,3172  55'250 0             TS      DVTHRUSH
 00807   REF  11  LAST  736   36,3173  3 4751 0             CAF     FOUR
 00808   REF  27  LAST  743   36,3174  55'515 0             TS      DVCNTR
 0081   REF  59  LAST  729   36,3175   0 6042 1            TC       INTPRET         LOAD CONSTANTS FOR DPS BURN
 0082                        36,3176    43175 0            VLOAD    CLEAR           LOAD F, MDOT, TDECAY
 0083   REF   1              36,3177    34001 1                     FDPS
 0084   REF   1              36,3200    02663 0                     NOTHRTL
 0085   REF   2  LAST  145   36,3201    03735 0            STORE    F
 00852                       36,3202    77735 0            SLOAD
 00854  REF   1              36,3203    26002 1                     DPSVEX
 00856                       36,3204    70476 0  P40IN     DCOMP    SR1
 0086   REF   1              36,3205    37743 0            STCALL   VEX             LOAD EXHAUST VELOCITY FOR TGO COMP.
 0087   REF   1              36,3206    56246 1                     S40.1           COMPUTES UT AND VGTIG
 0088                        36,3207    77624 1            CALL
 0089   REF   1              36,3210    56413 1                     S40.2,3         COMPUTES PREFERRED IMU ORIENTATION
 0090                        36,3211    77776 1            EXIT

 00901                       36,3212   0 0004 0            INHINT
 00902  REF  29  LAST  741   36,3213   0 4674 0            TC       IBNKCALL
 00903  REF   1              36,3214    40143 0            CADR     PFLITEDB        ZERO ATTITUDE ERRORS, SET DB TO ONE DEG.

 0091   REF   1              36,3215   0 3217 0            TC       P40SXT4


R0092                                                   ***********************
 0093   REF   1              36,3216   1 2130 0            TCF      BURNBABY
R0094                                                   ***********************


 0095                        36,3217   0 0006 1  P40SXT4   EXTEND
 0096   REF   3  LAST  740   36,3220   23'141 1            DXCH     P40/RET
 0100                        36,3221   0 0003 1  P41MANU   RELINT

 0101   REF  76  LAST  741   36,3222   0 5516 0            TC       DOWNFLAG        CLEAR 3AXISFLG -- R60 WILL USE VECPOINT.
 0102   REF   6  LAST  523   36,3223    00124 0            ADRES    3AXISFLG

 0103   REF 201  LAST  748   36,3224   0 4616 1            TC       BANKCALL
 0104   REF   4  LAST  523   36,3225    54123 0            CADR     R60LEM          DO ATTITUDE MANEUVER ROUTINE
 0105   REF   4  LAST  749   36,3226   0 1141 1            TC       P40/RET


 0106   REF   7  LAST  735   E7,1462                       EBANK=   TRKMKCNT
 0107   REF  19  LAST  740   36,3227   3 0005 1  POSTBURN  CA       Z
 0108   REF  19  LAST  742   36,3230   55'162 1            TS       DISPDEX
 0109                        36,3231   0 0006 1            EXTEND
 0110   REF   1              36,3232   2 2060 0            DCA      ACADN85
 0111   REF   4  LAST  730   36,3233   53'252 1            DXCH     AVEGEXIT
 0112   REF   1              36,3234   3 3764 1            CAF      V16N40
 0113   REF 202  LAST  749   36,3235   0 4616 1            TC       BANKCALL
 0114   REF   1              36,3236    20636 0            CADR     GOFLASHR
 0115   REF   1              36,3237   0 3262 1            TC       TERM40
 0116   REF   2  LAST  735   36,3240   1 3245 0            TCF      TIGNOW
 0117   REF   3  LAST  741   36,3241   0 3227 0            TC       POSTBURN
 0118   REF  44  LAST  748   36,3242  0 5353 1  P40PHS1  TC      PHASCHNG
 0119                        36,3243   00014 1           OCT     00014
 0120   REF 120  LAST  742   36,3244  1 5155 1           TCF     ENDOFJOB

 0121                        36,3245  0 0004 0  TIGNOW   INHINT
 01211  REF  30  LAST  749   36,3246  0 4674 0           TC      IBNKCALL
 01212  REF   4  LAST  523   36,3247   40154 0           CADR    ZATTEPOR
 0122   REF  31  LAST  750   36,3250  0 4674 0           TC      IBNKCALL
 0123   REF   3  LAST  523   36,3251   40141 1           CADR    SETMINDB
 0124                        36,3252  0 0003 1           RELINT
 0125   REF   2  LAST  730   36,3253  3 3765 0           CAF     V16N85B
 0126   REF 203  LAST  749   36,3254  0 4616 1           TC      BANKCALL
 0127   REF   1              36,3255   20463 1           CADR    REFLASHR
 0128   REF   2  LAST  749   36,3256  0 3262 1           TC      TERM40
 0129   REF   3  LAST  750   36,3257  1 3262 0           TCF     TERM40
 0130                        36,3260  0 3253 0           TC      -5

 01305  REF   1              36,3261  1 3242 1           TCF     P40PHS1

 0131                        36,3262  0 0006 1  TERM40   EXTEND
 0132   REF   1              36,3263  3 2110 0           DCA     SERVCADR
 0133   REF   5  LAST  749   36,3264  53'252 1           DXCH    AVEGEXIT
 0134   REF 136  LAST  740   36,3265  3 4755 1           CAF     ZERO
 0135   REF   8  LAST  749   36,3266  55'462 1           TS      TRKMKCNT          ZERO RENDZVS CNTERS
 0136   REF  20  LAST  749   36,3267  3 0005 1           CA      Z
 0137   REF  20  LAST  749   36,3270  55'162 1           TS      DISPDEX
 0138                        36,3271  0 0004 0           INHINT
 0139   REF  32  LAST  750   36,3272  0 4674 0           TC      IBNKCALL
 0140   REF   6  LAST  523   36,3273   40115 0           CADR    RESTOROB
 0141                        36,3274  0 0003 1           RELINT
 0142   REF  23  LAST  743   36,3275  0 6001 0           TC      GOTOPOOH

 0143   REF  21  LAST  748   E7,1455                     EBANK=  WHICH
 0144   REF   1                                          COUNT*  $$/P41
 0145   REF   1              36,3276  3 3140 1  P41LM    CAF     P41ADRES          INITIALIZATION FOR BURNBABY
 0146   REF  22  LAST  750   36,3277  55'455 0           TS      WHICH

 0147   REF 204  LAST  750   36,3300  0 4616 1           TC      BANKCALL
 0148   REF   5  LAST  748   36,3301   11233 0           CADR    R02BOTH

 0149   REF 100  LAST  749   36,3302  0 6042 1           TC      INTPRET           BOTH LM
 0150                        36,3303   71214 0  rPPIN    BON     DLOAD             IF NJETSFLAG IS SET, LOAD 2 JET F
 0151   REF   1              36,3304   00700 0                   NJETSFLG
 0152   REF   1              36,3305   75311 0                   P41FJET1
 0153   REF   1              36,3306   34017 0                   FRCS4             IF NJETSFLAG IS CLEAR, LOAD 4 JET F

 0154   REF   3  LAST  749   36,3307   37735 1  P41FJET  STCALL  F
 0155   REF   1              36,3310   75314 0                   P41IN

 0156                        36,3311   77745 1  P41FJET1 DLOAD
 0157   REF   1                36,3312   34021 0                      FRCS2
 0158   REF   4  LAST  750     36,3313   03735 0             STORE    F

 0159                          36,3314   77624 1  P41IN      CALL
 0160   REF   2  LAST  749     36,3315   56246 1                      S40.1            BOTH
 0164                          36,3316   77624 1  P41NORM    CALL
 0165   REF   2  LAST  749     36,3317   56413 1                      S40.2,3          CALCULATE PREFERRED IMU ORIENTATION AND
 0166                          36,3320   77776 1             EXIT                      SET PFRATFLG.

 0169                          36,3321  0 0004 0             INHINT
 0170   REF  33  LAST  750     36,3322  0 4674 0             TC       IBNKCALL
 0171   REF   5  LAST  750     36,3323   40154 0             CADR     ZATTEROR         ZERO ATTITUDE ERRORS
 0172   REF  34  LAST  751     36,3324  0 4674 0             TC       IBNKCALL
 0173   REF   4  LAST  750     36,3325   40141 1             CADR     SETMINDB         SET 0.3 DEGREE DEADBAND
 0174   REF   2  LAST  749     36,3326  0 3217 0             TC       P40SXT4

 0175   REF 101  LAST  750     36,3327  0 6042 1             TC       INTPRET
 0176                          36,3330   45175 0             VLOAD    CALL             TRANSFORM VELOCITY-TO-BE-GAINED AT TIG
 0177   REF   4  LAST  198     36,3331   03701 1                      VGTIG            FROM REFERENCE COORDINATES TO LM BODY-
 0178   REF   1                36,3332   57267 0                      S41.1            AXIS COORDINATES FOR V16N85 DISPLAY.
 0179   REF   6  LAST  319     36,3333   03502 0             STORE    VGBODY           (SCALED AT 2 (+7) METERS/CENTISECOND)
 0180                          36,3334   77776 1             EXIT

 0181   REF   3  LAST  750     36,3335  3 3765 0             CAF      V16N85B
 0182   REF 205  LAST  750     36,3336  0 4616 1             TC       BANKCALL
 0183   REF   1                36,3337   20447 1             CADR     GODSPRET


 01831  REF   6  LAST  705     36,3340  3 5017 1             CAF      PRIO5
 01832  REF  21  LAST  750     36,3341   55162 1             TS       DISPDEX          FOR SAFETY ONLY
 01833  REF  31  LAST  741     36,3342  0 5105 0             TC       FINDVAC
 01834  REF   3  LAST  244     E7,1700                       EBANK=   VGPREV
 01835  REF   1                36,3343   03365 1             2CADR    DYNMDISP
 01835  REF   1                36,3344   74067 0
 01836  REF   7  LAST  738     36,3345  0 5327 1             TC       2PHSCHNG
 0184                          36,3346   00076 0             OCT      00076            GROUP 6 RESTARTS AT REDO6.7
 0185                          36,3347   04024 0             OCT      04024            GROUP 4 RESTARTS HERE

R0186                                                   ***********************
 0187   REF   1                36,3350  1 2137 1             TCF      BURNBABY
A01871                                                  ***********************


 01872  REF  13  LAST  738     36,3351  3 4777 1  BLNKWAIT   CAF      1SEC
 01873  REF 206  LAST  751     36,3352  0 4616 1             TC       BANKCALL
 01874  REF  12  LAST  720     36,3353   01736 1             CADR     DELAYJOB

 01875  REF  22  LAST  751     36,3354  3 1162 0  REDO6.7    CA       DISPDEX          ON A RESTART, DO NOT PUT UP DISPLAY IF
 01876  REF  45  LAST  740     36,3355  6 4752 0             AD       TWO              BLANKING (BETWEEN TIG-35 AND TIG-30)
R0188                                                   ***********************
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 018801                        36,3356  0 0006 1           EXTEND
 018802 REF   1                36,3357  1 3351 1           BZF     BLNKWAIT

 018803 REF   4  LAST  751     36,3360  3 3765 0           CAF     V16N858
 018804 REF 207  LAST  751     36,3361  0 4616 1           TC      BANKCALL
 018805 REF   2  LAST  751     36,3362   20447 1           CADR    GOOSPRET

 018806 REF   7  LAST  751     36,3363  3 5017 1           CAF     PRIO5
 018807 REF  12  LAST  708     36,3364  0 5146 1           TC      PRIOCHNG

 018808 REF  23  LAST  751     36,3365  3 1162 0  DYNMDISP CA      DISPDEX          A NON-POSITIVE DISPDEX INDICATES PAST
 018809                        36,3366  0 0006 1           EXTEND                   TIG-35, SO SERVICER WILL BE DOING THE
 01881  REF 121  LAST  750     36,3367  6 5155 0           BZMF    ENDOFJOB         UPDATING OF NOUN 85. STOP DYNMDISP.
 018811 REF 102  LAST  751     36,3370  0 6042 1           TC      INTPRET
 018812                        36,3371   45175 0           VLOAD   CALL
 018813 REF   4  LAST  751     36,3372   03701 1                   VGPREV
 018814 REF   2  LAST  751     36,3373   57267 0                   S41.1
 018815 REF   7  LAST  751     36,3374   03502 0           STORE   VGBODY
 018816                        36,3375   77776 1           EXIT
 018817 REF  14  LAST  751     36,3376  3 4777 1           CAF     1SEC
 018818 REF 208  LAST  752     36,3377  0 4616 1           TC      BANKCALL
 018819 REF  13  LAST  751     36,3400   01736 1           CADR    DELAYJOB
 01882  REF   2  LAST  751     36,3401  1 3365 0           TCF     DYNMDISP


 0189   REF 103  LAST  752     36,3402  0 6042 1  CALCN85  TC      INTPRET
 0190                          36,3403   77624 1           CALL
 0191   REF   1                36,3404   75615 1                   UPDATEVG
 0192                          36,3405   45175 0           VLOAD   CALL
 0193   REF   5  LAST  752     36,3406   03701 1                   VGPREV
 0194   REF   3  LAST  752     36,3407   57267 0                   S41.1
 0195   REF   8  LAST  752     36,3410   03502 0           STORE   VGBODY
 0196                          36,3411   77776 1           EXIT
 0197   REF  43  LAST  735     36,3412  0 4635 0           TC      POSTJUMP
 0198   REF   3  LAST  726     36,3413   65746 1           CADR    SERVEXIT

 0199   REF   1                                            COUNT*  $$/P42
 0200   REF  23  LAST  750     E7,1455                     EBANK=  WHICH

 0201   REF  45  LAST  750     36,3414  0 5353 1  P42LM    TC      PHASCHNG
 02012                         36,3415   04024 0           OCT     04024

 02014  REF   1                36,3416  3 3141 0           CAF     P42ADRES         INITIALIZATION FOR BURNBABY
 0202   REF  24  LAST  752     36,3417   55455 0           TS      WHICH

 0203   REF  15  LAST  748     36,3420  4 0106 1           CS      FLGWRD10
 0204   REF  10  LAST  748     36,3421  7 4737 1           MASK    APSFLBIT
 0205   REF 229  LAST  748     36,3422  10 000 0           CCS     A
 0208   REF   2  LAST  748     36,3423  0 3125 1           TC      P40ALM
 0209   REF 209  LAST  752     36,3424  0 4616 1  P42STAGE TC      BANKCALL
 0210    REF   6  LAST  750    36,3425    11233 0             CADR     R02BOTH
 02101   REF   1               36,3426  3 6000 1              CAF      THRESH2       INITIALIZE DVMON
 02102   REF   3  LAST  748    36,3427   55'250 0             TS       OVTHRUSH
 02103   REF  12  LAST  748    36,3430  3 4751 0              CAF      FOUR
 02104   REF  28  LAST  748    36,3431   55'515 0             TS       OVCNTR

 0211    REF 104  LAST  752    36,3432  0 6042 1              TC       INTPRET
 0212                          36,3433    77214 0             SET      VLOAD         LOAD FAPS, MDOTAPS, AND ATDECAY INTO
 0213    REF   5  LAST  699    36,3434    01072 0                      AVFLAG        F, MDOT, AND TDECAY BY VECTOR LOAD.
 0214    REF   1               36,3435    34007 1                      FAPS
 0215    REF   5  LAST  751    36,3436    03735 0             STORE    F
 0216                          36,3437    52135 1             SLOAD    GOTO
 02162   REF   1               36,3440    26001 1                      APSVEX
 02164   REF   1               36,3441    75204 0                      P40IN

 0217    REF  25  LAST  752    E7,1455                        EBANK=   WHICH

 0218    REF   1                                              COUNT*   $$/P47
 0219    REF 210  LAST  752    36,3442  0 4616 1   P47LM      TC       BANKCALL
 0220    REF   7  LAST  753    36,3443    11233 0             CADR     R02BOTH
 0221    REF 105  LAST  753    36,3444  0 6042 1              TC       INTPRET
 0222                          36,3445    77624 1             CALRB
 0223    REF   1               36,3446    27547 1                      MIDTOAV2

 0224    REF 295  LAST  738    36,3447  3 0155 0              CA       MPAC +1
 0225    REF  17  LAST  741    36,3450  0 5173 1              TC       TWIDDLE
 0226    REF   1               36,3451    03453 0             ADRES    STARTP47

 02261   REF 122  LAST  752    36,3452  1 5155 1              TCF      ENDOFJOB

 0227    REF  46  LAST  752    36,3453  0 5353 1   STARTP47   TC       PHASCHNG
 02391                         36,3454    05014 1             OCT      05014
 02392                         36,3455    77777 0             OCT      77777

 02393                         36,3456  0 0006 1              EXTEND
 0240    REF   1               36,3457  3 3770 1              DCA      ACADN83
 0241    REF   6  LAST  750    36,3460   53'252 1             DXCH     AVEGEXIT
 0242    REF   5  LAST  731    36,3461  3 4736 1              CAF      PRIO20
 0243    REF  32  LAST  751    36,3462  0 5105 0              TC       FINDVAC
 0244    REF   4  LAST  318    E7,1622                        EBANK=   DELVIMU
 0245    REF   1               36,3463    03517 1             2CADR    P47BODY
 0245    REF   1               36,3464    74067 0
 0246    REF   2  LAST  242    36,3465  1 2344 1              TCF      REDO4.2       CHECKS PHASE 5 AND GOES TO PREREAD
A0247                                                                                SEE TIG-30 IN BURNBABY.

 0248    REF 106  LAST  753    36,3466  0 6042 1   CALCN83    TC       INTPRET
 0249                          36,3467    53375 0             VLOAD    VAD
 0250    REF   1               36,3470    03502 0                      DELVCTL
 0251    REF   2  LAST  149    36,3471    03527 1                      DELVREF
 0252    REF  11  LAST  682    36,3472    03656 1             STORE    DELVSIN       TEMP STORAGE FOR RESTARTS
 0253                              36,3473   77624 1             CALL
 0254   REF   4  LAST  752         36,3474   57267 0                    S41.1
 0255   REF   5  LAST  753         36,3475   03623 0             STORE  OELVIMU
 0256                              36,3476   77776 1             EXIT
 02561  REF  47  LAST  753         36,3477   0 5353 1            TC     PHASCHNG
 02562                             36,3500   10035 0             OCT    10035           REREADAC AND HERE

 02563  REF 107  LAST  753         36,3501   0 6042 1            TC     INTPRET
 02564                             36,3502   77775 1             VLOAO
 02565  REF  12  LAST  753         36,3503   03656 1                    OELVSIN
 02566  REF   2  LAST  753         36,3504   03502 0             STORE  OELVCTL
 02567                             36,3505   77776 1             EXIT

 0257   REF  44  LAST  752         36,3506   0 4635 0            TC     POSTJUMP
 0258   REF   4  LAST  752         36,3507   65746 1             CAOR   SERVEXIT

 0259   REF   1                    36,3510   3 3766 0  P47BOD    CAF    V1683
 0260   REF 211  LAST  753         36,3511   0 4616 1            TC     BANKCALL
 0261   REF   2  LAST  749         36,3512   20636 0             CAOR   GOFLASHR
 0262   REF  24  LAST  750         36,3513   0 6001 0            TC     GCTCPOCH
 0263   REF  25  LAST  754         36,3514   0 6001 0            TC     GCTOPCOH

 02631  REF   2  LAST  753         36,3515   1 3517 0            TCF    P47BODY

 02632  REF   2  LAST  750         36,3516   1 3242 1            TCF    P40PHS1

 0264   REF 108  LAST  754         36,3517   0 6042 1  P47BODY   TC     INTPRET
 0265                              36,3520   77775 1             VLOAO
 0266   REF   5  LAST  723         36,3521   06524 1                    HI6ZERCS
 0267   REF   6  LAST  754         36,3522   03623 0             STORE  OELVIMU
 0268   REF   3  LAST  754         36,3523   03502 0             STCRE  OELVCTL
 0269                              36,3524   77776 1             EXIT
 0270   REF   1                    36,3525   0 3510 0            TC     P47BOO

 0271   REF   6 LAST  743 TO  745:    12    619*                 COUNT* $$/P40
 0272   REF   7  LAST  741         36,3526   3 1517 0  IMPLBURN  CA     TGO +1
 02721  REF   1                    36,3527   0 3741 0            TC     GETOT
 0273   REF  18  LAST  753         36,3530   0 5173 1            TC     TWIOOLE
 0274   REF   2  LAST  242         36,3531   03546 0             AORES  ENGOFTSK
 0275   REF  77  LAST  749         36,3532   0 5516 0            TC     OOWNFLAG        TURN OFF IGNFLAG
 0276   REF   3  LAST  734         36,3533   00153 0             ADRES  IGNFLAG
 0277   REF  78  LAST  754         36,3534   0 5516 0            TC     OOWNFLAG        TURN OFF ASTNFLG
 0278   REF   4  LAST  740         36,3535   00154 1             AORES  ASTNFLAG
 0279   REF  79  LAST  754         36,3536   0 5516 0            TC     DOWNFLAG        TURN OFF IMPULSW
 0280   REF   1                    36,3537   00044 1             AORES  IMPULSW
 0281   REF  48  LAST  754         36,3540   0 5353 1            TC     PHASCHNG        RESTART PROTECT ENGOFTSK (ENGINOFF)
 0282                              36,3541   40114 1             OCT    40114

 0283   REF  13  LAST  738         36,3542   0 5221 0            TC     FIXDELAY        WAIT HALF A SECONO
 0284                              36,3543   00062 0             OEC    50
 0285    REF   3  LAST  740    36,3544   0 2657 1            TC        NOULLAGE         TURN OFF ULLAGE

 0286    REF  50  LAST  739    36,3545   0 5261 1            TC        TASKOVER

 0287    REF  35  LAST  751    36,3546   0 4674 0  ENGOFTSK  TC        IBNKCALL         THIS CODING ALLOWS ENGINOFF ET AL TO BE
 0288    REF   1               36,3547    75551 1            CADR      ENGINOFF         USED BOTH BY WAITLIST AND BY TC IBNKCALL
 0289    REF  51  LAST  755    36,3550   0 5261 1            TC        TASKOVER

 0290    REF   3  LAST  741    36,3551   3 4644 0  ENGINOFF  CAF       PRIO12           MUST BE LOWER PRIO THAN CLOCKJOB
 0291    REF  33  LAST  753    36,3552   0 5105 0            TC        FINDVAC
 0292    REF   9  LAST  750    E7,1462                       EBANK=    TRKMKCNT
 0293    REF   4  LAST  749    36,3553    03227 0            2CADR     POSTBURN
 0293                          36,3554    74067 0

 0294    REF  37  LAST  741    36,3555   3 4753 1  ENGINOF2  CAF       BIT1
 0295    REF  34  LAST  733    36,3556   0 5203 0            TC        WAITLIST
 0296    REF   4  LAST  726    E6,1422                       EBANK=    OMEGAQ
 0297    REF   1               36,3557    03612 1            2CADR     COASTSET
 0297    REF   1               36,3560    74066 1
 0298    REF  14  LAST  741    36,3561   4 0103 1  ENGINOF1  CS        FLAGWRD7         SET THE IDLE BIT.
 0299    REF   1               36,3562   7 4745 1            MASK      IDLEFBIT
 0300    REF  15  LAST  755    36,3563  26 103 1             ADS       FLAGWRD7

 0301    REF   4  LAST  755    36,3564   0 2657 1            TC        NOULLAGE

 0302                          36,3565   0 0006 1  ENGINOF4  EXTEND
 0303    REF  22  LAST  739    36,3566   3 0025 0            DCA       TIME2
 0304    REF   5  LAST  732    36,3567  53 342 1             DXCH      TEVENT

 0305    REF   4  LAST  732    36,3570   4 4745 1  ENGINOF3  CS        ENGONBIT         INSURE ENGONFLG IS CLEAR.
 03051   REF  22  LAST  733    36,3571   7 0101 0            MASK      FLAGWRD5
 03052   REF  23  LAST  755    36,3572  54 101 0             TS        FLAGWRD5
 03053   REF   7  LAST  732    36,3573   4 4355 1            CS        PRIO30           ENGINOF3 IS USED AS A PRE-ENGINE ARM
 0306                          36,3574   0 0006 1            EXTEND                     SUBROUTINE.
 0307    REF  24  LAST  732    36,3575  02 011 0             RAND      DSALMOUT
 0308    REF   6  LAST  753    36,3576   6 4736 1            AD        PRIO20           TURN OFF THE ENGINE - DPS OR APS
 0309                          36,3577   0 0006 1            EXTEND
 0310    REF  25  LAST  755    36,3600  01 011 0             WRITE     DSALMOUT

 0314    REF  21  LAST  748    36,3601   4 0111 1            CS        DAPBOOLS         TURN OFF TRIM GIMBAL
 0315    REF   1               36,3602   7 4736 0            MASK      USEQRJTS
 0316    REF  22  LAST  755    36,3603  26 111 1             ADS       DAPBOOLS

 0317    REF   1               36,3604   4 4737 1            CS        HIRTHROT         ZERO AUTO-THROTTLE WHENEVER THE ENGINE
 0319    REF   3  LAST  735    36,3605  54 055 0             TS        THRUST           IS TURNED OFF.
 0320    REF  31  LAST  735    36,3606   3 4750 1            CAF       BIT4             THE HARDWARE DOES SO ONLY WHEN THE
 0321                          36,3607   0 0006 1            EXTEND                     ENGINE IS DISARMED.
 0322    REF   9  LAST  736    36,3610  05 014 1             WOR       CHAN14

 0323    REF   2  LAST  565    36,3611   0 4707 0            TC        ISWRETRN
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0324    REF  36   LAST  755    36,3612  0 4674 0  COASTSET TC      IBNKCALL           DO DAP COASTING INITIALIZATION
0325    REF   4   LAST  741    36,3613   40205 1           CADR    ALLCOAST
0326    REF  52   LAST  755    36,3614  0 5261 1           TC      TASKOVER

0327    REF   5   LAST  755    E6,1422                     EBANK=  OMEGAQ
0328                           36,3615   45020 1  UPDATEVG STQ     CALL
0329    REF   3   LAST  144    36,3616   03665 1                   QTEMP1
0330    REF   1                36,3617   56447 0                   S40.8              X-PRODUCT STEERING
0331                           36,3620   43014 0           BDN     80N
03311   REF   4   LAST  692    36,3621   01307 1                   XDELVFLG
03312   REF   4   LAST  756    36,3622   03665 1                   QTEMP1
03313   REF   3   LAST  689    36,3623   03705 0                   NORMSW
03314   REF   1                36,3624   75637 1                   180SETUP
03315                          36,3625   45345 1           DLOAD   DSU
03316   REF   6   LAST  708    36,3626   01234 0                   PIPTIME
03317   REF   1                36,3627   03763 0                   TIGSAVE
03318                          36,3630   50025 0           DSU     BMN
03319   REF   1                36,3631   03432 1                   TNEWA
0332    REF   1                36,3632   75662 1                   GETRANS
03321                          36,3633   43345 1           DLOAD   DAD
03322   REF   2   LAST  756    36,3634   03763 0                   TIGSAVE
03323   REF   2   LAST  756    36,3635   03432 1                   TNEWA
0333    REF   1                36,3636   03765 0           STORE   TIGSAVEP
0336                           36,3637   77776 1  180SETUP EXIT
03361   REF   1                36,3640  10 754 0           CCS     PHASE2
03362   REF   1                36,3641  1 3667 1           TCF     NO.9
0337    REF   4   LAST  299    36,3642  3 4737 0           CAF     PRIO10
0338                           36,3643  0 0004 0           INHINT
0339    REF  34   LAST  755    36,3644  0 5105 0           TC      FINDVAC
0340    REF   2   LAST  145    E7,1706                     EBANK=  VG
0341    REF   1                36,3645   02707 0           2CADR   S40.9              LAMBERT VTOGAIN
0341    REF   1                36,3646   56067 0
0342    REF   8   LAST  751    36,3647  0 5327 1           TC      2PHSCHNG
0343                           36,3650   00172 0           OCT     00172              2.17SPCT FOR S40.9
0344                           36,3651   10035 0           OCT     10035              HERE AND REREADAC AFTER RESTART

0347    REF 109   LAST  754    36,3652  0 6042 1  ENDSTEER TC      INTPRET
034701                         36,3653   77745 1           DLOAD
034702  REF   2   LAST  756    36,3654   03765 0                   TIGSAVEP
03471   REF   3   LAST  756    36,3655   27763 0           STOVL   TIGSAVE
03472   REF   7   LAST  719    36,3656   01220 0                   RN
03473   REF   8   LAST  694    36,3657   26323 1           STOVL   RINIT
03474   REF   7   LAST  719    36,3660   01226 0                   VN
03475   REF   7   LAST  694    36,3661   02331 1           STORE   VINIT
03476                          36,3662   45345 1  GETRANS  DLOAD   DSU
03477   REF   7   LAST  677    36,3663   03631 0                   TPASS4
03478   REF   7   LAST  756    36,3664   01234 0                   PIPTIME
0348    REF   6   LAST  691    36,3665   37452 0           STCALL  DELLT4
0349    REF   5   LAST  756    36,3666   03665 1                   QTEMP1
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03491  REF 110  LAST  756   36,3667  0 6042 1  NO.9       TC      INTPRET
03492                       36,3670   77650 1             GOTO
03493  REF   6  LAST  756   36,3671   03665 1                     OTEMP1
0350   REF 111  LAST  757   36,3672  0 6042 1  STEERING   TC      INTPRET

0351                        36,3673   77624 1             CALL
0352   REF   2  LAST  752   36,3674   75615 1                     UPOATEVG
0353                        36,3675   77776 1             EXIT

0354   REF  29  LAST  753   E7,1515                       EBANK=  DVCNTR
0355                        36,3676  0 0004 0  NSTEER     INHINT
0356   REF   6  LAST  734   36,3677  3 5016 0             CA      EBANK7
0357   REF  24  LAST  734   36,3700  54 003 0             TS      EBANK
0359   REF  19  LAST  734   36,3701  4 0076 1             CS      FLAGWR02        CHECK IMPULSE SWITCH.  IT IS SET EITHER
0360   REF   2  LAST  734   36,3702  7 4743 1             MASK    IMPUL8IT        BY S40.13 IF T8URN<6 SECS OR 8Y S40.8 IF
0361   REF 230  LAST  752   36,3703  10 000 0             CCS     A               STEFRING IS ALMOST OONE.

0362                        36,3704  1 3711 1             TCF      +5             IMPULSW = 0     EXIT
0363   REF  16  LAST  755   36,3705  4 0103 1             CS      FLAGWRD7        IMPULSW = 1     WHY?  CHECK IDLFFLAG
0364   REF   2  LAST  755   36,3706  7 4745 1             MASK    IOLEF8IT            (IOLEFLAG = 0 --> DVMON ON)
0365   REF 231  LAST  757   36,3707  10 000 0             CCS     A
0366                        36,3710  1 3713 0             TCF      +3             OVMON ON-->THRUSTING-->IMPULSW VIA S40.8
0367   REF  45  LAST  754   36,3711  0 4635 0             TC      POSTJUMP        OVMON OFF-->IMPULSW ON VIA S40.13-->EXIT
0368   REF   5  LAST  754   36,3712   65746 1             CADR    SERVEXIT

03681  REF  37  LAST  756   36,3713  0 4674 0             TC      IBNKCALL
03682  REF   3  LAST  365   36,3714   40166 1             CAOR    STOPRATE

0369   REF  80  LAST  754   36,3715  0 5516 0             TC      OOWNFLAG        TURN OFF IMPULSW
0370   REF   2  LAST  754   36,3716   00044 1             AORES   IMPULSW

0371   REF  50  LAST  740   36,3717  0 5504 0             TC      UPFLAG
0372   REF   4  LAST  736   36,3720   00161 1             AORES   IOLEFLAG        TURN OFF DVMON

0373                        36,3721  0 0004 0             INHINT
0374                        36,3722  0 0006 1             EXTENO
0375   REF  32  LAST  739   36,3723  3 1442 1             OCA     TIG
0376   REF 296  LAST  753   36,3724  52 155 1             DXCH    MPAC
0377                        36,3725  0 0006 1             EXTENO
0378   REF  23  LAST  755   36,3726  4 0025 1             OCS     TIME2
0379   REF 297  LAST  757   36,3727  20 155 1             DAS     MPAC
0380   REF   8  LAST  738   36,3730  0 7262 0             TC      TPAGREE
0381   REF 298  LAST  757   36,3731  30 155 0             CAE     MPAC +1
0382   REF   2  LAST  754   36,3732  0 3741 0             TC      GETDT
0391   REF  19  LAST  754   36,3733  0 5173 1             TC      TWIOOLF
0392   REF   3  LAST  754   36,3734   03546 0             AORES   ENGOFTSK
0393   REF   9  LAST  756   36,3735  0 5327 1             TC      2PHSCHNG
0394                        36,3736   40114 1             OCT     40114           ENGOFTSK (ENGINOFF)
0395                        36,3737   00035 1             OCT     00035           SERVICER--REPEAOAC
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 0396    REF 123   LAST   753    36,3740   1 5155 1              TCF      ENDOFJOB

 0397    REF 232   LAST   757    36,3741   10 000 0   GETDT      CCS      A
 0398                            36,3742   1 3745 0              TCF      +3
 0399                            36,3743   1 3745 0              TCF      +2
 0400    REF 137   LAST   750    36,3744   3 4755 1              CAF      ZERO
 0401    REF  83   LAST   716    36,3745   6 4753 1              AD       ONE
 0402    REF 110   LAST   746    36,3746   56 001 0              XCH      L
 0403    REF 138   LAST   758    36,3747   3 4755 1              CAF      ZERO
 0404    REF   8   LAST   754    36,3750   5 3517 1              DXCH     TGO
 0405    REF   9   LAST   758    36,3751   3 1517 0              CA       TGO +1
 0406    REF 197   LAST   746    36,3752   0 0002 0              TC       Q


R0424    ***********************************************************************

 0425                            36,3753   00000 1   SEC15DP    OCT      00000          DON'T SEPARATE
 0426                            36,3754   02734 0   SEC15      DEC      1500           DON'T SEPARATE
 0427                            36,3755   00000 1   SEC30DP    2DEC     3000
 0427                            36,3756   05670 0
 0428                            36,3757   00000 1   SEC45DP    OCT      00000          DON'T MOVE FROM JUST BEFORE SEC45
 0429                            36,3760   10624 0   SEC45      DEC      4500
 0430                            36,3761   00000 1   5SECDP     OCT      00000          DON'T MOVE FROM JUST BEFORE 5SEC
 0431                            36,3762   00764 1   5SEC       DEC      500
 0432                            36,3763   05050 1   26SECS     DEC      2600
 0437                            36,3764   04050 0   V16N40     VN       1640
 0438                            36,3765   04125 0   V16N85B    VN       1685
 0439                            36,3766   04123 0   V1683      VN       1683
 0440    REF  15   LAST   752       4777             SEC01      =        1SEC
 0441    REF   2   LAST   743    36,2057             ACADN85    =        P40TABLE +3

 0442    REF   7   LAST   754    E7,1622                        EBANK=   DELVIMU
 0443    REF   1                 36,3767   03466 0   ACADN83    2CADR    CALCN83
 0443    REF   1                 36,3770   74067 0
R0444    ***************************************************
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P0445   PROGRAM DESCRIPTION S40.1        DATE15NOV66
R0446   MOD NO2          LOG SECTION  P40-P47
R0447   MOD BY ZELDIN AND ADAPTED BY TALAYCO
R0448   FUNCTIONAL DESCRIPTION
R0449             COMPUTE INITIAL THRUST DIRECTION(UT) AND INITIAL VALUE OF VG
R0450             VECTOR(VGTIG).
R0451   CALLING SEQUENCE
R0452          L CALL
R0453        L+1        S40.1
R0454   NORMAL EXIT MODE
R0455             AT L+2 OF CALLING SEQUENCE (GOTO L+2)  NORMAL RETURN OR
R0456             ERROR RETURN IF NOSOFLAG =1
R0457   SUBROUTINES CALLED
R0458             LEMPREC
R0459             INITVEL
R0460             CALCGRAV
R0461             MIDGIM
R0462   ALARM OR ABORT EXIT MODES
R0463        L+2 OF CALLING SEQUENCE,UNSOLVABLE CONIC IF NOSOFLAG=1
R0464   ERASABLE INITIALIZATION REQUIRED
R0465                   WEIGHT/G  ANTICIPATED VEHICLE MASS         DP   B16KGM
R0466             XDELVFLG       1=DELTA-V MANEUVER,0=AIMPT STEER
R0467              F          THRUST FOR ENGINE USED
R0468         IF DELTA-V MANEUVER
R0469             DELVSIN   SPECIFIED DELTA-V REQUIRED IN
R0470                       INERTIAL COORDS. OF ACTIVE VEHICLE
R0471                       AT TIME OF IGNITION                 VECTOR B7M/CS
R0472             DELVSAB   MAG. OF DELVSIN                     DP     B7M/CS
R0473             RTIG      POSITION AT TIME OF IGNITION       VECTOR B29M
R0474             VTIG      VELOCITY AT TIME OF IGNITION       VECTOR B7M/CS
R0475         IF AIMPT STEER
R0476             TIG       TIME OF IGNITION                    DP     B28CS
R0477             RTARG     POSITION TARGET TIME               VECTOR B29M
R0478             CSTEER    C FOR STEER LAW                     DP     B2
R0479             DLTARG    TARGET TIME-IGNITION TIME          DP     B28CS
R0480   OUTPUT
R0481         UT            DESIRED THRUST DIRECTION            VECT. B2M/(CS.CS)
R0482         VGTIG         INITIAL VALUE OF VELOCITY
R0483                       TO BE GAINED (INERT. COORD.)        VECTOR B7M/CS
R0484         DELVLVC       VGTIG IN LOC. VERT. COORDS.                B7M/CS
R0485             BDT   V REQUIRED AT TIG -V REQUIRED AT (TIG-2SEC)
R0486             -GDT  FOR S40.13                                    VECT  B7M/CS
R0487         RTIG          CALC IN S40.1B(AIMPT) FOR S40.2,3  VECTOR B29M
R0488                       POSITION AT TIME OF IGNITION
R0489   DEBRIS      QTEMP1
R0490         MPAC,QPRET
R0491         PUSHLIST
 0492                        14,2347                    BANK    14
 0493   REF   4  LAST   745  27,2000                    SETLOC  P40S1
 0494                        27,2246                    BANK
 0495   REF   1                                        COUNT*  $$/S40.1
 0496                      27,2246   71220 1  S40.1    STO     DLOAD
 0497   REF   3  LAST  622  27,2247   03632 0                  QTEMP
 0498   REF  33  LAST  757  27,2250   03442 0                  TIG
 0498I  REF   4  LAST  756  27,2251   03763 0           STORE   TIGSAVE
 0499                      27,2252   77614 1  DELVTEST BOFF
 0500   REF   5  LAST  756  27,2253   01347 0                  XDELVFLG
 0501   REF   1            27,2254   56336 1                  S40.1B
 0502                      27,2255   77201 1  CALCTHET SETPD   VLOAD
 0503                      27,2256   00001 0                  0
 0504   REF   5  LAST  647  27,2257   03650 1                  VTIG
 0505   REF   8  LAST  756  27,2260   02331 1           STORE   VINIT
 0506                      27,2261   53435 0           VXV     UNIT
 0507   REF   6  LAST  647  27,2262   03642 1                  RTIG
 0508   REF   3  LAST  146  27,2263   27673 0           STOVL   UT                  UP IN UT
 0509   REF   7  LAST  760  27,2264   03642 1                  RTIG
 0510   REF   9  LAST  756  27,2265   02323 1           STORE   RINIT
 0511                      27,2266   65236 0           VSQ     PDDL
 0512                      27,2267   00045 0                  36D
 0513                      27,2270   56205 0           DMP     DDV
 0514   REF   1            27,2271   16412 1                  THETACON
 0515                      27,2272   41205 0           DMP     DMP
 0516   REF   4  LAST  650  27,2273   03664 0                  DELVSAB
 0517   REF   1            27,2274   01244 1                  WEIGHT/G
 0518                      27,2275   77671 1           DDV
 0519   REF   6  LAST  753  27,2276   03735 0                  F
 0520                      27,2277   24017 1           STOVL   14D
 0521   REF  13  LAST  754  27,2300   03656 1                  DELVSIN

 0522                      27,2301   74241 0           DOT     VXSC
 0523   REF   4  LAST  760  27,2302   03673 0                  UT
 0524   REF   5  LAST  760  27,2303   03673 0                  UT
 0525                      27,2304   41552 0           VSL2    PUSH                (DELTAV.UP)UP SCALED AT 2(+7) P.D.L. 0
 0526                      27,2305   65245 1           BVSU    PDDL                DELTA VP SCALED AT 2(+7) P.D.L. 6
 0527   REF  14  LAST  760  27,2306   03656 1                  DELVSIN
 0528                      27,2307   00017 1                  14D
 0529                      27,2310   63356 1           SIN     PDVL
 0530                      27,2311   00007 0                  6D
 0531                      27,2312   53435 0           VXV     UNIT
 0532   REF   6  LAST  760  27,2313   03673 0                  UT
 0533                      27,2314   45561 1           VXSC    STADR
 0534   REF   5  LAST  751  27,2315   50076 0           STOVL   VGTIG               UNIT(VPXUP)SIN(THETAT/2) IN VGTIG.
 0535                      27,2316   65256 0           UNIT    PDDL                UNIT(DELTA VP) IN P.D.L. 6
 0536                      27,2317   00017 1                  14D
 0537                      27,2320   74346 0           COS     VXSC
 0538                      27,2321   74255 0           VAD     VXSC
 0539   REF   6  LAST  760  27,2322   03701 1                  VGTIG
 0540                      27,2323   00045 0                  36D
 0541                      27,2324   53352 0           VSL2    VAD
 0542                      27,2325   77626 0           STADR
 0543   REF   7  LAST  760   27,2326   74076 0            STORE  VGTIG          VG IGNITION SCALED AT 2(+7)M/CS

 0544                        27,2327   77656 1            UNIT
 0545   REF   7  LAST  760   27,2330   27673 0            STOVL  UT             THRUST DIRECTION SCALED AT 2(+1)
 0546   REF   8  LAST  761   27,2331   03701 1                   VGTIG
 0547                        27,2332   45006 0            PUSH   CALL
 0548   REF   1              27,2333   15741 1                   GET.LVC        VGTIG IN LV COOR AT 2(+7)M/CS IN DELVLVC
 0552                        27,2334   77650 1            GOTO
 0553   REF   4  LAST  760   27,2335   03632 0                   QTEMP
 0554                        27,2336   77745 1  S40.13    DLOAD
 0555   REF  34  LAST  760   27,2337   03442 0                   TIG
 0556   REF  42  LAST  728   27,2340   00041 1            STORE  TDEC1
 0557                        27,2341   77621 1            BDSU
 0558   REF   8  LAST  756   27,2342   03631 0                   TPASS4
 0559   REF   7  LAST  756   27,2343   37452 0            STCALL DELLT4         INTERCEPT TIME - TIG.
 0560   REF   7  LAST  709   27,2344   27056 1                   LEMPREC
 0561                        27,2345   40375 1            VLOAD  SETPD          LOAD STATE VECTOR AT TIG FOR INITVEL.
 0562   REF  24  LAST  716   27,2346   00001 0                   RATT
 0563                        27,2347   00001 0                   0
 0564   REF   8  LAST  760   27,2350   03642 1            STORE  RTIG
 0565   REF  10  LAST  760   27,2351   02323 1            STORE  RINIT
 05651                       27,2352   77656 1            UNIT
 05652  REF   2  LAST  149   27,2353   27537 0            STOVL  UNIT/R/
 0566   REF  20  LAST  716   27,2354   00007 0                   VATT
 05665  REF   6  LAST  760   27,2355   03650 1            STORE  VTIG
 0567   REF   9  LAST  760   27,2356   02331 1            STORE  VINIT
 0568                        27,2357   65345 0            DLOAD  PDDL           NUMIT = 0
 0569   REF  11  LAST  679   27,2360   06524 1                   ZEROVECS
 0570   REF   1              27,2361   16406 1                   EPS1
 0571                        27,2362   43214 1            BOFF   DAD
 0572   REF   4  LAST  756   27,2363   03745 1                   NORMSW
 0573   REF   1              27,2364   56366 1                   SMALLEPS
 0574   REF   1              27,2365   16410 0                   EPS2           EPSILON4 = 10 DEGREES OR 45 DEGREES.
 0575                        27,2366   66006 1  SMALLEPS  PUSH   SXA,1
 0576   REF  12  LAST  700   27,2367   02776 0                   RTX1
 0577                        27,2370   45134 0            SXA,2  CALL
 0578   REF  11  LAST  701   27,2371   02777 1                   RTX2
 0579   REF   2  LAST  676   27,2372   22000 1                   INITVEL
 0580                        27,2373   41575 0            VLOAD  PUSH
 0581   REF  11  LAST  692   27,2374   02366 0                   DELVEET3       VGTIG = VR - VN.
 0582   REF   9  LAST  761   27,2375   03701 1            STORE  VGTIG
 0583                        27,2376   77656 1            UNIT                  UT = UNIT (VGTIG)
 0584   REF   8  LAST  761   27,2377   17673 0            STODL  UT
 0585                        27,2400   00045 0                   36D
 0586   REF   3  LAST  316   27,2401   37664 1            STCALL VGDISP         CONVERT VGTIG (IN PUSHLIST ) TO LOCAL
 0587   REF   2  LAST  761   27,2402   15741 1                   GET.LVC        VERTICAL COORDINATES.
 0588                        27,2403   77650 1            GOTO
 0589   REF   5  LAST  761   27,2404   03632 0                   QTEMP

 0590                        27,2405   00707 1  EPS1      2DEC*  2.777777778 E-2*  10 DEGREES AT 1 REVOLUTION.
 0590                        27,2406   03434 1
 0591                              27,2407    03070 0   EPS2       2DEC*   9.722222222 E-2*   35 DEGREES AT 1 REVOLUTION.
 0591                              27,2410    34344 0
 0592                              27,2411    00024 1   THETACON 2DEC     .31830989 B-8
 0592                              27,2412    13714 1
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L         P40-P47                                                                       USER'S PAGE NO.  17       E7 S3

R0593    SUBROUTINE NAME: S40.2,3          MOD. NO. 3 DATE: APRIL 4, 1967

R0594    MODIFICATION BY: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0595    MOD. NO. 4:  JULY 18, 1967:  PETER ADLER (MIT/IL)

R0596    MOD. NO. 5:  OCTOBER 18, 1967:  PETER ADLER (MIT/IL)

R0597    ORIGINALLY BY: SAYDEAN ZELDIN (MIT INSTRUMENTATION LAB) AND RICHARD TALAYCO (SYSTEM DEVELOPMENT CORP)

R0599    S40.2,3 COMPUTES "POINTVSM" WHICH IS THE HALF-UNIT DESIRED THRUST VECTOR IN STABLE-MEMBER COORDINATES FROM "UT"
R0601    WHICH IS THE SAME VECTOR IN REFERENCE COORDINATES.  IT DETERMINES THE CORRECT VALUES FOR "SCAXIS" USING THE +X
R0603    AXIS FOR DPS, APS, AND RCS BURNS.  THE "WINGS-LEVEL HEADS-UP" LM ORIENTATION IS THEN COMPUTED IN REFERENCE
R0605    COORDINATES.  THESE VECTORS ALSO DEFINE THE "PREFERRED IMU ORIENTATION".  UPON COMPLETION OF THIS CALCULATION,
R0607    THE "PREFERRED ATTITUDE COMPUTED" FLAG IS SET (PFRATFLG).


R0608    CALLING SEQUENCE:

A0609                                                  L          CALL                       INTERPRETIVE CALL.
A0610                                                  L +1                S40.2,3
A0611                                                  L +2      (RETURN)                    GIMBAL ANGLE VECTOR IN MPAC.

R0612    SUBROUTINES CALLED:  NONE.

R0613    NORMAL RETURN:  L +2 (SEE CALLING SEQUENCE ABOVE).

R0614    ALARM/ABORT MODES:  NONE.

R0615    INPUT:

R0616              1. REFSMMAT                MATRIX FROM REFERENCE TO STABLE-MEMBER COORDINATES SCALED AT 2.
R0618              2. UT                      HALF-UNIT DESIRED THRUST DIRECTION.
R0619              3. RTIG                    POSITION AT TIG IN REFERENCE COORDINATES.

R0621    OUTPUT:

R0622              1. : XSCREF :              WINGS-LEVEL HEADS-UP LM ORIENTATION
R0623                 : YSCREF :              IN REFERENCE COORDINATES
R0624                 : ZSCREF :              (PREFERRED IMU ORIENTATION).
R0625              2. POINTVSM                DESIRED THRUST DIRECTION IN STABLE-MEMBER COORDINATES.
R0627              3. SCAXIS                  HALF-UNIT OF AXIS TO ALIGN IN STABLE-MEMBER COORDINATES.
R0629              4. PFRATFLG                INTERPRETIVE FLAG.  ON:  PREFERRED ORIENTATION COMPUTED; OFF:  NOT COMPUTED.

R0631    DEBRIS:  NONE.
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 0632   REF   1                                             COUNT* $$/S40.2
 0633                        27,2413   77775 1  S40.2,3   VLOAD                     UT: DESIRED THRUST DIRECTION (HALF-UNIT)
 0634   REF   9  LAST  761   27,2414   03673 0                     UT               (PUT INTO TOP OF PUSH-DOWN-LIST.)
 0635                        27,2415   76521 0            MXV      VSL1             TRANSFORM THRUST DIRECTION TO STABLE-
 0636   REF  22  LAST  728   27,2416   01734 0                     REFSMMAT         MEMBER FROM REFERENCE COORDS (RESCALE).
 0637   REF   5  LAST  522   27,2417   27773 1            STOVL    POINTVSM         SAVE FOR "VECPOINT" ROUTINE (LEMMANU).
 0638   REF   6  LAST  586   27,2420   06522 1                     UNITX            SCAXIS SET TO +X, FOR P40 AND P42 AND
 0639   REF  22  LAST  522   27,2421   27765 0            STOVL    SCAXIS           FOR P41 IF RCS NOT -X,+Y,-Y,+Z,-Z.

 0640   REF  10  LAST  764   27,2422   03673 0                     UT               ASSUME +X BURN ALWAYS, EVEN FOR RCS.
 0641   REF   1              27,2423   03607 0  PLUSX     STORE    XSCREF           XSCREF = UT (DESIRED THRUST DIRECTION.)
 0642                        27,2424   53435 0            VXV      UNIT             RTIG = POSITION AT TIME-OF-IGNITION.
 0643   REF   9  LAST  761   27,2425   03642 1                     RTIG             YSCREF = UNIT(UT X RTIG)
 06431                       27,2426   46125 0            PDDL     BHIZ
 06432                       27,2427   00045 0                     360              TEST MAGNITUDE OF UT X RTIG
 06433  REF   1              27,2430   56441 0                     FIXY             IF SMALL, USE UT X VTIG AS YSC
 06434                       27,2431   45575 1  STORY     VLOAD    STADR
 0644   REF   1              27,2432   74162 1            STORE    YSCREF
 0645                        27,2433   76435 1            VXV      VSL1             COMPUTE (YSCREF X XSCREF),BUT FOR A
 0646   REF   2  LAST  764   27,2434   03607 0                     XSCREF           RIGHT HANDED SYSTEM, NEED (X CROSS Y)
 0647                        27,2435   77676 0            VCOMP                     ZSCREF = - (YSCREF X XSCREF)
 0648   REF   1              27,2436   03623 0            STORE    ZSCREF                   = + (XSCREF X YSCREF)

 0649                        27,2437   43414 1            SET      PVQ
 0650   REF   1              27,2440   01073 1                     PFRATFLG
 06501                       27,2441   47375 0  FIXY      VLOAD    VXV              IN THIS CASE,
 06502  REF   3  LAST  764   27,2442   03607 0                     XSCREF           YSCREF = UNIT(XSCREF X VTIG)
 06503  REF   7  LAST  761   27,2443   03650 1                     VTIG
 06504                       27,2444   41456 0            UNIT     PUSH
 06505                       27,2445   77650 1            GOTO
 06506  REF   1              27,2446   56431 1                     STORY
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P0651   SUBROUTINE S40.8

R0652   MODIFIED APRIL 3, 1969  BY  PETER ADLER   MIT/IL

R0653   DESCRIPTION

R0654         S40.8 UPDATES THE VELOCITY-TO-BE-GAINED VECTOR, VG, (AND FOR LAMBERT TARGETTED BURNS ALSO EXTRAPOLATES VG
R0656   USING THE BDT VECTOR)  COMPUTES THE TIME FOR ISSUING THE ENGINE OFF COMMAND, TGO, AND CALLS THE ROUTINE
R0658   "FINDCDUW", WHICH GENERATES STEERING COMMANDS FOR THE DAP.

R0659   CALLING SEQUENCE

R0660   L-1          CALL
R0661   L                     S40.8
R0662   L+1                                   INTERPRETIVE RETURN

R0663   ALARM

R0664         IF VG . DELVREF IS NEGATIVE (VG AND DELVREF OVER 90 DEGREES APART), BYPASS TGO AND STEERING COMPUTATIONS
R0666   AND SET ALARM 1407.  RETURN TO CALLER NORMALLY.

R0667   INPUT AND INITIALIZATION

R0668   VGPREV              REFERENCE        2(7) M/CS
R0669   DELVREF             REFERENCE        2(7) M/CS
R0670   BDT                 REFERENCE        2(7) M/CS
R0671   TDECAY              TAIL-OFF TIME    2(28)  CS
R0672   XDELVFLG            1 = EXTERNAL DELTA-V;   0 = LAMBERT (AIMPOINT)
R0673   STEERSW             1 = DO STEERING AND TGO COMPUTATIONS; 0 = VG UPDATE ONLY
R0674   FIRSTFLG            1 = GONE TO LAMBERT AT LEAST ONCE;  0 = HAVEN'T GONE TO LAMBERT YET

R0676   NOTE:  VGTIG EQUALS VGPREV

R0677   OUTPUT

R0678   STEERSW             SEE INPUT
R0679   IMPULSW             1 = ENGINE OFF IN TGO CENTISECONDS;  0 = CONTINUE BURN
R0680   TGO                 TIME TO CUT-OFF 2(28)   CS   .
R0681   SEE FINDCDUW FOR STEERING OUTPUTS.

R0682   SUBROUTINE CALLED

R0683         FINDCDUW

R0684   DEBRIS

R0685         MPACS, PUSHLIST

 0686   REF    1                                              COUNT* $$/S40.8
 0687                            27,2447   77614 1  S40.8    BOF                        GENERATE VR IF NOT EXTERNAL DELTA-V BURN
 0688     REF   6  LAST  760     27,2450   01347 0                     XDELVFLG
 0689     REF   1                27,2451   56731 1                     RASTEER1
 0690                            27,2452   52375 1           VLOAD     VSU
 0691     REF   6  LAST  752     27,2453   03701 1                     VGRREV
 0692     PEF   3  LAST  753     27,2454   C3527 1                     OELVREF
 0693     REF   3  LAST  756     27,2455   03707 1  VGAIN*   STORE     VG                    VELOCITY TO BE GAINEO SCALED AT (7)M/CS
 0694                            27,2456   76521 0           MXV       VSL1
 0695     REF  23  LAST  764     27,2457   C1734 0                     REFSMMAT
 0696     REF   3  LAST  202     27,2460   03253 0           STORF     UNFC/2
 0707                            27,2461   51575 1  8DTDK    VLCAD     ABVAL
 0708     PEF   4  LAST  766     27,2462   C3707 1                     VG
 0709     FEF   4  LAST  761     27,2463   03664 0           STORE     VGOISP
 0710                            27,2464   77201 1  TGDCALC  SETPD     VLCAO
 0711                            27,2465   00001 0                     0
 0712     REF   5  LAST  766     27,2466   03707 1                     VG
 0713     PEF   7  LAST  766     27,2467   27701 1           STCVL     VGPREV
 0714     FEF   4  LAST  766     27,2470   03527 1                     OELVREF
 0715                            27,2471   57414 1           BDFF      VCOMP
 0716     REF   1                27,2472   01344 0                     STEERSW
 0717     FFF   4  LAST  713     27,2473   00052 0                     QRRET
 0718                            27,2474   77656 1           UNIT
 0719                            27,2475   41441 0           DDT       RUSH
 0720     PEF   6  LAST  766     27,2476   03707 1                     VG
 0721                            27,2477   55244 0           BPL       OOV
 0722     REF   1                27,2500   56526 0                     ALAPMIT               OELV IS MORE THAN 90 OEGREES FROM VG.
 0723     REF   2  LAST  749     27,25C1   03743 1                     VEX
 0724                            27,2502   41215 1           DAO       OMR
 0725     REF  12  LAST  671     27,2503   06522 1                     OPHALF
 0726                            27,2504   56261 1           SR        DOV
 0727                            27,2505   20613 1                     IOD
 0728                            27,2506   00045 0                     36D
 0729                            27,2507   43205 1           OMP       OAD
 0730     PEF   1                27,2510   16535 0                     -FOUROT
 0731     REF   1                27,2511   03741 C                     TDECAY
 0732     REF  10  LAST  758     27,2512   03517 1           STDRE     TGO
 0733                            27,2513   77615 0           DAC
 0734     PEF   8  LAST  756     27,2514   C1234 0                     PIRTIME
 0735     REF  35  LAST  761     27,2515   17442 0           STDOL     TIG
 0736     REF  11  LAST  766     27,2516   03517 1                     TGC
 0737                            27,2517   51025 1           DSU       BPL
 0738     REF   1                27,2520   16537 1                     FDURSECS              400 CS
 0739     REF   1                27,2521   61100 1                     FINOCDUW -2
 0740                            27,2522   43014 0           SET       CLRGD
 0741     REF   3  LAST  757     27,2523   01066 0                     IMPULSW
 0742     REF   2  LAST  766     27,2524   C1224 1                     STFERSW
 0743     REF   5  LAST  766     27,2525   00052 0                     QRRET

 0744                            27,2526   77776 1  ALARMIT  EXIT
 0745    REF  30  LAST  742   27,2527  0 5567 0            TC      ALARM
 0746                         27,2530   01407 0            OCT     01407
 0747    REF 112  LAST  757   27,2531  0 6042 1            TC      INTPRET
 0748                         27,2532   77650 1            GOTO                      SKIP TGO COMPUTATION BUT CALL FINDCDUW.
 07485   REF   2  LAST  766   27,2533   61100 1                    FINDCDUW -2       FINDCDUW WILL EXIT TO UPDATEVG +3.

 0749                         27,2534   77715 1  -FOURDT   2DEC    -800 B-18         -4 (200 CS.)  B (-18)
 0749                         27,2535   77777 0
 0751                         27,2536   00000 1  FOURSECS  2DEC    400               400 CS SCALED AT 2(+28)CS
 0751                         27,2537   00620 0
 07515   REF   3  LAST  766   E7,1742            2VEXHUST  =       VEX
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R0752   NAME      S40.13 - TIMEBURN
R0753   FUNCTION          (1) DETERMINE WHETHER A GIVEN COMBINATION OF VELOCITY TO
R0754                     BE GAINED AND ENGINE CHOICE RESULT IN A BURN TIME
R0755                     SUFFICIENT TO ALLOW STEERING AT THE VEHICLE DURING THE
R0756                     BURN
R0757                     (2) THE MAGNITUDE OF THE RESULTING BURN TIME -- IF IT
R0758                     IS SHORT --  AND THE ASSOCIATED TIME OF THE ENGINE OFF
R0759                     SIGNAL
R0760   CALLING SEQUENCE  VIA FINDVAC AS A NEW JOB
R0761   INPUT             VGTIG VELOCITY TO BE GAINED VECTOR (METERS/CS) AT +7
R0762                     WEIGHT/G MASS OF VEHICLE IN KGM AT +16
R0763                     F  APS ENGINE THRUST IN M.NEWTONS AT +7
R0764                     AND ALSO FOR RCS ENGINE
R0765                     MDOT RATE OF DECREASE OF VEHICLE MASS DURING ENGINE
R0766                     BURN IN KILOGRAMS/CS  AT +3 . THIS SCALING MAY
R0767                     REQUIRE MODIFICATION FOR SATURN BURNS.
R0768             ENGIFLAG      SWITCH TO DECIDE WHETHER APS OR DPS ENGINE IS USED
R0769                      =0    DPS
R0770                      =1    APS
R0771   OUTPUT            IMPULSW  ZERO FOR STEERING
R0772                               ONE FOR ATTITUDE HOLD
R0773                     NOTHROTL  ZERO FOR THROTTLING
R0774                                ONE  TO INHIBIT THROTTLING
R0775                     TGO  TIME TO BURN IN CS
R0776             THE QUANTITY M.NEWTON = 10000 NEWTONS WILL BE USED TO EXPRESS
R0777                     FORCE


 0778   REF  12  LAST  766   E7,1516                               EBANK= TGC
 0779   REF   1                                                    COUNT* $$/40.13
 0780   REF 113  LAST  767   27,2540   0 6042 1   S40.13           TC      INTPRET
 0781                        27,2541    43001 1                    SETPD   CLEAR
 0782                        27,2542    00001 0                            00D
 0783   REF   4  LAST  766   27,2543    01266 1                            IMPULSW       ASSUME NO STEERING UNTIL FOUND OTHERWISE
 0784                        27,2544    51575 1                    VLOAD   ABVAL
 0785   REF  10  LAST  761   27,2545    03701 1                            VGTIG         VELOCITY TO BE GAINED AT +7
 0786                        27,2546    41325 0                    PDDL    DMP           000 = MAG OF VGTIG AT +7
 0787   REF   1              27,2547    21006 1                            4SEC(17)      CORRECT VG FOR 4 SECS OF 2 JET ULLAGE
 0788   REF   2  LAST  751   27,2550    34021 0                            FRCS2
 0789                        27,2551    72471 0                    DDV     SL1           SCALE
 0790   REF   2  LAST  760   27,2552    01244 1                            WEIGHT/G
 0791                        27,2553    41421 0                    BDSU    PUSH
 0792                        27,2554    43014 0                    BOFF    SET
 0793   REF   1              27,2555    05342 1                            APSFLAG
 0794   REF   1              27,2556    56626 0                            S40.130       FOR DPS ENGINE
 0795   REF   2  LAST  749   27,2557    02463 1                            NOTHROTL
 0796                        27,2560    56345 0                    DLDAD   00D           000 = MAG OF VGTIG CORRECTED
 0797   REF   1              27,2561    16001 1                            K1VAL         M.NEWTONS-CS AT ~~+24~~
 0798   REF   3  LAST  768   27,2562    01244 1                            WEIGHT/G                          +23
 0799                        27,2563    50021 1                    BDSU    BMN
 0800                          27,2564   00001 0                    00D
 0801   REF   1                27,2565   56610 0                    S40.131       TGO LESS THAN 100 CS
 0802                          27,2566   41325 0             PDDL   DMP           020 = TEMP1 AT +7
 0803   REF   2  LAST  145     27,2567   03737 1                    MDOT

R0804   MDOT REPRESENTS THE RATE OF DECREASE OF VEHICLE MASS DURING ENGINE
R0805   BURN IN KILOGRAMS/CS .  WHEN  SATURN IS USED , THE SCALING MAY
R0806   REQUIRE ADJUSTMENT

 0807   REF   1                27,2570   16700 1                    3.5SEC        350 CS AT +14
 0808                          27,2571   65221 0             BDSU   POOL
 0809   REF   4  LAST  768     27,2572   01244 1                    WEIGHT/G
 0810   REF   7  LAST  760     27,2573   03735 0                    F
 0811                          27,2574   60405 0             DMP    SR2           SCALE
 0812   REF   1                27,2575   16702 0                    5SECS
 0813                          27,2576   41471 0             DDV    PUSH          040 = TEMP2
 0814                          27,2577   51021 0             BDSU   8PL
 0815                          27,2600   00003 1                    02D
 0816   REF   2  LAST  768     27,2601   56626 0                    S40.130
 0817                          27,2602   55345 0             DLOAD  BDDV
 0818                          27,2603   43205 1             DMP    DAD
 0819   REF   2  LAST  769     27,2604   16702 0                    5SECS
 0820   REF   1                27,2605   16676 1                    1SEC2D        100 CS AT +14
 0821                          27,2606   77650 1             GOTO
 0822   REF   1                27,2607   56616 0                    S40.132
 0823                          27,2610   41345 0  S40.131    DLOAD  DMP
 0824   REF   5  LAST  769     27,2611   01244 1                    WEIGHT/G
 0825                          27,2612   41542 1             SR1    PUSH
 0826                          27,2613   56215 1             DAD    DDV
 0827   REF   1                27,2614   16003 0                    K2VAL         M.NEWTON CS AT +24
 0828   REF   1                27,2615   16005 0                    K3VAL         M.NEWTON [illegible] AT +10
 0829                          27,2616   77414 0  S40.132    SET    EXIT
 0830   REF   5  LAST  768     27,2617   01066 0                    IMPULSW
 0831   REF   9  LAST  757     27,2620   0 7262 0 S40.132*   TC     TPAGREE
 0832   REF 299  LAST  757     27,2621   3 0154 1            CA     MPAC
 0833   REF 111  LAST  758     27,2622   56 001 0            XCH    L
 0834   REF 139  LAST  758     27,2623   3 4755 1            CA     ZERO
 0835   REF  13  LAST  768     27,2624   53'517 1            DXCH   TGO
 0836   REF   1                27,2625   1 2650 1            TCF    S40.134

 0837                          27,2626   41345 0  S40.130    DLOAD  DMP           FOR DPS ENGINE
 0838                          27,2627   00001 0                    00D
 0839   REF   6  LAST  769     27,2630   01244 1                    WEIGHT/G
 0840                          27,2631   43006 0             PUSH   BON
 0841   REF   2  LAST  768     27,2632   05302 0                    APSFLAG
 0842   REF   1                27,2633   56671 1                    APSTGO
 0843                          27,2634   43071 0             DDV    CLEAR
 0844   REF   1                27,2635   16007 1                    S40.136
 0845   REF   3  LAST  768     27,2636   02663 0                    NOTHROTL
 0846                          27,2637   41400 0             BOV    PUSH
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L          P40-P47                                                                                USER'S PAGE NO.  24       E7 S3

 0847    REF    1                  27,2640    56653 1                    S40.130V
 0848                              27,2641    51025 1  S40.137   DSU     BPL
 0849    REF    1                  27,2642    16704 0                    6SEC               600.0 CS AT +14
 0850    REF    1                  27,2643    56661 0                    S40.138
 0851                              27,2644    52015 1            DAC     GOTO
 0852    REF    2  LAST   770      27,2645    16704 0                    6SEC
 0853    REF    2  LAST   769      27,2646    56616 0                    S40.132
 0854                              27,2647    77776 1  S40.133   EXIT
 0855    REF   49  LAST   754      27,2650    0 5353 1  S40.134  TC      PHASCHNG
 0856                              27,2651    00003 1            OCT     00003
 0857    REF  124  LAST   758      27,2652    0 5155 0           TC      ENDOFJOB
 0858                              27,2653    40545 1  S40.130V  DLOAD   SR4                RECOMPUTE TGO IN TIME2 UNITS
 0859                              27,2654    77671 1            DDV
 0860    REF    1                  27,2655    16011 0                    S40.136_           S40.136 SHIFTED LEFT 10
 0861    REF   14  LAST   769      27,2656    03517 1            STORE   TGO
 0862                              27,2657    77776 1            EXIT
 0863    REF    2  LAST   769      27,2660    1 2650 1           TCF     S40.134            REJOIN COMMON CODING FOR RESTART PROTECT

 0864                              27,2661    51025 1  S40.138   DSU     BPL
 0865    REF    1                  27,2662    16706 1                    89SECS
 0866    REF    1                  27,2663    56666 1                    STORETGO
 0867                              27,2664    77614 1            SET
 0868    REF    4  LAST   769      27,2665    02463 1                    NOTHROTL
 0869                              27,2666    77745 1  STORETGO  DLOAD                      LOAD TGO AT 2(14)
 0870                              27,2667    77776 1            EXIT
 0871    REF    1                  27,2670    1 2620 0           TCF     S40.132*

 0872                              27,2671    62471 1  APSTGO    DDV     SL2
 0873    REF    2  LAST   753      27,2672    34007 1                    FAPS
 08735                             27,2673    77650 1            GOTO
 0874    REF    2  LAST   770      27,2674    56667 0                    STORETGO +1
 0878                              27,2675    00144 0  1SEC2D    2DEC    100.0 B-14         100.0 CS AT +14
 0878                              27,2676    00000 1
 0879                              27,2677    01274 1  3.5SEC    2DEC    350.0 B-13         350 CS AT +13
 0879                              27,2700    00000 1
 0880                              27,2701    00764 1  5SECS     2DEC    500.0 B-14         500.0 CS AT +14
 0880                              27,2702    00000 1
 0881                              27,2703    01130 1  6SEC      2DEC    600.0 B-14         600.0 CS AT +14
 0881                              27,2704    00000 1
 0886                              27,2705    21304 0  89SECS    2DEC    8900.0 B-14
 0886                              27,2706    00000 1
R0888    FUNCTION     (1) GENERATES REQUIRED VELOCITY AND VELOCITY-TO-BE-GAINED
R0889                 VECTORS FOR USE DURING AIMPOINT MANEUVERS EVERY TWO
R0890                 COMPUTATION CYCLES (4 SECONDS).
R0891                 (2) UPDATES THE B VECTOR WHICH IS USED IN THE FINAL
R0892                 CALCULATION OF EXTRAPOLATING THE VELOCITY-TO-BE-GAINED
R0893                 THROUGH ONE 2-SECOND INTERVAL INTO THE FUTURE.
R0894    CALLING SEQ  VIA FINDVAC AS NEW JOB.
R0895    INPUT        RN          - ACTIVE VEHICLE RADIUS VECTOR IN METERS AT +29.
R0896                 VN          - ACTIVE VEHICLE VELOCITY VECTOR IN METERS/CS AT +7
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R0897                 VRPREV   - LAST COMPUTED VELOCITY REQUIRED VECTOR IN
R0898                              METERS/CS AT +7.
R0899                 TIG      - TIME OF IGNITION IN CS AT +28.
R0900                 DLTARG   - COMPUTATION CYCLE INTERVAL = 200 CS AT +28.
R0901                 PIPTIME  - TIME OF RN AND VN IN CS AT +28.
R0902                 GDT/2    - HALF OF VELOCITY GAINED IN DELTA T TIME DUE TO
R0903                              ACCERERATION OF GRAVITY IN METERS/CS AT +7.
R0904                 DELVREF  - CHANGE IN VELOCITY DURING LAST 2 SEC IN
R0905                              METERS/CS AT +7.
R0906      OUTPUT     VGPREV   - VELOCITY TO BE GAINED VECTOR IN METERS/CS AT +7.
R0907                 VGDISP   - MAG OF VGPREV FOR DISPLAY PURPOSES.
R0908                 VRPREV   - VELOCITY REQUIRED VECTOR IN METERS/CS AT +7.
R0909                 BDT      - B VECTOR IN METERS/CS AT +7.
R0910      SUBROUTINES USED  -   INITVEL
 0911      REF   8  LAST  766    E7,1700                     EBANK=  VGPREV
 0912      REF   2 LAST   44 TO   44:      2       2*        COUNT*  $$/S40.9
 0913      REF 114  LAST  768    27,2707  0 6042 1  S40.9    TC      INTPRET
 0914                            27,2710   77601 0           SETPD
 0915                            27,2711   00001 0                   000
 0925                            27,2712   71214 0           SET     DLOAD
 0926      REF   6  LAST  753    27,2713   01072 0                   AVFLAG          SET AVFLAG FOR LEM ACTIVE
 0927      REF   6  LAST  754    27,2714   06524 1                   HI6ZEROS
 0928                            27,2715   77725 1           PDDL
 0929      REF   2  LAST  761    27,2716   16406 1                   EPS1
 0930                            27,2717   43214 1           BOFF    DLOAD           EPSILON4 = 10 OR 45 DEGREES.
 0931      REF   5  LAST  761    27,2720   03745 1                   NORMSW
 0932      REF   1               27,2721   56723 1                   EPSSMALL
 0933      REF   2  LAST  761    27,2722   16410 0                   EPS2
 0934                            27,2723   45006 0  EPSSMALL PUSH    CALL
 0935      REF   1               27,2724   22002 0                   HAVEGLES
 0936                            27,2725   77776 1  ENDS40.9 EXIT
 0937      REF  50  LAST  770    27,2726  0 5353 1           TC      PHASCHNG
 0938                            27,2727   00002 0           OCT     2
 0939      REF 125  LAST  770    27,2730  1 5155 1           TCF     ENDOFJOB


 0940                            27,2731   51575 1  RASTEER1 VLOAD   ABVAL
 0941      REF   8  LAST  756    27,2732   01220 0                   RN
 0942                            27,2733   53744 0           LXC,2   SL*
 0943      REF  12  LAST  761    27,2734   02777 1                   RTX2
 0944                            27,2735   57576 1                   0,2
 0945      REF   2  LAST  145    27,2736   27715 1           STOVL   RMAG
 0946      REF   9  LAST  692    27,2737   03444 0                   RTARG
 0947                            27,2740   47051 0           VSU     RTB
 0948      REF   9  LAST  771    27,2741   01220 0                   RN
 0949      REF   3  LAST  707    27,2742   21725 1                   NORMUNX1
 0950      REF   1               27,2743   17656 1           STODL   1C
 0951                            27,2744   00045 0                   360             C(360) = ABVAL(C)
 0952                            27,2745   53674 1           XAD,2   SL*
 0953      REF  15  LAST  690    27,2746   00046 0                   X1
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0954                          27,2747   57576 1                 0,2
0955                          27,2750   00037 0         STORE   300
0956                          27,2751   41301 0         NORM    OMP
0957   REF  13   LAST   716   27,2752   00050 1                 X2
0958   REF   3   LAST   771   27,2753   03715 1                 RMAG
0959                          27,2754   57101 0         NORM    XAC,2
0960   REF  16   LAST   771   27,2755   00047 1                 X1
0961   REF  17   LAST   772   27,2756   00046 0                 X1
0962                          27,2757   77734 1         SXA,2
0963   REF   1                27,2760   03766 0                 MUSCALE
0964   REF   2   LAST   145   27,2761   17725 1         STOOL   R1C                                  2(+58 -X)
0965                          27,2762   00037 0                 300
0966                          27,2763   65342 1         SR1     PODL
0967   REF   4   LAST   772   27,2764   03715 1                 PMAG
0968                          27,2765   65342 1         SR1     POCL
0969   REF   4   LAST   688   27,2766   03723 1                 RTMAG
0970                          27,2767   43342 0         SR1     OAC
0971                          27,2770   45415 0         OAO     STAOR
0972   REF   1                27,2771   74044 1         STORE   SS            SS = (R1 + R2 +C )/2
0973                          27,2772   41225 1         OSU     OMP
0974                          27,2773   00037 0                 300
0975   REF   3   LAST   692   27,2774   03721 0                 MU/A
0976                          27,2775   77621 1         BOSU
0977   REF  .3   LAST   692   27,2776   03717 0                 MUASTEER
0978                          27,2777   45325.1         POCL    OSU
0979   REF   2   LAST   772   27,3000   03733 0                 SS
0980   REF   5   LAST   772   27,3001   03715 1                 RMAG
0981                          27,3002   70501 1         NORM    SR1
0982   REF  18   LAST   772   27,3003   00047 1                 X1
0983                          27,3004   41271 0         OOV     OMP
0984   REF   3   LAST   772   27,3005   03725 1                 R1C
0985                          27,3006   53664 0         XSU,2   SL*
0986   REF  19   LAST   772   27,3007   00046 0                 X1
0987                          27,3010   57575 1                 1,2
0988                          27,3011   77754 1         LXA,2
0989   REF   2   LAST   772   27,3012   03766 0                 MUSCALE
0990                          27,3013   75366 0         SQRT    SIGN
0991   REF   3   LAST   690   27,3014   02673 1                 GEOMSGN
0992                          27,3015   00041 1         STORE   320             + OR - A
0993                          27,3016   41345 0         OLDAO   DMP
0994   REF   3   LAST   772   27,3017   03733 0                 SS
0995   REF   4   LAST   772   27,3020   03721 0                 MU/A
0996                          27,3021   77621 1         BOSU
0997   REF   4   LAST   772   27,3022   03717 0                 MUASTFER
0998                          27,3023   45325 1         POOL    OSU
0999   REF   4   LAST   772   27,3024   03733 0                 SS
1000   REF   5   LAST   772   27,3025   03723 1                 RTMAG
1001                          27,3026   70501 1         NORM    SP1
1002   REF  20   LAST   772   27,3027   00047 1                 X1
1003                          27,3030   41271 0         OOV     OMP
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$\left(\mu - \frac{(s-c)\mu}{2a}\right)$

$(s-r)$

$\frac{2(s-r)}{rc}\left(\mu - \frac{\mu(s-c)}{2a}\right)$

$SQRT\left(\left\{\frac{2(s-r)}{rc}\right\}\left(\mu - \frac{\mu(s-c)}{2a}\right)\right)$

(GEOMSGN = SGNA)

$A = SGNA\left(SQRT\left(\frac{2(s-r)}{rc}\left(\mu - \frac{\mu(s-c)}{2a}\right)\right)\right)$

$\mu - \frac{\mu s}{2a}$

$\frac{2(s-rT)}{rc}\left(\mu - \frac{\mu s}{2a}\right)$

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1004   REF   4  LAST  772   27,3031   03725 1                     P1C
1005                        27,3032   53664 0        XSU,2        SL*
1006   REF  21  LAST  772   27,3033   00046 0                     X1
1007                        27,3034   57575 1                     1,2
1008                        27,3035   65366 1        SORT         POOL             -B (NO SIGN)
1009   REF   5  LAST  772   27,3036   03733 0                     SS
1010                        27,3037   56225 1        CSU          00V
1011                        27,3040   00037 0                     300
1012   REF   6  LAST  773   27,3041   03733 0                     SS
1013                        27,3042   41566 1        SQRT         PUSH
1014                        27,3043   67542 0        SR1          ASIN
1015                        27,3044   65205 0        CMF          POCL
1016   REF   1              27,3045   17216 1                     2PI+3
1017                        27,3046   56325 0        POOL         00V
1018                        27,3047   00037 0                     300
1019   REF   7  LAST  773   27,3050   03733 0                     SS
1020                        27,3051   77600 1        BOV
1021                        27,3052   57053 0                     +1
1022                        27,3053   41366 1        SQRT         OMP
1023                        27,3054   44242 0        SR3          BOSU
1024                        27,3055   65365 1        SIGN         POOL
1025   REF   4  LAST  772   27,3056   02673 1                     GEOMSGN
1026   REF   2  LAST  773   27,3057   17216 1                     2PI+3
1027                        27,3060   45302 1        SR2          0SL
1028                        27,3061   65205 0        CMP          POOL
1029   REF   8  LAST  773   27,3062   03733 0                     SS
1030   REF   9  LAST  773   27,3063   03733 0                     SS
1031                        27,3064   75442 1        SR3          SORT
1032                        27,3065   77605 1        OMP
1033                        27,3066   52525 1        POOL         SL3
1034   REF   5  LAST  772   27,3067   03717 0                     MUASTEER
1035                        27,3070   55366 1        SORT         BOOV
1036                        27,3071   43225 0        CSU          0A0
1037   REF   9  LAST  761   27,3072   03631 0                     TPASS4
1038   REF   0  LAST  766   27,3073   01234 0                     PIPTIME
1039                        27,3074   14037 0        STCOL        30D
1040                        27,3075   77765 0        SIGN
1041                        27,3076   00037 0                     300              B WITH SIGN
1042                        27,3077   00037 0        STCRE        30C
1043                        27,3100   77214 0        BON          VLOA0
1044   REF   6  LAST  771   27,3101   03705 0                     NORMSW
1045   REF   1              27,3102   57123 0                     1BOMESS
1046   REF   2  LAST  771   27,3103   03656 1                     IC
1047                        27,3104   53451 1        VSU          UNIT
1048   REF   3  LAST  761   27,3105   03537 0                     UNIT/R/
1049                        27,3106   63361 0        VXSC         POVL
1050                        27,3107   00037 0                     300
1051   REF   3  LAST  773   27,3110   03656 1                     IC
1052                        27,3111   53455 0        VAC          UNIT
1053   REF   4  LAST  773   27,3112   03537 0                     UNIT/R/
```

~~SQRT $\left(\frac{s-c}{s}\right)$~~

ASIN (SQRT (s-c)/s))

$\sqrt{\frac{c}{s}}\sqrt{\frac{s-c}{s}} =$

SQRT(c/s) SQRT $\left(\frac{s-c}{s}\right) = \frac{1}{s}$SQRT (c(s-c))

SGNA (ARCSIN $\sqrt{\frac{s-c}{s}} - \frac{1}{s}\sqrt{c(s-c)}$)

$\frac{S}{s}$(π/2 — SGNA( ))

$s\sqrt{s} = \sqrt{s^3}$

$\sqrt{\frac{s^3}{2\mu}}$

T MIN ENERGY

$(t_m - t_2)$

UNCM

B UNCM

VNCP

A uncp

```
 1054                              27,3113    53361 0  GETVRVG1 VXSC     VAD
 1055                              27,3114    00041 1                    320
 1056                              27,3115    53744 0  GETVRVG2 LXC,2    VSR*
 1057    REF   13  LAST   771      27,3116    02777 1                    RTX2
 1058                              27,3117    57177 1                    0 -1,2
 1059    REF    7  LAST   692      27,3120    02337 1           STORE    VIPRIME
 1060                              27,3121    77650 1           GOTO
 1061    REF    1                  27,3122    57166 1                    ASTRENO -2
 1062                              27,3123    50375 0  180MESS  VLOAD    DOT
 1063    REF    4  LAST   773      27,3124    03656 1                    IC
 1064    REF    5  LAST   773      27,3125    03537 0                    UNIT/R/
 1065                              27,3126    77240 1           BMN      VLOAD
 1066    REF    1                  27,3127    57146 0                    NEGPROC
 1067    REF    5  LAST   774      27,3130    03656 1                    IC
 1068                              27,3131    63362 0           VSR1     DOVL
 1069    REF    6  LAST   774      27,3132    03537 0                    UNIT/R/
 1070                              27,3133    53362 0           VSR1     VAD
 1071                              27,3134    77656 1           UNIT
 1072                              27,3135    57406 1           PUSH     VCOMP               FOR A
 1073                              27,3136    75235 1           VXV      SIGN
 1074    REF    4  LAST   689      27,3137    02674 0                    UN
 1075    REF    5  LAST   773      27,3140    02673 1                    GEOMSGN
 1076                              27,3141    74256 0           UNIT     VXSC
 1077                              27,3142    00037 0                    300
 1078                              27,3143    77715 1           PDVL                         UNIT(IC-IR)     +-B
 1079                              27,3144    77650 1           GOTO
 1080    REF    1                  27,3145    57113 0                    GETVRVG1
 1081                              27,3146    74575 0  NEGPROC  VLOAD    VSR1
 1082    REF    7  LAST   774      27,3147    03537 0                    UNIT/R/
 1083                              27,3150    74515 0           PDVL     VSR1
 1084    REF    6  LAST   774      27,3151    03656 1                    IC
 1085                              27,3152    53451 1           VSU      UNIT
 1086                              27,3153    77606 1           PUSH
 1087                              27,3154    75235 1           VXV      SIGN
 1088    REF    5  LAST   774      27,3155    02674 0                    UN                  FOR B
 1089    REF    6  LAST   774      27,3156    02673 1                    GEOMSGN
 1090                              27,3157    74256 0           UNIT     VXSC
 1091                              27,3160    00041 1                    320
 1092                              27,3161    77715 1           PDVL
 1093                              27,3162    53361 0           VXSC     VAD
 1094                              27,3163    00037 0                    30D
 1095                              27,3164    77650 1           GOTO
 1096    REF    1                  27,3165    57115 0                    GETVRVG2
 1097                              27,3166    77651 0           VSU
 1098    REF    3  LAST   729      27,3167    03553 1                    VN1
 1099    REF   12  LAST   761      27,3170    02366 0  ASTRENC  STORE    DELVEET3
 1100                              27,3171    53135 0  FIRSTTME SLOAD    BZE
 1101    REF   14  LAST   774      27,3172    03000 1                    RTX2
 1102    REF    1                  27,3173    57177 1                    GETGOBL
 1103                              27,3174    52175 0           VLOAD    GOTO                NO OBLATENESS COMP IF IN MOON SPHERE
 1104   REF  13  LAST  774   27,3175   02366 0                  DELVEET3
 1105   REF   1              27,3176   57212 1                  NOGOBL
 1106                        27,3177   53575 0  GETGOBL  VLOAD  UNIT             CALCULATE OBLATENESS TERM.
 1107   REF  10  LAST  771   27,3200   01220 0                  RN
 1108                        27,3201   45345 1           DLOAD  DSU
 1109   REF  10  LAST  773   27,3202   01234 0                  PIPTIME                      2
 1110   REF   3  LAST  727   27,3203   03512 1                  GOBLTIME         G    = -(MU/R  )(UNITGOBL)(T - TIG)
 1111                        27,3204   56205 0           DMP    DDV               OBL
 1112   REF   1              27,3205   16023 1                  EARTHMU
 1113                        27,3206   00043 0                  34D              34D = /RN/ (2) FROM UNIT OPERATION.
 1114                        27,3207   53361 0           VXSC   VAD
 1115   REF   1              27,3210   03521 1                  UNITGOBL
 1116   REF  14  LAST  775   27,3211   02366 0                  DELVEET3          OUTPUT FROM INITVEL  VG = VR - VN
 1117   REF  15  LAST  775   27,3212   02366 0  NOGOBL   STORE  DELVEET3         VG = VR + GOBL - VN
 1118                        27,3213   77650 1           GOTO
 1119   REF   1              27,3214   56455 0                  VGAIN*


 1120                        27,3215   31103 1  2PI+3    2DEC   3.141592653 B-2
 1120                        27,3216   36652 0
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R1121    TRIMGIMB        (FORMERLY S40.6)
R1122    MOD 0      24 FEB 67      PETER ADLER
R1123    FUNCTION:
R1124              TRIMS DPS ENGINE TO MINIMIZE THRUST/CG OFFSET. ENGINE IS GIMBALLED TO FULL + PITCH AND + ROLL (TO LOCK)
R1126              FOR REFERENCE AND IS THEN BROUGHT BACK TO TRIM POSITION BY RUNNING FOR THE PROPER TIMES (TO BE
R1128              SPECIFIED BY GAEC) IN - PITCH AND - ROLL.
R1129    CALLING SEQUENCE:
R1130              VIA WAITLIST FROM R03
R1131    INPUT:
R1132              PITTIME     TIME TO RUN FROM FULL + PITCH TO TRIM  (CS)
R1133              ROLLTIME    TIME TO RUN FROM FULL + ROLL  TO TRIM  (CS)
P1134    SUBROUTINES USED:
R1135              WAITLIST, FIXDELAY, VARDELAY, FLAGUP, FLAGDOWN, NOVAC

 1136    REF   1                                            COUNT*  $$/S40.6
 1137    REF   3  LAST  316   E6,1401                       EBANK=  ROLLTIME        OCTAL MASKS:  PRIO5=05000 EBANK5=02400

 1138    REF  81  LAST  757   27,3217  0 5516 0  TRIMGIMB TC      DOWNFLAG        GMBDRVSW FLAG IS SET WHEN EITHER ROLL OR
 1139    REF   1              27,3220   00137 1           ADRES   GMBDRVSW        PITCH IS COMPLETED, WHICHEVER IS FIRST.

 1140    REF   8  LAST  752   27,3221  4 5017 0           CS      PRIO5           TURN OFF - PITCH, - ROLL, IF ON.
 1141                         27,3222  0 0006 1           EXTEND
 1142    REF  44  LAST  611   27,3223  03 012 1           WAND    CHAN12
 1143    REF   3  LAST  600   27,3224  3 5014 1           CAF     EBANK5          TURN ON + PITCH, + ROLL.
 1144                         27,3225  0 0006 1           EXTEND
 1145    REF  45  LAST  776   27,3226  05 012 1           WOR     CHAN12
 1146    REF  14  LAST  754   27,3227  0 5221 0           TC      FIXDELAY        WAIT ONE MINUTE TO MAKE SURE ENGINE IS
 1147                         27,3230   13560 0           DEC     6000            AT FULL + PITCH AND FULL + ROLL
 1148    REF   4  LAST  776   27,3231  4 5014 0           CS      EBANK5          TURN OFF + PITCH, + ROLL.
 1149                         27,3232  0 0006 1           EXTEND
 1150    REF  46  LAST  776   27,3233  03 012 1           WAND    CHAN12
 1151    REF   9  LAST  776   27,3234  3 5017 1           CAF     PRIO5           TURN ON - PITCH, - ROLL.
 1152                         27,3235  0 0006 1           EXTEND
 1153    REF  47  LAST  776   27,3236  05 012 1           WOR     CHAN12
 1154    REF   2  LAST  316   27,3237  31'402 0           CAE     PITTIME         GET TIME TO SHUT OFF - PITCH AND SET UP
 1155    REF  20  LAST  757   27,3240  0 5173 1           TC      TWIDDLE         TWIDDLE-TASK TO TURN IT OFF THEN
 1156    REF   1              27,3241   03260 0           ADRES   PITCHOFF

 1157    REF   4  LAST  776   27,3242  31'401 0           CAE     ROLLTIME        GET TIME TO SHUT OFF - ROLL AND GO AWAY
 1158    REF   6  LAST  610   27,3243  0 5224 0           TC      VARDELAY        UNTIL THEN
 1159    REF  26  LAST  708   27,3244  4 4740 1           CS      BIT12
 1160                         27,3245  0 0006 1           EXTEND
 1161    REF  48  LAST  776   27,3246  03 012 1           WAND    CHAN12          SHUT OFF ROLL
 1162    REF   3  LAST  709   27,3247  3 0102 1  ROLLOVER CA      FLAGWRD6        IF HERE INLINE (ROLL DONE) IS PITCH DONE
 1163    REF   1              27,3250  7 4742 0           MASK    GMBDRBIT        IF HERE FROM PITCHOFF, IS ROLL DONE?
 1164                         27,3251  0 0006 1           EXTEND
 1165    REF   2  LAST  776   27,3252  1 3264 0           BZF     PITCHOFF +4     NO.  SET FLAG, ROLL OR PITCH DONE.
 1166    REF   5  LAST  756   27,3253  3 4737 0           CAF     PRIO10          RETURN TO R03
 1167    REF  20  LAST  738   27,3254  0 5072 1           TC      NOVAC
 1168    REF   3  LAST  598   E7,1471                       EBANK=  WHOCARES
 1169    REF   1                 27,3255    02325 1             2CADR   TRIMOONE
 1169    REF   1                 27,3256    02067 1
 1170    REF  53   LAST   756    27,3257  0 5261 1              TC      TASKOVER
 1171    REF  30   LAST   611    27,3260  4 4742 0   PITCHOFF   CS      BIT10
 1172                            27,3261  0 0006 1              EXTEND
 1173    REF  49   LAST   776    27,3262  03 0012 1             WAND    CHAN12           SHUT OFF PITCH
 1174    REF   1                 27,3263  1 3247 1              TCF     ROLLOVER         SEE IF ROLL HAS FINISHED ALSO.
 1175    REF  51   LAST   757    27,3264  0 5504 0              TC      UPFLAG           ROLL DONE; OR PITCH DONE; BUT NOT BOTH.
 1176    REF   2   LAST   776    27,3265    00137 1             ADRES   GMBDRVSW
 1177    REF  54   LAST   777    27,3266  0 5261 1              TC      TASKOVER
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L       P40-P47                                                                          USER'S PAGE NO.  32      E6  S3

P1178   SUBROUTINE NAME: S41.1          MOD. NO. 0  DATE: FEBRUARY 28, 1967

R1179                        MOD. NO. 1  DATE: JANUARY 23, 1968: BY PETER ADLER (MIT/IL)

R1181   AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R1182   S41.1 PERFORMS THE COORDINATE SYSTEM TRANFORMATION FROM THE REFERENCE FRAME TO THE BODY OF THE LM.
R1184   SPECIFICALLY, IT IS USED TO TRANSFORM A VELOCITY (SCALED AT 2(+7) METERS/CENTISECOND) FROM REFERENCE TO LM AXIS
R1186   COORDINATES.  FIRST THE VECTOR IS TRANSFORMED TO THE STABLE MEMBER COORDINATES BY THE MATRIX REFSMMAT.  THIS
R1188   LEAVES THE VECTOR IN MPAC, SCALED AT 2(+8) METERS/CENTISECOND.  THEN
R1189   THE SUBROUTINE CDUTRIG IS CALLED TO SET UP THE DOUBLE-PRECISION CDU VECTOR ALONG WITH ITS SINES AND COSINES.
R1191   THE VECTOR IS THEN TRANSFORMED FROM STABLE MEMBER COORDINATES TO SPACECRAFT (OR LM) COORDINATES BY THE
R1193   SUBROUTINE *SMNB*.  FINALLY( THE VECTOR IS RESCALED TO 2(+7) METERS/CENTISECOND, AND CONTROL IS RETURNED TO THE
R1195   CALLER WITH C(MPAC) = VELOCITY(LM).

R1196   CALLING SEQUENCE:

A1197                                            L          VLOAD  CALL
A1198                                            L +1              VELOCITY(REF)   SCALED AT 2(+7)M/CS IN REFERENCE COORDS.
A1199                                            L +2              S41.1
A1200                                            L +3       STORE  VELOCITY(LM)    SCALED AT 2(+7)M/CS IN LM BODY AXIS SYS.

R1201   SUBROUTINES CALLED:

R1202             1.  CDUTRIG,
R1203                    WHICH CALLS CDULOGIC.
R1204             2.  *SMNB*

R1205   NORMAL RETURN: L +3 (SEE CALLING SEQUENCE, ABOVE.)

R1206   ALARM/ABORT MODES: NONE.

R1207   RESTART PROTECTION: NONE.
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P1208    INPUT:

R1209                1.  REFSMMAT.
R1210                2.  CDUX, CDUY, CDUZ.
R1211                3.  VELOCITY (REF) IN MPAC.

R1212    OUTPUT:

R1213                1.  CDUSPOT:  DOUBLE PRECISION CDU VECTOR, ORDERED Y,Z,X.
R1214                2.  SINCDU:   HALF SINES OF CDUSPOT COMPONENTS.
R1215                3.  COSCDU:   HALF COSINES OF CDUSPOT COMPONENTS.
R1216                4.  MPAC:     VELOCITY(LM) (SCALED AT 2(+7) METERS/CENTISECOND)

R1217    DEBRIS: NONE.

R1218    CHECKOUT STATUS: CODED.

 1219    REF   1                                         COUNT*  $$/S41.1
 1220                           27,3267    76521 0  S41.1    MXV     VSL1              CONVERT VECTOR IN MPAC FROM REF AT 2(+7)
 1221    REF  24  LAST  766     27,3270    01734 0                   REFSMMAT          TO SM AND RESCALE DUE TO HALFUNIT MATRIX
 1222                           27,3271    77650 1           GOTO                      CONVERT TO BODY AT 2(+7) USING PRESENT
 1223    REF   2  LAST  522     27,3272    47650 1                   CDU*SMNB          CDU ANGLES.  CDU*SMNB WILL RETURN
A1224                                                                                  VIA RVQ TO THE CALLER OF S41.1
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L        THE LUNAR LANDING                                                                         USER'S PAGE NO.  1       E0 S3

 0001                                32,3000                            BANK    32
 0002    REF   3  LAST  605          32,2000                            SETLOC  F2OPS*32
 0003                                32,3000                            BANK

 0004    REF   1                     E7,1621                            EBANK=  E2DPS

R0005                                                ****************************************
R0006                                                P63: THE LUNAR LANDING, BRAKING PHASE
R0007                                                ****************************************

 0008    REF   1                                                        COUNT*  $$/P63

 0009    REF  51  LAST  771          32,3000  0 5353 1  P63LM           TC      PHASCHNG
 0010                                32,3001   04024 0                  OCT     04024

 0011    REF 212  LAST  754          32,3002  0 4616 1                  TC      BANKCALL         DO IMU STATUS CHECK ROUTINE R02
 0012    REF   8  LAST  753          32,3003   11233 0                  CADR    R02BOTH

 0013    REF   1                     32,3004  3 3255 0                  CAF     P63ADRES         INITIALIZE WHICH FOR BURNBABY
 0014    REF  26  LAST  753          32,3005  55'455 0                  TS      WHICH

 00141   REF   1                     32,3006  3 2000 0                  CAF     DPSTHRSH         INITIALIZE DVMON
 00142   REF   4  LAST  753          32,3007  55'250 0                  TS      DVTHRUSH
 00143   REF  13  LAST  753          32,3010  3 4751 0                  CAF     FOUR
 00144   REF  30  LAST  757          32,3011  55'515 0                  TS      DVCNTR

 0015    REF  84  LAST  758          32,3012  4 4753 0                  CS      ONE              INITIALIZE WCHPHASE AND FLPASS0
 0016    REF   2  LAST  733          32,3013  55'346 0                  TS      WCHPHASE

 0017    REF 140  LAST  769          32,3014  3 4755 1                  CA      ZERO
 00175   REF   3  LAST  733          32,3015  55'623 0                  TS      FLPASS0

 0018    REF  57  LAST  611          32,3016  4 4736 0                  CS      BIT14
 0019                                32,3017  0 0006 1                  EXTEND
 0020    REF  50  LAST  777          32,3020  03 012 1                  WAND    CHAN12           REMOVE TRACK-ENABLE DISCRETE.

 0023    REF 115  LAST  771          32,3021  0 6042 1  FLAGORGY        TC      INTPRET          DIONYSIAN FLAG WAVING
 0024                                32,3022   43014 0                  CLEAR   CLEAR
 0025    REF   5  LAST  770          32,3023   02663 0                          NOTHROTL
 0026    REF   1                     32,3024   03271 0                          REDFLAG
 0030                                32,3025   43014 0                  CLEAR   SET
 0031    REF   1                     32,3026   05660 1                          LRBYPASS
 0032    REF   4  LAST  728          32,3027   03067 0                          MUNFLAG
 0033                                32,3030   43014 0                  CLEAR   CLEAR
 0034    REF   3  LAST  506          32,3031   00266 0                          P25FLAG          TERMINATE P25 IF IT IS RUNNING.
 0035    REF   5  LAST  571          32,3032   00270 1                          RNDVZFLG         TERMINATE P20 IF IT IS RUNNING

A0036                                                                                            ****************************************

 0037                                32,3033   77201 1  IGNALG          SETPD   VLOAD            FIRST SET UP INPUTS FOR RP-TO-R:-
 0038                        32,3034   00001 0                     0                AT 0D LANDING SITE IN MOON FIXED FRAME
 0039   REF   6  LAST  719   32,3035   02023 1                     RLS              AT 6D ESTIMATED TIME OF LANDING
 0040                        32,3036   41525 0            PDDL     PUSH             MPAC NON-ZERO TO INDICATE LUNAR CASE
 0041   REF   3  LAST  202   32,3037   02401 0                     TLAND
 0042   REF   2  LAST  151   32,3040   37625 1            STCALL   TPIP            ALSO SET TPIP FOR FIRST GUIDANCE PASS
 0043   REF   1              32,3041   55716 1                     RP-TO-R
 0044                        32,3042   64312 0            VSL4     MXV
 0045   REF  25  LAST  779   32,3043   01734 0                     REFSMMAT
 0046   REF   3  LAST  202   32,3044   37635 0            STCALL   LAND
 0047   REF   1              32,3045   71343 0                     GUIDINIT        GUIDINIT INITIALIZES WM AND /LAND/
 0048                        32,3046   45345 1            DLOAD    DSU
 0049   REF   4  LAST  781   32,3047   02401 0                     TLAND
 0050   REF   1              32,3050   25262 0                     GUIDDURN
 0051   REF  43  LAST  761   32,3051   34041 0            STCALL   TDEC1           INTEGRATE STATE FORWARD TO THAT TIME
 0052   REF   8  LAST  761   32,3052   27056 1                     LEMPREC
 0053                        32,3053   77331 0            SSP      VLOAD
 00531  REF   1              32,3054   03647 1                     NIGNLOOP
 00532                       32,3055   00050 1                     400
 0057   REF   7  LAST  764   32,3056   06522 1                     UNITX
 0058   REF   2  LAST  123   32,3057   26575 1            STOVL    CG
 0059   REF   4  LAST  586   32,3060   06520 0                     UNITY
 0060   REF   3  LAST  781   32,3061   26603 0            STOVL    CG  +6
 0061   REF   7  LAST  707   32,3062   06516 0                     UNITZ
 0062   REF   4  LAST  781   32,3063   16611 0            STODL    CG  +14
 00621  REF   1              32,3064   25260 1                     99999CON
 00622  REF   4  LAST  317   32,3065   27665 1            STOVL    DELTAH          INITIALIZE DELTAH FOR V16N68 DISPLAY
 00623  REF  12  LAST  761   32,3066   06524 1                     ZEROVECS
 00624  REF   4  LAST  766   32,3067   17253 0            STODL    UNFC/2          INITIALIZE TRIM VELOCITY CORRECTION TERM
 0063   REF   7  LAST  771   32,3070   06524 1                     HI6ZEROS
 0065   REF   3  LAST  202   32,3071   03643 0            STORE    TTF/8

 0066                        32,3072   77745 1  IGNALOOP  DLOAD
 0067   REF  14  LAST  728   32,3073   00015 0                     TAT
 0068   REF   4  LAST  728   32,3074   27561 0            STOVL    PIPTIME1
 0073   REF  10  LAST  728   32,3075   00017 1                     RATT1
 0074                        32,3076   64312 0            VSL4     MXV
 0075   REF  26  LAST  781   32,3077   01734 0                     REFSMMAT
 0076   REF   5  LAST  603   32,3100   37521 0            STCALL   R
 0077   REF   2  LAST  728   32,3101   67067 1                     MUNGRAV
 0078   REF   4  LAST  680   32,3102   35236 0            STCALL   GOT/2
 0079   REF   1              32,3103   62415 0                     ?GUIDSUB        WHICH DELIVERS N PASSES OF GUIDANCE

R0080  DDUMCALC IS PROGRAMMED AS FOLLOWS:-

R0081                                      2                                                       -
R0083               (RIGNZ - RGU )/16 + 16(RGU  )KIGNY/B8 + (RGU - RIGNX)KIGNX/B4 + (ABVAL(VGU) - VIGN)KIGNV/B4
R0085                           2           1              0
R0086       DDUM = -------------------------------------------------------------------------------------------
R0088                                            10
R0089                                           2   (VGL  - 16 VGL  KIGNX/B4)
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R0090                                                      2        0

R0091   THE NUMERATOR IS SCALEO IN METERS AT 2(28).   THE OENOMINATOR IS A VELCCITY IN UNITS OF 2(10)M/CS.
R0093   THE QUOTIENT IS THUS A TIME IN UNITS OF 2(18) CENTISECONOS.   THE FINAL SHIFT RESCALES TO UNITS OF 2(28) CS.
R0095   THERE IS NO OAMPING FACTOR.   THE CONSTANTS KIGNX/B4, KIGNY/B8 ANO KIGNV/B4 ARE ALL NEGATIVE IN SIGN.

 0097   REF   2  LAST  781   32,3104  55'646 0  COUMCALC TS     NIGNLOOP
 00971  REF 116  LAST  780   32,3105  C 6042 1           TC     INTPRET
 00972                       32,3106   57345 1           OLCAD  OMPR           FORM OENOMINATCR FIRST
 0098   REF   3  LAST  202   32,3107   03627 1                  VGU
 0099   REF   2  LAST  122   32,3110   C2501 1                  KIGNX/B4
 0100                        32,3111   44232 1           SL4R   80SU
 0101   REF   4  LAST  782   32,3112   03633 1                  VGU  +4
 0102                        32,3113   45325 1           POOL   OSU
 0103   REF   2  LAST  122   32,3114   02477 1                  RIGNZ
 0104   REF   3  LAST  202   32,3115   C2633 0                  RGU  +4
 0105                        32,3116   65222 0           SR4R   POOL
 C106   REF   4  LAST  782   32,3117   02631 1                  RGU  +2
 0107                        32,3120   57316 1           OSQ    OMPR
 0108   REF   2  LAST  122   32,3121   02503 0                  KIGNY/B8
 0109                        32,3122   65232 1           SL4R   POOL
 0110   REF   5  LAST  782   32,3123   02627 0                  RGU
 0111                        32,3124   57225 0           OSU    OMPR
 0112   REF   2  LAST  122   32,3125   02475 0                  PIGNX
 0113   REF   3  LAST  782   32,3126   02501 1                  KIGNX/B4
 0114                        32,3127   51515 1           POVL   ABVAL
 0115   REF   5  LAST  782   32,313C   C3627 1                  VGU
 0116                        32,3131   57225 0           OSU    OMPR
 0117   REF   2  LAST  122   32,3132   02473 0                  VIGN
 0118   REF   2  LAST  122   32,3133   C2505 C                  KIGNV/B4
 0119                        32,3134   43215 0           OAO    OAO
 0120                        32,3135   56215 1           CAC    OOV
 0121                        32,3136   77661 0           SRR
 0122                        32,3137   21613 0                  100

 0123                        32,3140   43206 1           PUSH   OAC
 0124   REF   5  LAST  781   32,3141   03561 0                  PIPTIME1
 0125   REF  44  LAST  781   32,3142   14041 1           STOOL  TOEC1          STORE NEW GUESS FOR NEXT INTEGRATION
 0126                        32,3143   45246 0           ABS    OSU
 0127   REF   1              32,3144   25264 0                  OOUMCRIT
 0128                        32,3145   45040 1           BMN    CALL
 0129   REF   1              32,3146   65165 0                  OOUMGCCC
 0130   REF  26  LAST  712   32,3147   27410 1                  INTSTALL
 0131                        32,3150   43014 0           SET    SET
 0132   REF  14  LAST  712   32,3151   01473 C                  INTYPFLG
 0133   REF  13  LAST  713   32,3152   00063 1                  MOONFLAG
 0134                        32,3153   77745 1           OLCAD
 0136   REF   6  LAST  782   32,3154   03561 0                  PIPTIME1
 0137   REF  12  LAST  712   32,3155   25517 0           STOVL  TET            HOPEFULLY ?GUIOSU8 010 NOT
 0138   REF  11  LAST  781   32,3156   00017 1                  RATT1            CLOBBER RATT1 ANC VATT1
 0139   REF  12  LAST  712   32,3157   25535 0            STCVL   RCV
 0140   REF  13  LAST  728   32,3160   00025 0                    VATT1
 0141   REF  10  LAST  712   32,3161   35543 0            STCALL  VCV
 0142   REF   7  LAST  712   32,3162   27106 0                    INTEGRVS
 0143                        32,3163   77650 1            GOTO
 0144   REF   1              32,3164   65072 1                    IGNALOOP

 0145                        32,3165   54335 0  OOUMGCOO  SLOAO   SR
 0146   REF   4  LAST  733   32,3166   03423 1                    ZOCMTIME
 0147                        32,3167   20617 0                    140
 0148                        32,3170   77621 1            BOSU
 0149   REF  45  LAST  782   32,3171   00041 1                    TOEC1
 0150   REF  36  LAST  766   32,3172   27442 0            STCVL   TIG            COMPUTE OISTANCE LANOING SITE WILL BE
 0151   REF   3  LAST  603   32,3173   03527 1                    V                OUT CF LM'S CRBITAL PLANE AT IGNITION:
 0152                        32,3174   53435 0            VXV     UNIT             SIGN IS + IF LANOING SITE IS TO THE
 0153   REF   6  LAST  781   32,3175   03521 1                    R                RIGHT, NORTH; - IF TO THE LEFT, SOUTH.
 0154                        32,3176   72441 0            OOT     SL1
 0155   REF   4  LAST  781   32,3177   03635 1                    LANO
 0156   REF   3  LAST  317   32,3200   26617 0  R60INIT   STCVL   OUTCFPLN       INITIALIZATION FOR CALCMANU
 0157   REF   5  LAST  781   32,3201   03253 0                    UNFC/2
 0158   REF   4  LAST  123   32,3202   02621 0            STCRE   R60VSAVE       STORE UNFC/2 TEMPORARILY IN R60SAVE
 0162                        32,3203   77776 1            EXIT
A0163                                                                            ***************************************

 0164   REF  52  LAST  780   32,3204   C 5353 1 IGNALGRT  TC      PHASCHNG       PREVENT REPEATING IGNALG
 0165                        32,3205   04024 0            OCT     04024

 0166   REF   1              32,3206   4 4362 0 ASTNCLCK  CS      ASTNCEX
 0167   REF 213  LAST  780   32,3207   C 4616 1           TC      BANKCALL
 0168   REF   2  LAST  728   32,3210   74670 0            CAOR    STCLOK2
 0169   REF 126  LAST  771   32,3211   1 5155 1           TCF     ENOCFJCB       RETURN IN NEW JOB AND IN EBANK FIVE

 0170   REF 117  LAST  782   32,3212   0 6042 1 ASTNRET   TC      INTPRET
 0171                        32,3213   47131 1            SSP     RTB            GO PICK UP DISPLAY AT ENO OF R51:
 0172   REF   2  LAST  125   32,3214   02747 1                    OMAJ             "PROCEEO" WILL OC A FINE ALIGNMENT
 0173   REF   1              32,3215   65217 0            FCAOR   P63SPOT2         " ENTER " WILL RETURN TC P63SPOT2
 0174   REF   1              32,3216   31127 1                    R51P63
 0175                        32,3217   53575 0  P63SPOT2  VLOAO   UNIT           INITIALIZE KALCMANU FOR BURN ATTITUOE
 01751  REF   5  LAST  783   32,3220   02621 0                    R60VSAVE
 01752  REF   6  LAST  764   32,3221   27773 1            STOVL   POINTVSM
 01753  REF   8  LAST  781   32,3222   06522 1                    UNITX
 01754  REF  23  LAST  764   32,3223   03765 0            STCRE   SCAXIS
 01755                       32,3224   77776 1            EXIT

 01756  REF   7  LAST  757   32,3225   3 5016 0           CAF     EBANK7
 01757  REF  25  LAST  757   32,3226   54 003 0           TS      EBANK

 0176                        32,3227   C 0004 0           INHINT
 0177   REF  38  LAST  757   32,3230   C 4674 0           TC      IBNKCALL
 0178   REF   2  LAST  749   32,3231   40143 0            CAOR    PFLITEOB
 0179                            32,3232  C 0003 1              RELINT

 0180   REF 214  LAST  783       32,3233  C 4616 1              TC       BANKCALL
 0181   REF   5  LAST  749       32,3234   54123 0              CADR     R60LEM

 0182   REF  53  LAST  783       32,3235  C 5353 1              TC       PHASCHNG        PREVENT RECALLING R60
 0183                            32,3236   04024 0              OCT      04024

 0184   REF  41  LAST  683       32,3237  3 4746 0   P63SPOT3  CA       BIT6            IS THE LR ANTENNA IN POSITION 1 YET
 0185                            32,3240  0 0006 1              EXTEND
 0186   REF  22  LAST  609       32,3241  02 0033 0             RAND     CHAN33
 0187                            32,3242  0 0006 1              EXTEND
 0188   REF   1                  32,3243  1 3251 0              BZF      P63SPOT4        BRANCH IF ANTENNA ALREADY IN POSITION 1

 0189   REF   1                  32,3244  3 3256 0              CAF      CODE500         ASTRONAUT: PLEASE CRANK THE
 0190   REF 215  LAST  784       32,3245  0 4616 1              TC       BANKCALL                   SILLY THING AROUND
 0191   REF   4  LAST  743       32,3246   20624 0              CADR     GOPERF1
 0192   REF  26  LAST  754       32,3247  1 6001 1              TCF      GOTOPOOH        TERMINATE
 0193   REF   1                  32,3250  1 3237 0              TCF      P63SPOT3        PROCEED    SEE IF HE'S LYING

 0194   REF 216  LAST  784       32,3251  0 4616 1   P63SPOT4  TC       BANKCALL        ENTER      INITIALIZE LANDING RADAR
 0195   REF   1                  32,3252   67701 0              CADR     SETPOS1

 0196   REF  46  LAST  757       32,3253  0 4635 0              TC       POSTJUMP        OFF TO SEE THE WIZARD...
 0197   REF   2  LAST  749       32,3254   74130 0              CADR     BURNBABY


R0198                                                  ----------------------------------------

R0199                                                        CONSTANTS FOR P63LM AND IGNALG


 0200   REF   2  LAST  743       32,3255   02100 1   P63ADRES GENADR P63TABLE


 0202   REF   2  LAST  462          4362             ASTNDEX  =       MD1             OCT 25;  INDEX FOR CLOKTASK


 0203                            32,3256   00500 1   CODE500  OCT     00500


 02035                           32,3257   00035 1   99999CON 2DEC    30479.7 B-24
 02035                           32,3260   30373 0


 0204                            32,3261   00004 0   GUIDDURN 2DEC    +       66440              GUIDDURN     +6.64400314E+ 2
 0204                            32,3262   01610 1
 0205                            32,3263   00000 1   DDUMCRIT 2DEC    +8 B-28         CRITERION FOR IGNALG CONVERGENCE
 0205                            32,3264   00010 0
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R0206                          ----------------------------------------
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P0207                                ***************************************
R0208                                P68: LANDING CONFIRMATION
R0209                                ***************************************

 0210                     34,3271                     BANK    34
 0211  REF   1            34,2000                     SETLOC  F2DPS*34
 0212                     34,3271                     BANK

 0213  REF   1                                        COUNT*  $$/P6567

 0214  REF  54  LAST 784  34,3271  0 5353 1  LANDJUNK TC      PHASCHNG
 0215                     34,3272   04024 0           OCT     04024

 02151                    34,3273  0 0004 0           INHINT
 0216  REF 217  LAST 784  34,3274  0 4616 1           TC      BANKCALL      ZERO ATTITUDE ERROR
 0217  REF   6  LAST 751  34,3275   40154 0           CADR    ZATTEROR

 0221  REF 118  LAST 783  34,3276  0 6042 1           TC      INTPRET       TO INTERPRETIVE AS TIME IS NOT CRITICAL
 02211                    34,3277   77614 1           SET                   PREVENT RCS JET FIRINGS IF MODE CONT IS
 02212 REF   4  LAST 735  34,3300   06460 0                   PULSEFLG      IN ATT HOLD
 0222                     34,3301   43014 0           SET     CLEAR
 0223  REF  14  LAST 658  34,3302   04067 1                   SURFFLAG
 0224  REF   1            34,3303   04666 0                   LETABORT
 0225                     34,3304   77214 0           SET     VLOAD
 0226  REF   3  LAST 769  34,3305   05062 0                   APSFLAG
 0230  REF  11  LAST 775  34,3306   01220 0                   RN
 0231  REF   3  LAST 659  34,3307   16032 1           STODL   ALPHAV
 0232  REF  11  LAST 775  34,3310   01234 0                   PIPTIME
 0233                     34,3311   45014 0           SET     CALL
 0234  REF   3  LAST 659  34,3312   01463 1                   LUNAFLAG
 0235  REF   2  LAST 659  34,3313   26347 0                   LAT-LONG
 0236                     34,3314   77201 1           SETPD   VLOAD         COMPUTE RLS AND STORE IT AWAY
 0237                     34,3315   00001 0                   0
 0238  REF  12  LAST 786  34,3316   01220 0                   RN
 0239                     34,3317   65352 0           VSL2    PDDL
 0240  REF  12  LAST 786  34,3320   01234 0                   PIPTIME
 0241                     34,3321   45006 0           PUSH    CALL
 0242  REF   1            34,3322   51700 1                   R-TO-RP
 0243  REF   7  LAST 781  34,3323   02023 1           STORE   RLS
 0244                     34,3324   77776 1           EXIT
 0245  REF   1            34,3325  3 3342 1           CAF     V06N43*       ASTRONAUT: NOW LOOK WHERE YOU ENDED UP
 0246  REF 218  LAST 786  34,3326  0 4616 1           TC      BANKCALL
 0247  REF  21  LAST 742  34,3327   20477 1           CADR    GOFLASH
 0248  REF  27  LAST 784  34,3330  1 6001 1           TCF     GOTOPOOH      TERMINATE
 0249                     34,3331  1 3333 0           TCF     +2            PROCEED
 0250                     34,3332  1 3325 1           TCF     -5            RECYCLE


 0251  REF 119  LAST 786  34,3333  0 6042 1           TC      INTPRET
 0252                     34,3334   77775 1           VLOAD                 INITIALIZE GSAV AND (USING REFMF)
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                                                                   UNITX           YNBSAV, ZNBSAV AND ATTFLAG FOR P57
 0253    REF    9  LAST  783    34,3335    06522 1            STCALL GSAV
 0254    REF    5  LAST  204    34,3336    36231 1                   REFMF
 0255    REF    1               34,3337    23471 0
 0256                           34,3340    77776 1            EXIT

 0257    REF   28  LAST  786    34,3341  1 6001 1             TCF    GCTCPOOH          ASTRONAUT: PLEASE SELECT P57


 0258                           34,3342    01453 1  V06N43*   VN     0643
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L       THROTTLE CONTROL ROUTINES                                                              LSEP'S PAGE NO.  1      E0 S3

 0001                          31,2144                         BANK    31

 0002   REF   2  LAST   40     31,2000                         SETLOC  FTHROT

 0003                          31,2144                         BANK

 0004   REF   2  LAST  151     E7,1612                         EBANK=  PIF

 0005   REF   2 LAST   40 TO   40:       5      5*             COUNT*  $$/THROT
R0006   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

R0008       HERE FC, DESIRED THRUST, AND FP, PRESENT THRUST, UNWEIGHTED, ARE COMPUTED.


 0010   REF   3  LAST  213     31,2144  3 1245 0  THROTTLE CA      ABDELV              COMPUTE PRESENT ACCELERATION IN UNITS OF
 0011                          31,2145  0 0006 1           EXTEND                        2(-4) M/CS/CS, SAVING SERVICER TROUBLE
 0012   REF   1                31,2146  7 2356 1           MP      /AF/CNST
 0013                          31,2147  0 0006 1     +3    EXTEND
 0014   REF   2  LAST  151     31,2150  22'607 1           QXCH    RTNHOLD
 0015   REF   1                31,2151  0 2337 1  AFDUMP   TC      MASSMULT
 0016   REF   1                31,2152  53'470 1           DXCH    FP                  FP = PRESENT THRUST
 0017                          31,2153  0 0006 1           EXTEND
 0018   REF   2  LAST  142     31,2154  3 1464 0           DCA     /AFC/
 0019   REF   2  LAST  788     31,2155  0 2337 1           TC      MASSMULT
 0020   REF   3  LAST  202     31,2156  55'615 0           TS      FC                  FC = THRUST DESIRED BY GUIDANCE
 0021   REF   2  LAST  142     31,2157  53'466 0           DXCH    FCODD               FCODD = WHAT IT IS GOING TO GET

R00211  COMPUTE DESIRED THRUST FOR DISPLAY AS A PERCENTAGE OF 10,500 POUNDS

 002111 REF   1                31,2160  3 2360 0           CAF     4FMAXNOM            MOVE 4FMAXNOM TO ERASABLE FOR OV BELOW
 002112 REF 198  LAST  758     31,2161  54 002 1           TS      Q
 00212  REF   4  LAST  788     31,2162  3 1615 1           CA      FC
 00213  REF   1                31,2163  7 2357 0           MASK    OCT17777            FOR SAFETY
 00214                         31,2164  0 0006 1           EXTEND
 00215  REF 199  LAST  788     31,2165  10 002 1           DV      Q
 00216                         31,2166  0 0006 1           EXTEND
 00217  REF   2  LAST  167     31,2167  7 5003 0           MP      4SECS
 00218  REF   2  LAST  319     31,2170  55'750 0           TS      THRDISP             FOR DISPLAY IN  N92

R0022       IF IT HAS BEEN LESS THAN 3 SECONDS SINCE THE LAST THROTTLING, AUGMENT FP USING THE FWEIGHT CALCULATED THEN.


 0024   REF   2  LAST  151     31,2171  4 1617 1           CS      TTHROT              THIS CODING ASSUMES A FLATOUT WITHIN
 0025   REF   8  LAST  738     31,2172  6 0025 0           AD      TIME1                 80 SECONDS BEFORE FIRST THROTTLE CALL
 0026   REF  15  LAST  568     31,2173  7 4733 0           MASK    POSMAX
 0027                          31,2174  4 0000 0           COM
 0028   REF   1                31,2175  6 5002 0           AD      3SECS
 0029                          31,2176  0 0006 1           EXTEND
 0030   REF   1                31,2177  6 2203 1           BZMF    WHERETO             BRANCH IF (TIME1-TTHROT +1) > 3 SECONDS
 0031                        31,2200  C 0006 1            EXTENO
 0032  REF   2  LAST  151    31,2201  3 1611 0            DCA    FWEIGHT
 0033  REF   2  LAST  788    31,2202  21'470 1            DAS    FP

R0034      THIS LCGIC OETERMINES THF THROTTLING IN THE REGION 10% - 94%.   THE MANUAL THRCTTLE, NOMINALLY SET AT
R0036  MINIMUM 8Y ASTRONALT CR MISSICN CCNTRCL PROGRAMS, PROVIOES THE LOWER 8OUNO.   A STOP IN THE THROTTLF HAPOWARE
R003B  PRCVIDES THE UPPER.

 0039  REF   5  LAST  776    31,2203  3 5014 1  WHERETO  CA     EBANK5          INITIALIZE L*WCR*T AND H*GHCR*T FROM
 0040  REF. 26  LAST  783    31,2204  54 C03 0           TS     EBANK             PAO LOAOEO ERASABLES IN W-MATRIX
 0041  REF   2  LAST  122    E5,1506                     E8ANK= LOWCRIT
 0042                        31,2205  0 0006 1           EXTENO
 0043  REF   3  LAST  789    31,2206  3 15C7 1           OCA    LOWCPIT
 0044  REF   1               31,2207  52 131 0           OXCH   L*WCR*T
 0045  REF   B  LAST  7B3    31,2210  3 5016 0           CA     FBANK7
 0046  REF  27  LAST  789    31,2211  54 003 0           TS     E8ANK
 0047  REF   3  LAST  78B    E7,1612                     EBANK= PIF
 0048  REF 141  LAST  780    31,2212  4 4755 0           CS     ZERO            INITIALIZE P1FPSET
 0049  REF   2  LAST  151    31,2213  55'606 1           TS     PIFPSET
 0050  REF   1               31,2214  4 0131 0           CS     H*GHCR*T
 0051  REF   2  LAST  151    31,2215  6 1620 1           AO     FCCLO
 0052                        31,2216  0 0006 1           EXTENO
 0053  REF   1               31,2217  6 2231 0           8ZMF   LCWFCOLO        BRANCH IF FCOLO < OR = H1GHCRIT
 0054  REF   2  LAST  789    31,2220  4 0130 1           CS     L*WCR*T
 0055  REF   3  LAST  78B    31,2221  6 1465 1           AO     FCODO
 0056                        31,2222  0 0006 1           EXTENO
 0057  REF   1               31,2223  6 2226 0           8ZMF   FCOMPSET        8RANCH IF FC < OR = LOWCRIT
 0058  REF   3  LAST  789    31,2224  3 1467 0           CA     FP              SEE NOTE 1
 0059  REF   )               31,2225  1 2236 0           TCF    FLATOUT1

 0060  REF   1               31,2226  4 2002 0  FCOMPSET CS     FMAXOOO         SEE NOTE 2
 0061  REF   4  LAST  7B9    31,2227  6 1467 0           AO     FP
 0062  REF   1               31,2230  1 2240 1           TCF    FLATOLT2

 0063  REF   2  LAST  789    31,2231  4 0131 0  LCWFCOLD CS     H*GHCR*T
 0064  REF   4  LAST  789    31,2232  6 1465 1           AO     FCCDD
 0065                        31,2233  0 0006 1           EXTENO
 0066  REF   1               31,2234  6 2241 1           BZMF   OOPIF           8RANCH IF FC < OR = HIGHCRIT

 0067  REF   1               31,2235  3 2C03 0           CA     FMAXPCS         NO:    THROTTLE-UP
 006B  REF   5  LAST  789    31,2236  53'466 0  FLATOUT1 OXCH   FCOOD
 0069  REF   1               31,2237  3 4737 0           CA     FEXTRA
 0070  REF   3  LAST  789    31,2240  55'606 1  FLATOUT2 TS     PIFPSET

A0071                                           NOTE 1   FC IS SET EOUAL TO FP SO PIF WILL BF ZFRC.   THIS IS OESIRABLE
A0072                                                    AS THERE IS ACTUALLY NC THROTTLF CHANGE.

A0073                                           NOTE 2   HERE, SINCE WE ARE ABOUT TC RETURN TO THE THROTTLEABLE REGION
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A0074                                                                     (BELOW 55%) THE QUANTITY -(FMAXODD - FP) IS COMPUTED AND PUT
A0075                                                                     INTO PIFPSET TO COMPENSATE FOR THE DIFFERENCE BETWEEN THE
A0076                                                                     NUMBER OF BITS CORRESPONDING TO FULL THROTTLE (FMAXODD) AND THE
A0077                                                                     NUMBER CORRESPONDING TO ACTUAL THRUST (FP).   THUS THE TOTAL
A0078                                                                     THROTTLE COMMAND PIF = FC - FP -(FMAXODD - FP) = FC - FMAXODD.

 0081   REF   1                31,2241   0 3677 1  DOPIF     TC      FASTCHNG
 0082                          31,2242   0 0006 1            EXTEND
 0083   REF   6  LAST  789     31,2243   3 1466 1            DCA     FCODD
 0084   REF   3  LAST  789     31,2244   55'620 0            TS      FCOLD
 0085   REF   4  LAST  789     31,2245   53'613 0            DXCH    PIF
 0086                          31,2246   0 0006 1            EXTEND
 0087   REF   5  LAST  789     31,2247   4 1470 1            DCS     FP
 0088   REF   5  LAST  790     31,2250   21'613 0            DAS     PIF                 PIF = FC - FP, NEVER EQUALS +0

 0089   REF   6  LAST  790     31,2251   3 1612 0  DOIT      CA      PIF
 0090   REF   4  LAST  789     31,2252   6 1606 0            AD      PIFPSET             ADD IN PIFPSET, WITHOUT CHANGING PIF
 0091   REF   3  LAST  202     31,2253   55'614 1            TS      PSEUDO55
 0092   REF   4  LAST  755     31,2254   54 055 0            TS      THRUST
 0093   REF  32  LAST  755     31,2255   3 4750 1            CAF     BIT4
 0094                          31,2256   0 0006 1            EXTEND
 0095   REF  10  LAST  755     31,2257   05 014 1            WOR     CHAN14
 0096   REF   9  LAST  788     31,2260   3 0025 0            CA      TIME1
 0097   REF   3  LAST  788     31,2261   55'617 1            TS      TTHROT

R0098        SINCE /AF/ IS NOT AN INSTANTANEOUS ACCELERATION, BUT RATHER AN "AVERAGE" OF THE ACCELERATION LEVELS DURING
R0100   THE PRECEEDING PIPA INTERVAL, AND SINCE FP IS COMPUTED DIRECTLY FROM /AF/, FP IN ORDER TO CORRESPOND TO THE
R0102   ACTUAL THRUST LEVEL AT THE END OF THE INTERVAL MUST BE WEIGHTED BY

R0103                                            PIF(PPROCESS + TL)      PIF /PIF/
R0104                               FWEIGHT = ------------------ + -------------
R0105                                                  PGUID           2 PGUID FRATE

R0106   WHERE PPROCESS IS THE TIME BETWEEN PIPA READING AND THE START OF THROTTLING, PGUID IS THE GUIDANCE PERIOD, AND
R0108   FRATE IS THE THROTTLING RATE (32 UNITS PER CENTISECOND).  PGUID IS EITHER 1 OR 2 SECONDS. THE "TL" IN THE
R0110   FIRST TERM REPRESENTS THE ENGINE'S RESPONSE LAG.   HERE FWEIGHT IS COMPUTED FOR USE NEXT PASS.

 0112   REF   2  LAST  153     31,2262   3 1762 0            CA      THISTPIP +1         INITIALIZE FWEIGHT COMP AS IF FOR P66
 0113   REF  49  LAST  461     31,2263   54 130 1            TS      BUF

 0114   REF  11  LAST  685     31,2264   4 1010 0            CS      MODREG              ARE WE IN FACT IN P66?
 0115   REF   1                31,2265   6 2452 0            AD      DEC66
 0116                          31,2266   0 0006 1            EXTEND
 0117   REF   1                31,2267   1 2274 0            BZF     FWCOMP              YES

 0118   REF  13  LAST  786     31,2270   3 1234 0            CA      PIPTIME  +1         NO:   INITIALIZE FOR TWO SECOND PERIOD
 0119   REF  50  LAST  790     31,2271   54 130 1            TS      BUF
 0120   REF   3  LAST  788     31,2272   3 5003 1            CAF     4SECS
 0121   REF   2  LAST  790     31,2273   1 2275 1            TCF     FWCOMP   +1
 0122    REF   3  LAST  610     31,2274  3 5000 1  FWCOMP    CAF     2SECS
 0126    REF 200  LAST  788     31,2275 54 002  1    +1      TS      0
 01261                          31,2276  0 0006 1            EXTEND
 01262   REF  42  LAST  784     31,2277  7 4746 1            MP      BIT6
 01263   REF  51  LAST  790     31,2300 22 131  1            LXCH    BUF  +1
 0127    REF  52  LAST  791     31,2301  4 0130 1            CS      BUF               TIME OF LAST PIPA READING.
 0128    REF  10  LAST  790     31,2302  6 0025 0            AD      TIME1
 0129    REF   1                31,2303  6 2004 1            AD      THROTLAG          COMPENSATE FOR ENGINE RESPONSE LAG
 0130    REF   4  LAST  464     31,2304  7 4357 0            MASK    LOW8              MAKE SURE SMALL AND POSITIVE
 0131                           31,2305 22 007  0            ZL
 0132                           31,2306  0 0006 1            EXTEND
 0133    REF 201  LAST  791     31,2307 10 002  1            OV      0
 0134                           31,2310  0 0006 1            EXTEND
 0135    REF   7  LAST  790     31,2311  7 1612 1            MP      PIF
 0136                           31,2312  6 0000 1            DOUBLE
 0137    REF   3  LAST  789     31,2313 53'611  1            DXCH    FWEIGHT
 0138    REF   8  LAST  791     31,2314 11'612  1            CCS     PIF
 0139    REF  85  LAST  780     31,2315  6 4753 1            AD      ONE
 0140                           31,2316  1 2320 0            TCF     +2
 0141    REF  86  LAST  791     31,2317  6 4753 1            AD      ONE
 0142                           31,2320  0 0006 1            EXTEND
 0143    REF   9  LAST  791     31,2321  7 1612 1            MP      PIF
 0144                           31,2322  0 0006 1            EXTEND
 0145    REF  53  LAST  791     31,2323 10 131  0            OV      BUF +1
 0146                           31,2324 22 007  0            ZL
 0147    REF   4  LAST  791     31,2325 21'611  1            DAS     FWEIGHT


 0148    REF   3  LAST  788     31,2326  0 1607 1  THCOMP    TC      RTNHOLD


R0149        FLATOUT THROTTLES UP THE DESCENT ENGINE, AND IS CALLED AS A BASIC SUBROUTINE.

 0151    REF  29  LAST  735     31,2327  3 4737 0  FLATOUT   CAF     BIT13             4096 PULSES
 0152    REF   5  LAST  790     31,2330 55'606  1  WHATOUT   TS      PIFPSET           USE PIFPSET SO FWEIGHT WILL BE ZERO
 0153    REF 142  LAST  789     31,2331  4 4755 0            CS      ZERO
 0154    REF   4  LAST  790     31,2332 55'620  0            TS      FCOLD
 0155    REF  10  LAST  791     31,2333 55'612  1            TS      PIF
 0156                           31,2334  0 0006 1            EXTEND
 0157    REF   4  LAST  791     31,2335 23'607  1            QXCH    RTNHOLD
 0158    REF   1                31,2336  1 2251 1            TCF     DOIT


R0159        MASSMULT SCALES ACCELERATION, ARRIVING IN A AND L IN UNITS OF 2(-4) M/CS/CS, TO FORCE IN PULSE UNITS.

 0161                           31,2337  0 0006 1  MASSMULT  EXTEND
 0162    REF  54  LAST  791     31,2340 22 130  0            QXCH    BUF
 0163    REF 300  LAST  769     31,2341 52 155  1            DXCH    MPAC
 0164    REF  16  LAST  438     31,2342  0 7106 1            TC      DMP
 0165    REF   5  LAST  297     31,2343   01243 0            ADRES   MASS
```

```
L        THROTTLE CONTROL ROUTINES                                                          USER'S PAGE NO.   5      E7 S3

 0166   REF  17  LAST  791    31,2344  0 7106 1             TC      DMP              LEAVES PROPERLY SCALED FORCE IM MPAC
 0167   REF   1               31,2345   02005 0             ADRES   SCALEFAC
 0168   REF  10  LAST  769    31,2346  0 7262 0             TC      TPAGREE
 0169   REF 301  LAST  791    31,2347  3 0154 1             CA      MPAC
 0170                         31,2350  0 0006 1             EXTEND
 0171                         31,2351  1 2354 0             BZF     +3
 0172   REF  16  LAST  788    31,2352  3 4733 1             CAF     POSMAX
 0173   REF  55  LAST  791    31,2353  0 0130 0             TC      BUF
 0174   REF 302  LAST  792    31,2354  52 156 1             DXCH    MPAC +1
 0175   REF  56  LAST  792    31,2355  0 0130 0             TC      BUF


R0176                CONSTANTS:-

 0177   REF  30  LAST  791       4737             FEXTRA   =        BIT13                       FEXT        +5.13309020E+ 4

 0180                         31,2356   04143 0  /AF/CNST DEC      .13107

 01802                        31,2357   17777 0  OCT17777 OCT      17777
 01804                        31,2360   35074 1  4FMAXNOM DEC      14908                EQUIVALENT TO 10,500 LBS.
R0181   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

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P0001

 0002   REF   2  LAST  780   E7,1621                        EBANK=  E2DPS

 0003   REF   2  LAST  39 TO  40:     2     2*              COUNT*  $$/F2DPS

R0004   ############################################################################################################
R0006   LUNAR LANDING FLIGHT SEQUENCE TABLES
R0007   ############################################################################################################

R0009   FLIGHT SEQUENCE TABLES ARE ARRANGED BY FUNCTION.   THEY ARE REFERENCED USING AS AN INDEX THE REGISTER WCHPHASE:

A0011                                                       WCHPHASE  =  -1  --->  IGNALG
A0012                                                       WCHPHASE  =   0  --->  BRAKQUAD
A0013                                                       WCHPHASE  =   1  --->  APPRQUAD
A0014                                                       WCHPHASE  =   2  --->  VERTICAL

R0015   ############################################################################################################

R0017   ROUTINES FOR STARTING NEW GUIDANCE PHASES:

 0018   REF   1                 31,2361  1 2573 0           TCF     TTFINCR         IGNALG
 0019   REF   2  LAST  793      31,2362  1 2573 0  NEWPHASE TCF     TTFINCR         BRAKQUAD
 0020   REF   1                 31,2363  1 2556 1           TCF     STARTP64        APPRQUAD
 0021   REF   1                 31,2364  1 2547 1           TCF     P65START        VERTICAL
R0022

R0023   PRE-GUIDANCE COMPUTATIONS:

 0024   REF   1                 31,2365  1 2753 0           TCF     CALCRGVG        IGNALG
 0025   REF   1                 31,2366  1 2763 0  PREGUIDE TCF     RGVGCALC        BRAKQUAD
 0026   REF   1                 31,2367  1 2654 0           TCF     REDESIG         APPRQUAD
 0027   REF   2  LAST  793      31,2370  1 2763 0           TCF     RGVGCALC        VERTICAL
R0028

R0029   GUIDANCE EQUATIONS:

 0030   REF   1                 31,2371  1 3026 1           TCF     TTF/8CL         IGNALG
 0031   REF   2  LAST  793      31,2372  1 3026 1  WHATGUID TCF     TTF/8CL         BRAKQUAD
 0032   REF   3  LAST  793      31,2373  1 3026 1           TCF     TTF/8CL         APPRQUAD
 0033   REF   1                 31,2374  1 3503 0           TCF     VERTGUID        VERTICAL
R0034

R0035   POST GUIDANCE EQUATION COMPUTATIONS:

 0036   REF   1                 31,2375  1 3225 0           TCF     CGCALC          IGNALG
 0037   REF   1                 31,2376  1 3212 1  AFTRGUID TCF     EXTLOGIC        BRAKQUAD
 0038   REF   2  LAST  793      31,2377  1 3212 1           TCF     EXTLOGIC        APPRQUAD
 0039   REF   1                 31,2400  1 3400 1           TCF     STEER?          VERTICAL
R0040
```

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L        LUNAR LANDING GUIDANCE EQUATIONS                                              USER'S PAGE NO.   2       E7 S3

R0041    WINDOW VECTOR COMPUTATIONS:

 0042    REF   1                 31,2401  1 3275 0            TCF      EXGSUB          IGNALG
 0043    REF   1                 31,2402  1 3316 1  WHATEXIT  TCF      EXBRAK          BRAKQUAD
 0044    REF   1                 31,2403  1 3324 0            TCF      EXNORM          APPRQUAD
R0045

R0046    DISPLAY ROUTINES:

 0047    REF   1                 31,2404  1 3437 0  WHATDISP  TCF      P63DISPS        BRAKQUAD
 0048    REF   1                 31,2405  1 3442 1            TCF      P64DISPS        APPRQUAD
 0049    REF   1                 31,2406  1 3471 1            TCF      VERTDISP        VERTICAL
R0050

R0051    ALARM ROUTINE FOR TTF COMPUTATION:

 0052    REF   1                 31,2407  1 3672 0            TCF      1406POO         IGNALG
 0053    REF   1                 31,2410  1 3674 0  WHATALM   TCF      1406ALM         BRAKQUAD
 0054    REF   2   LAST   794    31,2411  1 3674 0            TCF      1406ALM         APPRQUAD
R0055

R0056    INDICES FOR REFERENCING TARGET PARAMETERS:

 0057                            31,2412  00000 1             OCT      0               IGNALG
 0058                            31,2413  00000 1   TARGTDEX  OCT      0               BRAKQUAD
 0059                            31,2414  00034 0             OCT      34              APPRQUAD
R0060

R0061    ************************************************************************************************
R0063    ENTRY POINTS:  ?GUIDSUB FOR THE IGNITION ALGORITHM, LUNLAND FOR SERVOUT
R0064    ************************************************************************************************

R0066    IGNITION ALGORITHM ENTRY:  DELIVERS N PASSES OF QUADRATIC GUIDANCE

 0067                            31,2415   77776 1  ?GUIDSUB  EXIT
 0068    REF  46   LAST   751    31,2416  3 4752 0            CAF      TWO             N = 3
 0069    REF   1                 31,2417  55'647 1            TS       NGUIDSUB
 0070    REF   1                 31,2420  1 2531 0            TCF      GUILDRET +2

 0071    REF   2   LAST   794    31,2421  55'647 1  GUIDSUB   TS       NGUIDSUB        ON SUCEEDING PASSES SKIP TTFINCR
 0072    REF   2   LAST   793    31,2422  1 2753 0            TCF      CALCRGVG

R0073    NORMAL ENTRY:  CONTROL COMES HERE FROM SERVOUT

 0074    REF  55   LAST   786    31,2423  0 5353 1  LUNLAND   TC       PHASCHNG
 0075                            31,2424   00035 1            OCT      00035           GROUP 5: RETAIN ONLY PIPA TASK
 0076    REF  24   LAST   755    31,2425  3 0101 1            CA       FLAGWRD5 ✓      HAS THROTTLE-UP COME YET?
 0077    REF   1                 31,2426  7 4744 0            MASK     ZOOMBIT <
 0078                            31,2427  0 0006 1            EXTEND
 0079    REF   1                 31,2430  1 3431 0            BZF      DISPEXIT +3     NO:   DO DISPLAYS ONLY
 0080    REF  56  LAST  794     31,2431  C 5353 1             TC      PHASCHNG          YES:  DO GUIDANCE
 0081                           31,2432   05023 0             OCT     05023
 0082                           31,2433   20000 0             OCT     20000

R0083    ***********************************************************************************************************
R0085    GUILDENSTERN:  AUTO-MODES MONITOR (R13)
R0086    ***********************************************************************************************************

 0088    REF   1                                              COUNT*  $$/R13

R0089    THE PHILOSOPHY OF GUILDENSTERN: ON EVERY APPEARANCE OF THE ATTITUDE-HOLD DISCRETE CHECK TO SEE IF THE ROD SWITCH
R0091    HAS BEEN CLICKED. IF SO, SELECT P66. IF THE DAP IS IN  AUTO AND THE                                      PRESENT
R0092    SPROGRAM IN PROGRESS IS P66, CHECK FOR A
R00925   RESTART. IF ONE HAS OCCURED RE-INITIALIZE P66 AND CONTINUE OTHERWISE YOUCONTINUE WITH PRESENT DATA IN P66.TO
R0093    SELECT P66 THE ATTITUDE-HOLD DISCRETE MUST BE PRESENT AND THE ROD SWITCH MUST HAVE BEEN CLICKED. OTHERWISE THE
R00937   AUTOMATIC LANDING WILL CONTINUE.
 0094    REF  12  LAST  790     31,2434  4 1010 0  GUILDEN    CS      MODREG            ARE WE IN P66?(EVEN THO WE ARE IN AUTO
 00945   REF   2  LAST  790     31,2435  6 2452 0    STERN    AD      DEC66             DAP)
 0095                           31,2436  0 0006 1             EXTEND
 00955   REF   1                31,2437  1 2522 1             BZF     RESTART?          YES: GO SE IF THERE HAS BEEN A RESTART

 0096    REF  31  LAST  792     31,2440  3 4737 0             CAF     BIT13             NO: IS UN-ATTITUDE-HOLD DISCRETE HERE?
 00965                          31,2441  0 0006 1             EXTEND
 0097    REF   3  LAST  480     31,2442  02 031 1             RAND    CHAN31
 00975   REF 233  LAST  758     31,2443  10 000 0             CCS     A
 0098    REF   2  LAST  794     31,2444  1 2527 1             TCF     GUILDRET          YES: ALL'S WELL ,OR AT LEAST AUTOMATIC

 0099    REF   1                31,2445  3 1746 0             CA      RODCOUNT          NO: HAS ROD SWITCH BEEN CLICKED
 0100                           31,2446  0 0006 1             EXTEND
 0101    REF   3  LAST  795     31,2447  1 2527 1             BZF     GUILDRET          NO: CONTINUE WITH THE AUTOMATIC LANDING

 0102    REF   2  LAST  790     31,2450  0 3677 1  STARTP66   TC      FASTCHNG          YES
 0103    REF   2  LAST  375     31,2451  0 5311 1             TC      NEWMODEX
 0104                           31,2452   00102 1  DEC66      DEC     66
 0105                           31,2453  0 0006 1             EXTEND
 0106    REF   7  LAST  319     31,2454  3 1474 1             DCA     HDOTDISP          SET DESIRED ALTITUDE RATE = CURRENT
 0107    REF   1                31,2455  53'645 0             DXCH    VDGVERT                ALTITUDE RATE.
 0108    REF 120  LAST  786     31,2456  0 6042 1  STRTP66A   TC      INTPRET
 0109                           31,2457   41535 1             SLOAD   PUSH
 0110    REF   1                31,2460   01457 0                     RBIASZ
 0111                           31,2461   41535 1             SLOAD   PUSH
 0112    REF   1                31,2462   01455 1                     RBIASY
 0113                           31,2463   55535 1             SLOAD   VDEF
 0114    REF   2  LAST  110     31,2464   01453 1                     RBIASX
 0115                           31,2465   43161 0             VXSC    SET
 0116    REF   1                31,2466   25532 1                     BIASFACT
 0117    REF   1                31,2467   00463 0                     RODFLAG
 0118    REF   1                31,2470   26621 0             STOVL   VBIAS
 0119    REF   2  LAST  105     31,2471   01254 0                     TEMX
 0120                           31,2472   77676 0             VCOMP
 0121   REF   2  LAST  153   31,2473    27764 1          STOVL  OLDPIPAX
 0122   REF  13  LAST  781   31,2474    06524 1                 ZEROVECS
 0123   REF   2  LAST  153   31,2475    17767 1          STODL  DELVROD
 0124   REF   2  LAST  123   31,2476    02540 1                 RODSCALE
 0125   REF   2  LAST  153   31,2477    17757 1          STODL  RODSCAL1
 0126   REF  14  LAST  790   31,2500    01234 0                 PIPTIME
 0127   REF   2  LAST  153   31,2501    03760 0          STORE  LASTTPIP
 0128                        31,2502    77776 1          EXIT
 0129   REF 143  LAST  791   31,2503   3 4755 1          CAF    ZERO
 0130   REF   5  LAST  791   31,2504   55'620 0          TS     FCOLD
 0131   REF   5  LAST  791   31,2505   55'610 0          TS     FWEIGHT
 0132   REF   6  LAST  796   31,2506   55'611 1          TS     FWEIGHT +1
 0134   REF  47  LAST  794   31,2507   3 4752 0          CAF    TWO            WCHPHASE = 2 ---> VERTICAL: P65,P66,P67
 01341  REF   1              31,2510   55'647 1          TS     WCHVERT
 0135   REF   3  LAST  733   31,2511   55'621 1          TS     WCHPHOLD
 0136   REF   3  LAST  780   31,2512   55'346 0          TS     WCHPHASE
 0137   REF 219  LAST  786   31,2513   0 4616 1          TC     BANKCALL       TEMPORARY, I HOPE HOPE HOPE
 0138   REF   4  LAST  757   31,2514    40166 1          CADR   STOPRATE       TEMPORARY, I HOPE HOPE HOPE
 0139   REF  82  LAST  776   31,2515   0 5516 0          TC     DOWNFLAG       PERMIT X-AXIS OVERRIDE
 0140   REF   3  LAST  231   31,2516    00311 1          ADRES  XOVINFLG
 0141   REF  83  LAST  796   31,2517   0 5516 0          TC     DOWNFLAG
 0142   REF   2  LAST  780   31,2520    00143 1          ADRES  REDFLAG
 0143   REF   2  LAST  793   31,2521   1 3503 0          TCF    VERTGUID

 0167   REF  26  LAST  523   31,2522   3 0075 0 RESTART? CA     FLAGWRD1       HAS THERE BEEN A RESTART?
 0168   REF   2  LAST  219   31,2523   7 4740 1          MASK   RODFLBIT
 0169                        31,2524   0 0006 1          EXTEND
 0170   REF   1              31,2525   1 2456 0          BZF    STRTP66A       YES. REINITIALIZE BUT LEAVE VDGVERT AS
A0171                                                                             IS.

 0172   REF   3  LAST  796   31,2526   1 3503 0          TCF    VERTGUID       NO:  CONTINUE WITH R.O.D.

R0173   ************************************************************************************************************
R0175   INITIALIZATION FOR THIS PASS
R0176   ************************************************************************************************************

 0178   REF    3 LAST   793 TO  795:    43    45*        COUNT* $$/F2OPS

 0179   REF 144  LAST  796   31,2527   3 4755 1 GUILDRET CAF    ZERO
 0180   REF   2  LAST  795   31,2530   55'746 1          TS     RODCOUNT

 0181                        31,2531   0 0006 1  +2      EXTEND
 0182   REF   3  LAST  781   31,2532   3 1625 1          DCA    TPIP
 0183   REF   1              31,2533   53'574 1          DXCH   TPIPOLD

 0184   REF   3  LAST  795   31,2534   0 3677 1          TC     FASTCHNG

 0185                        31,2535   0 0006 1          EXTEND
 0186   REF   7  LAST  782   31,2536   3 1561 1          DCA    PIPTIME1
 0187   REF   4  LAST  796   31,2537   53'625 0          DXCH   TPIP
 0188                              31,2540  0 0006 1              EXTEND
 0189    REF   4  LAST  781        31,2541  3 1643 1              DCA     TTF/8
 0190    REF   2  LAST  151        31,2542  53'553 1              DXCH    TTF/8TMP

 0191    REF   4  LAST  780        31,2543  11'623 0              CCS     FLPASS0
 0192    REF   3  LAST  793        31,2544  1 2573 0              TCF     TTFINCR

 0193    REF   4  LAST  796        31,2545  51'346 1  BRSPOT1     INDEX   WCHPHASE
 0194    REF   1                   31,2546  1 2362 0              TCF     NEWPHASE

R0195    ************************************************************************************************
R0197    ROUTINES TO START NEW PHASES
R0198    ************************************************************************************************

 0200    REF   3  LAST  795        31,2547  0 5311 1  P65START    TC      NEWMODEX
 0201                              31,2550   00101 1              DEC     65
 0202    REF 145  LAST  796        31,2551  3 4755 1              CAF     ZERO
 0203    REF   2  LAST  796        31,2552  55'647 1              TS      WCHVERT
 0204    REF  84  LAST  796        31,2553  0 5516 0              TC      DOWNFLAG        PERMIT X-AXIS OVERRIDE
 0205    REF   4  LAST  796        31,2554   00311 1              ADRES   XOVINFLG
 0206    REF   4  LAST  797        31,2555  1 2573 0              TCF     TTFINCR


 0207    REF   4  LAST  797        31,2556  0 5311 1  STARTP64    TC      NEWMODEX
 0208                              31,2557   00100 0              DEC     64
 0209    REF   1                   31,2560  3 1425 0              CA      DELTTFAP        AUGMENT TTF/8
 0210    REF   3  LAST  797        31,2561  27'552 0              ADS     TTF/8TMP
 0211                              31,2562  0 0004 0              INHINT
 0212    REF   4  LAST  474        31,2563  0 6022 1              TC      C13STALL
 0213    REF  27  LAST  776        31,2564  3 4740 0              CA      BIT12           ENABLE RUPT10
 0214                              31,2565  0 0006 1              EXTEND
 0215    REF  15  LAST  565        31,2566  05 013 0              WOR     CHAN13
 0216    REF   1                   31,2567  3 3707 1              CAF     P64DB
 0217    REF   2  LAST  214        31,2570  55'343 0              TS      DB
 0218    REF  85  LAST  797        31,2571  0 5516 0              TC      DOWNFLAG        INITIALIZE REDESIGNATION FLAG
 0219    REF   3  LAST  796        31,2572   00143 1              ADRES   REDFLAG

A0220                                                      (CONTINUE TO TTFINCR)

R0221    ************************************************************************************************
R0223    INCREMENT TTF/8, UPDATE LAND FOR LUNAR ROTATION, DO OTHER USEFUL THINGS
R0224    ************************************************************************************************

R0226                   TTFINCR COMPUTATIONS ARE AS FOLLOWS:-

R0227                             TTF/8 UPDATED FOR TIME SINCE LAST PASS:

R0228                                        TTF/8 = TTF/8 + (TPIP - TPIPOLD)/8

R0229                             LANDING SITE VECTOR UPDATED FOR LUNAR ROTATION:
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R0230                                                         -               -              -
R0232                                          LAND = /LAND/ UNIT(LAND - LAND(TPIP - TPIPOLD) * WM)

R0234                                   SLANT RANGE TO LANDING SITE, FOR DISPLAY:

R0235                                                                 -       -
R0236                                          RANGEDSP = ABVAL(LAND - R)

 0237    REF 121  LAST  795    31,2573  0 6042 1  TTFINCR  TC      INTPRET
 0238                          31,2574   45345 1           DLOAD   DSU
 0239    REF   5  LAST  796    31,2575   03625 0                   TPIP
 0240    REF   2  LAST  796    31,2576   03574 1                   TPIPOLD
 0241                          31,2577   41461 1           SLR     PUSH                 SHIFT SCALES DELTA TIME TO 2(17) CSECS
 0242                          31,2600   21214 0                   11D
 0243                          31,2601   47361 0           VXSC    VXV
 0244    REF   5  LAST  783    31,2602   03635 1                   LAND
 0245    REF   2  LAST  121    31,2603   02325 1                   WM
 0246                          31,2604   47045 0           BVSU    RTB
 0247    REF   6  LAST  798    31,2605   03635 1                   LAND
 0248    REF   2  LAST  341    31,2606   21727 0                   NORMUNIT
 0249                          31,2607   76561 1           VXSC    VSL1
 0250    REF   3  LAST  120    31,2610   02333 0                   /LAND/
 0251    REF   2  LAST  151    31,2611   17545 0           STODL   LANDTEMP
 0252                          31,2612   77776 1           EXIT

 0253    REF 303  LAST  792    31,2613  52 155 1           DXCH    MPAC
 0254    REF   4  LAST  797    31,2614  21'553 1           DAS     TTF/8TMP             NOW HAVE INCREMENTED TTF/8  IN TTF/8TMP

 0255    REF   4  LAST  796    31,2615  0 3677 1           TC      FASTCHNG

 0256                          31,2616  0 0006 1           EXTEND
 0257    REF   5  LAST  798    31,2617  3 1553 0           DCA     TTF/8TMP
 0258    REF   5  LAST  797    31,2620  53'643 0           DXCH    TTF/8

 0259    REF   1               31,2621  0 3643 0           TC      TDISPSET

 0260    REF   2  LAST  338    31,2622  3 7721 1           CAF     PRIO31               TEMPORARILY OVER-PRIO CHARIN
 0261    REF  13  LAST  752    31,2623  0 5146 1           TC      PRIOCHNG

 0262    REF 122  LAST  798    31,2624  0 6042 1           TC      INTPRET
 0263                          31,2625   53375 0           VLOAD   VAD                  ADD IN CORRECTION FROM NOUN 69
 0264    REF   3  LAST  798    31,2626   03545 0                   LANDTEMP
 0265    REF   4  LAST  123    31,2627   02635 0                   DLAND
 0266    REF   7  LAST  798    31,2630   03635 1           STORE   LAND
 0267                          31,2631   77646 0           ABVAL                        RECOMPUTE /LAND/
 0268    REF   4  LAST  798    31,2632   02333 0           STORE   /LAND/
 0269                          31,2633   77776 1           EXIT

 0270    REF   5  LAST  798    31,2634  0 3677 1           TC      FASTCHNG             SINCE REDESIG MAY CHANGE LANDTEMP
 0271    REF   6  LAST  789    31,2635  3 5014 1                CAF     EBANK5
 0272    REF   5  LAST  798    E5,1634                          EBANK=  DLAND
 0273    REF  28  LAST  789    31,2636  54 003 0                TS      EBANK
 0274    REF 146  LAST  797    31,2637  3 4755 1                CAF     ZERO              ZERO N 69 REGISTERS
 0275    REF   6  LAST  799    31,2640  55'634 0                TS      DLAND
 0276    REF   7  LAST  799    31,2641  55'635 1                TS      DLAND     +1
 0277    REF   8  LAST  799    31,2642  55'636 1                TS      DLAND     +2
 0278    REF   9  LAST  799    31,2643  55'637 0                TS      DLAND     +3
 0279    REF  10  LAST  799    31,2644  55'640 0                TS      DLAND     +4
 0280    REF  11  LAST  799    31,2645  55'641 1                TS      DLAND     +5
 0281    REF   9  LAST  789    31,2646  3 5016 0                CAF     EBANK7
 0282    REF   1               E7,1666                          EBANK=  TREDES
 0283    REF  29  LAST  799    31,2647  54 003 0                TS      EBANK

 0284    REF   7  LAST  755    31,2650  3 4736 1                CAF     PRIO20
 0285    REF  14  LAST  798    31,2651  0 5146 1                TC      PRIOCHNG

 0286    REF   5  LAST  797    31,2652  51'346 1    BRSPOT2     INDEX   WCHPHASE
 0287    REF   1               31,2653  1 2366 1                TCF     PREGUIDE

R0288    ****************************************************************************************************
R0290    LANDING SITE PERTURBATION EQUATIONS
R0291    ****************************************************************************************************

 0293    REF   4  LAST  776    31,2654  3 0102 1    REDESIG     CA      FLAGWRD6          IS REDFLAG SET?
 0294    REF   1               31,2655  7 4746 1                MASK    REDFLBIT
 0295                          31,2656  0 0006 1                EXTEND
 0296    REF   3  LAST  793    31,2657  1 2763 0                BZF     RGVGCALC          NO:   SKIP REDESIGNATION LOGIC

 0297    REF   2  LAST  799    31,2660  3 1666 0                CA      TREDES            YES:  HAS TREDES REACHED ZERO?
 0298                          31,2661  0 0006 1                EXTEND
 0299    REF   4  LAST  799    31,2662  1 2763 0                BZF     RGVGCALC          YES:  SKIP REDESIGNATION LOGIC

 0300                          31,2663  0 0004 0                INHINT
 0301    REF   1               31,2664  3 1446 0                CA      ELINCR1
 0302    REF   2  LAST  151    31,2665  55'554 0                TS      ELINCR
 0303    REF   2  LAST  142    31,2666  3 1445 0                CA      AZINCR1
 0304    REF   2  LAST  151    31,2667  55'556 1                TS      AZINCR
 0305    REF   6  LAST  798    31,2670  0 3677 1                TC      FASTCHNG

 0306    REF 147  LAST  799    31,2671  3 4755 1                CA      ZERO
 0307    REF   2  LAST  799    31,2672  55'446 1                TS      ELINCR1
 0308    REF   3  LAST  799    31,2673  55'445 1                TS      AZINCR1
 0309    REF   3  LAST  799    31,2674  55'555 1                TS      ELINCR  +1
 0310    REF   3  LAST  799    31,2675  55'557 0                TS      AZINCR  +1

 0311    REF  19  LAST  606    31,2676  3 0120 1                CA      FIXLOC            SET PD TO 0
 0312    REF   6  LAST  608    31,2677  54 166 1                TS      PUSHLOC

 0313    REF 123  LAST  798    31,2700  0 6042 1                TC      INTPRET
 0314                        31,2701    52375 1           VLOAD   VSU
 0315   REF   8  LAST  798   31,2702    03635 1                   LAND
 0316   REF   7  LAST  783   31,2703    03521 1                   R                  -     -
 0317                        31,2704    41434 1           RTB     PUSH              PUSH DOWN UNIT (LAND - R)
 0318   REF   3  LAST  798   31,2705    21727 0                   NORMUNIT
 0319                        31,2706    76435 1           VXV     VSL1
 0320   REF   2  LAST  115   31,2707    02154 0                   YNBPIP                               -          -     -
 0321                        31,2710    65361 0           VXSC    POOL              PUSH DOWN - ELINCR(YNB * UNIT(LAND - R))
 0322   REF   4  LAST  799   31,2711    03555 1                   ELINCR
 0323   REF   4  LAST  799   31,2712    03557 0                   AZINCR
 0324                        31,2713    52361 1           VXSC    VSU
 0325   REF   3  LAST  800   31,2714    02154 0                   YNBPIP
 0326                        31,2715    41455 0           VAD     PUSH              RESULTING VECTOR IS 1/2 REAL SIZE

 0327                        31,2716    45345 1           DLOAD   DSU               MAKE SURE REDESIGNATION IS NOT
 0328                        31,2717    00001 0                   0                   TOO CLOSE TO THE HORIZON
 0329   REF   1              31,2720    05660 1                   DEPRCRIT
 0330                        31,2721    71240 1           BMN     DLOAD
 0331   REF   1              31,2722    62725 0                   REDES1
 0332   REF   2  LAST  800   31,2723    05660 1                   DEPRCRIT
 0333                        31,2724    00001 0           STORE   0
 0334                        31,2725    45345 1  REDES1   DLOAD   DSU
 0335   REF   9  LAST  800   31,2726    03635 1                   LAND
 0336   REF   8  LAST  800   31,2727    03521 1                   R
 0337                        31,2730    74271 0           DOV     VXSC
 0338                        31,2731    00001 0                   0
 0339                        31,2732    53455 0           VAD     UNIT
 0340   REF   9  LAST  800   31,2733    03521 1                   R
 0341                        31,2734    76561 1           VXSC    VSL1
 0342   REF   5  LAST  798   31,2735    02333 0                   /LAND/
 0343   REF   4  LAST  798   31,2736    03545 0           STORE   LANDTEMP
 0344                        31,2737    77776 1           EXIT                      LOOKANGL WILL BE COMPUTED AT RGVGCALC

 0345   REF   7  LAST  799   31,2740  0 3677 1           TC      FASTCHNG

 0346                        31,2741  0 0006 1           EXTEND
 0347   REF   5  LAST  800   31,2742  3 1545 1           DCA     LANDTEMP
 0348   REF  10  LAST  800   31,2743  53'635 1           DXCH    LAND
 0349                        31,2744  0 0006 1           EXTEND
 0350   REF   6  LAST  800   31,2745  3 1547 0           DCA     LANDTEMP +2
 0351   REF  11  LAST  800   31,2746  53'637 0           DXCH    LAND     +2
 0352                        31,2747  0 0006 1           EXTEND
 0353   REF   7  LAST  800   31,2750  3 1551 1           DCA     LANDTEMP +4
 0354   REF  12  LAST  800   31,2751  53'641 1           DXCH    LAND     +4

 0355   REF   5  LAST  799   31,2752  1 2763 0           TCF     RGVGCALC

R0356   ****************************************************************************************************
R0358   COMPUTE STATE IN GUIDANCE COORDINATES
R0359   ****************************************************************************************************
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R0361                RGVGCALC COMPUTATIONS ARE AS FOLLOWS:-

R0362                            VELOCITY RELATIVE TO THE SURFACE:

R0363                                        -       -   -    -
R0364                                        ANGTERM = V + R * WM

R0365                            STATE IN GUIDANCE COORDINATES:

R0366                                        -     *   -   -
R0367                                        RGU = CG (R - LAND)

R0368                                        -     *   -   -    -
R0369                                        VGU = CG (V - WM * R)

R0373                            DEPRESSION ANGLE FOR DISPLAY:

R0374                                                             -     -       -
R0375                                        LOOKANGL = ARCSIN(UNIT(R - LAND).XNBPIP)

 0376  REF 124  LAST  799   31,2753  0 6042 1  CALCRGVG TC       INTPRET       IN IGNALG, COMPUTE V FROM INTEGRATION
 0377                       31,2754   64375 1           VLOAD    MXV             OUTPUT AND TRIM CORRECTION TERM
 0378  REF  14  LAST  783   31,2755   00025 0                    VATT1           COMPUTED LAST PASS AND LEFT IN UNFC/2
 0379  REF  27  LAST  781   31,2756   01734 0                    REFSMMAT
 0380                       31,2757   53362 0           VSR1     VAD
 0381  REF   6  LAST  783   31,2760   03253 0                    UNFC/2
 0382  REF   4  LAST  783   31,2761   03527 1           STORE    V
 0383                       31,2762   77776 1           EXIT

 0384  REF 125  LAST  801   31,2763  0 6042 1  RGVGCALC TC       INTPRET       ENTER HERE TO RECOMPUTE RG AND VG
 0385                       31,2764   47375 0           VLOAD    VXV
 0386  REF  10  LAST  800   31,2765   03521 1                    R
 0387  REF   3  LAST  798   31,2766   02325 1                    WM
 0388                       31,2767   70455 1           VAD      VSR2          RESCALE TO UNITS OF 2(9) M/CS
 0389  REF   5  LAST  801   31,2770   03527 1                    V
 0390  REF   2  LAST  120   31,2771   02265 1           STORE    ANGTERM
 0391                       31,2772   77721 0           MXV
 0392  REF   5  LAST  781   31,2773   02575 1                    CG            NO SHIFT SINCE ANGTERM IS DOUBLE SIZED
 0393  REF   6  LAST  782   31,2774   27627 1           STOVL    VGU
 0398  REF  11  LAST  801   31,2775   03521 1                    R                        -   -
 0399                       31,2776   41451 1           VSU      PUSH          PUSH DOWN R - LAND
 0400  REF  13  LAST  800   31,2777   03635 1                    LAND
 0401                       31,3000   76521 0           MXV      VSL1
 0402  REF   6  LAST  801   31,3001   02575 1                    CG
 0403  REF   6  LAST  782   31,3002   02627 0           STORE    RGU
 0404                       31,3003   77646 0           ABVAL
 0405  REF   3  LAST  317   31,3004   26617 0           STOVL    RANGEDSP
 0406                       31,3005   50234 1           RTB      DOT           NOW IN MPAC IS SINE(LOOKANGL)/4
 0407  REF   4  LAST  800   31,3006   21727 0                    NORMUNIT
 0408  REF   2  LAST  115   31,3007   02146 0                    XNBPIP
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969  FLY     153  PAGE  802
L       LUNAR LANDING GUIDANCE EQUATIONS                                                    USER'S PAGE NO.  10     E7 S3

 0409                        31,3010   77776 1            EXIT

 0410   REF  20  LAST  799   31,3011  3 0120 1            CA     FIXLOC          RESET PUSH DOWN POINTER
 0411   REF   7  LAST  799   31,3012  54 166 1            TS     PUSHLOC

 0412   REF 304  LAST  798   31,3013  3 0154 1            CA     MPAC            COMPUTE LOOKANGL ITSELF
 0413                        31,3014  6 0000 1            DOUBLE
 0414   REF 220  LAST  796   31,3015  0 4616 1            TC     BANKCALL
 0415   REF   1              31,3016   61663 0            CAOR   SPARCSIN -1
 0416   REF   1              31,3017  6 3713 1            AD     1/2DEG
 04161  REF   1              31,3020  6 1356 0            AD     ELBIAS          BIAS LPD ANGLE FOR WINDOW BENDING
 0417                        31,3021  0 0006 1            EXTEND
 0418   REF   1              31,3022  7 3712 1            MP     180DEGS
 0419   REF   1              31,3023  55'667 0            TS     LOOKANGL        LOOKANGL FOR DISPLAY DURING P64

 0420   REF   6  LAST  799   31,3024  51'346 1   BRSPOT3  INDEX  WCHPHASE
 0421   REF   1              31,3025  1 2372 1            TCF    WHATGUID

R0422   ******************************************************************************************************************
R0424   TTF/8 COMPUTATION
R0425   ******************************************************************************************************************

 0427   REF   1              31,3026  0 3636 1   TTF/8CL  TC     INTPRETX
 0428                        31,3027   77743 1            DLOAD*
 0429   REF   1              31,3030   02431 0                   JDG2TTF,1
 0430   REF   2  LAST  151   31,3031   23571 0            STODL* TABLTTF  +6      A(3) = 8 JDG  TO TABLTTF
 0431   REF   1              31,3032   02427 1                   ADG2TTF,1                    2
 0432   REF   3  LAST  802   31,3033   17567 0            STODL  TABLTTF  +4      A(2) = 6 ADG  TO TABLTTF
 0433   REF   7  LAST  801   31,3034   03633 1                   VGU      +4                  2
 0434                        31,3035   42605 1            DMP    DAD*
 0435   REF   1              31,3036   05656 1                   3/4DP
 0436   REF   1              31,3037   02425 0                   VDG2TTF,1
 0437   REF   4  LAST  802   31,3040   23565 0           .STODL* TABLTTF  +2      A(1) = (6 VGU  + 18 VDG )/8 TO TABLTTF
 0438   REF   1              31,3041   02407 0                   RDG  +4,1                    2         2
 0439                        31,3042   41225 1            DSU    DMP
 0440   REF   7  LAST  801   31,3043   02633 0                   RGU      +4
 0441   REF   1              31,3044   05654 0                   3/8DP
 0442   REF   5  LAST  802   31,3045   03563 1            STORE  TABLTTF         A(0) = -24(RGU  - RDG )/64 TO TABLTTF
 0443                        31,3046   77776 1            EXIT                                 2      2

 0444   REF  28  LAST  617   31,3047  3 4744 1            CA     BIT8
 0445   REF   6  LAST  802   31,3050  55'572 1            TS     TABLTTF  +10    FRACTIONAL PRECISION FOR TTF TO TABLE

 0446                        31,3051  0 0006 1            EXTEND
 0447   REF   6  LAST  798   31,3052  3 1643 1            DCA    TTF/8
 0448   REF 305  LAST  802   31,3053  52 155 1            DXCH   MPAC            LOADS TTF/8 (INITIAL GUESS) INTO MPAC
 0449   REF  48  LAST  796   31,3054  3 4752 0            CAF    TWO             DEGREE - ONE
 0450   REF 112  LAST  769   31,3055  54 001 1            TS     L
 0451   REF   1              31,3056  3 3705 0            CAF    TABLTTFL
 0452   REF   1              31,3057  0 3512 1            TC     ROOTPSRS        YIELDS TTF/8 IN MPAC
 0453   REF   7  LAST  802   31,3060  51'346 1           INDEX  WCHPHASE
 0454   REF   1              31,3061  1 2410 1           TCF    WHATALM

 0455                        31,3062  0 0006 1           EXTEND                 GOOD RETURN
 0456   REF 306  LAST  802   31,3063  3 0155 0           DCA    MPAC            FETCH TTF/8 KEEPING IT IN MPAC
 0457   REF   7  LAST  802   31,3064  53'643 0           DXCH   TTF/8           CORRECTED TTF/8

 0458   REF   2  LAST  798   31,3065  0 3643 0           TC     TDISPSET

A0459                                                (CONTINUE TO QUADGUID)


R0460   **************************************************************************************************** ***********
R0462   MAIN GUIDANCE EQUATION
R0463   **************************************************************************************************** ***********

R0465                        AS PUBLISHED:-

R0466                                                 -     -        -     -
R0467                                   -     -     6(VDG + VG)   12(RDG - RG)
R0468                                   ACG = ADG + ----------- + ------------
R0469                                                   TTF         (TTF)(TTF)

R0470                        AS HERE PROGRAMMED:-

R0471                                               -     -
R0472                                        3 (1/4(RDG - RG)   -     - )
R0473                                        - (------------- + VDG + VG)
R0474                                  -     4 (    TTF/8               )   -
R0475                                  ACG = ---------------------------- + ADG
R0476                                                   TTF/8

 0477   REF   8  LAST  803   31,3066  4 1642 1  QUADGUID CS     TTF/8
 0478   REF   1              31,3067  6 1426 0           AD     LEADTIME        LEADTIME IS A NEGATIVE NUMBER
 0479   REF  17  LAST  792   31,3070  6 4733 1           AD     PDSMAX          SAFEGUARD THE COMPUTATIONS THAT FOLLOW
 0480   REF 113  LAST  802   31,3071  54 001 1           TS     L                 BY FORCING -TTF+LEADTIME > OR = ZERO
 0481   REF 114  LAST  803   31,3072  4 0001 1           CS     L
 0482   REF 115  LAST  803   31,3073  6 0001 0           AD     L
 0483                        31,3074  22 007 0           ZL
 0484                        31,3075  0 0006 1           EXTEND
 0485   REF   9  LAST  803   31,3076  11'642 1           DV     TTF/8
 0486   REF  57  LAST  792   31,3077  54 130 1           TS     BUF             - RATIO OF LAG-DIMINISHED TTF TO TTF
 0487                        31,3100  0 0006 1           EXTEND
 0488                        31,3101  7 0000 0           SQUARE
 0489   REF  58  LAST  803   31,3102  54 131 0           TS     BUF   +1
 0490   REF  59  LAST  803   31,3103  6 0130 0           AD     BUF
 0491   REF  60  LAST  803   31,3104  56 131 1           XCH    BUF   +1        RATIO SQUARED - RATIO
 0492   REF  61  LAST  803   31,3105  6 0131 1           AD     BUF   +1
 0493   REF 307  LAST  803   31,3106  54 154 0           TS     MPAC            COEFFICIENT FOR VGL TERM
 0494   REF  62  LAST  803   31,3107  6 0131 1           AD     BUF   +1
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0495   REF  21  LAST  802   31,3110  50 120 1          INDEX  FIXLOC
0496                        31,3111  54 C32 1          TS     260             COEFFICIENT FOR ROG-RGU TERM
0497   REF  63  LAST  803   31,3112  6 0131 1          AO     8UF   +1
0498   REF  22  LAST  804   31,3113  50 120 1          INDEX  FIXLOC
0499                        31,3114  54 034 1          TS     280             COEFFICIENT FOR VOG TERM
0500   REF  64  LAST  804   31,3115  6 0130 0          AO     BUF
0501   REF  18  LAST  803   31,3116  6 4733 1          AO     POSMAX
0502   REF  65  LAST  804   31,3117  6 0131 1          AO     8UF   +1
0503   REF  66  LAST -804   31,3120  6 0131 1          AC     8UF   +1
0504   REF  23  LAST  804   31,3121  50 120 1          INDEX  FIXLCC
0505                        31,3122  54 C36 0          TS     300             COEFFICIENT FOR ACG TERM

0506   REF 148  LAST  799   31,3123  3 4755 1          CAF    ZERO
0507   REF   8  LAST  608   31,3124  54 163 1          TS     MODE

0508   REF   2  LAST  802   31,3125  0 3636 1          TC     INTPRETX
0509                        31,3126   65361 0          VXSC   PDCL
0510   REF   8  LAST  802   31,3127   C3627 1                 VGU
0511                        31,3130   00035 1                 28D
0512                        31,3131   62757 0          VXSC*  POVL*
0513   REF   1              31,3132   02411 1                 VOG,1
0514   REF   2  LAST  802   31,3133   02403 1                 ROG,1
0515                        31,3134   70251 0          VSL    V/SC
0516   REF   8  LAST  802   31,3135   02627 0                 RGU
0517   REF  1C  LAST  803   31,3136   03643 0                 TTF/8
0518                        31,3137   74342 1          VSR2   VXSC
0519                        31,3140   00033 1                 260
0520                        31,3141   53255 0          VAC    VAO
0521                        31,3142   74341 1          V/SC   VXSC
0522   REF  11  LAST  804   31,3143   03643 0                 TTF/8
0523   REF   2  LAST  802   31,3144   C5656 1                 3/4DP
0524                        31,3145   73725 0          POOL   VXSC*
0525                        31,3146   00037 0                 300
0526   REF   1              31,3147   C2417 1                 AOG,1
0527                        31,3150   77655 1          VAC
0528                        31,3151   76505 0 AFCCALC1 VXM    VSL1            VERTGUID COMES HERE
0529   REF   7  LAST  801   31,3152   02575 1                 CG
0530                        31,3153   70315 1          PDVL   V/SC
0531   REF   5  LAST  781   31,3154   01236 1                 GOT/2
0532   REF   1              31,3155   05652 0                 GSCALE
0533                        31,3156   45445 0          BVSU   STACR
0534   REF   7  LAST  801   31,3157   74524 1          STCRE  UNFC/2          UNFC/2 NEED NOT BE UNITIZED
0535                        31,3160   77646 0          ABVAL
0536   REF   3  LAST  788   31,3161   17464 1 AFCCALC2 STCDL  /AFC/           MAGNITUDE OF AFC FOR THROTTLE
0537   REF   8  LAST  804   31,3162   03253 0                 UNFC/2          VERTICAL COMPONENT
0538                        31,3163   65316 0          DSQ    POOL
0539   REF   9  LAST  804   31,3164   03255 0                 UNFC/2    +2    OUT-OF-PLANE
0540                        31,3165   65316 0          DSQ    POOL
0541   REF   1              31,3166   05650 1                 HIGHESTF
0542                        31,3167   63471 0          DDV    DSC
```

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 0543   REF   6  LAST  791    31,3170   C1244 1                    MASS                                  2       2       2
 0544                         31,3171   45225 C            DSL     OSU                 AMAXHCRIZ = SQRT(ATCTAL   - A     - A   )
 0545                         31,3172   71244 0            BPL     OLOAD                                            1       0
 0546   REF   1               31,3173   63175 1                    AFCCALC3
 0547   REF  14  LAST  796    31,3174   06524 1                    ZEROVECS
 0548                         31,3175   43366 0   AFCCALC3 SQRT    DAO
 0549   REF  10  LAST  804    31,3176   03257 1                    UNFC/2     +4
 0550                         31,3177   44244 0            BPL     BDSU
 0551   REF   1               31,3200   63203 0                    AFCCLENC
 0552   REF  11  LAST  805    31,3201   03257 1                    UNFC/2     +4
 0553   REF  12  LAST  805    31,3202   03257 1            STORE   UNFC/2     +4
 0554                         31,3203   77776 1   AFCCLENO EXIT
 0555   REF   8  LAST  800    31,3204  0 3677 1            TC      FASTCHNG

 0556   REF   8  LAST  803    31,3205  3 1346 1            CA      WCHPHASE            PREPARE FOR PHASE SWITCHING LOGIC
 0557   REF   4  LAST  796    31,3206  55'621 1            TS      WCHPHOLD
 0558   REF   5  LAST  797    31,3207  25'623 1            INCR    FLPASSC             INCREMENT PASS CCUNTER

 0559   REF   9  LAST  805    31,3210  51'346 1   BRSPOT4  INDEX   WCHPHASE
 0560   REF   1               31,3211  1 2376 0            TCF     AFTRGUIC

R0561   ***********************************************************************************************
R0563   NEW PHASE NOW?
R0564   ***********************************************************************************************

 0566   REF  10  LAST  805    31,3212  51'346 1   EXTLCGIC INDEX   WCHPHASE            IS TTF NEARER ZERO THAN CRITERION?
 0567   REF   2  LAST  141    31,3213  3 1423 0            CA      TENOBRAK
 0568   REF  12  LAST  804    31,3214  6 1642 0            AD      TTF/8
 0569                         31,3215  0 0006 1            EXTEND
 0570   REF   2  LAST  793    31,3216  6 3225 1            BZMF    CGCALC              NO

 0571   REF   9  LAST  805    31,3217  0 3677 1            TC      FASTCHNG            YES:  INCREMENT WCHPHASE, ZERO FLPASSO

 0572   REF   5  LAST  805    31,3220  3 1621 0            CA      WCHPHCLC
 0573   REF  87  LAST  791    31,3221  6 4753 1            AD      ONE
 0574   REF  11  LAST  805    31,3222  55'346 C            TS      WCHPHASE
 0575   REF 149  LAST  804    31,3223  3 4755 1            CAF     ZERO
 0576   REF   6  LAST  805    31,3224  55'623 0            TS      FLPASSO

A0577                                                      (CCNTINUE TO CGCALC)

R0578   ***********************************************************************************************
R0580   ERECT GUIDANCE-STABLE MEMBER TRANSFORMATICN MATRIX
R0581   ***********************************************************************************************

 0583   REF   7  LAST  799    31,3225  3 5014 1   CGCALC   CAF     EBANK5
 0584   REF  30  LAST  799    31,3226  54 C03 0            TS      EBANK
 0585   REF   2  LAST  122    E5,1435                      EBANK=  TCGIBRAK
 0586                         31,3227  0 0006 1            EXTEND
 0587   REF  12  LAST  805    31,3230  5 1346 1            INDEX   WCHPHASE
 0588   REF   1                31,3231   5 2413 0              INDEX   TARGTDEX
 0589   REF   2  LAST  122     31,3232   3 1435 1              DCA     TCGFBRAK
 0590   REF  18  LAST  745     31,3233   24 006 1              INCR    BBANK
 0591   REF  19  LAST  806     31,3234   24 006 1              INCR    BBANK
 0592   REF  13  LAST  805     E7,1642                         EBANK=  TTF/8
 0593   REF  14  LAST  806     31,3235   6 1642 0              AD      TTF/8
 0594   REF 116  LAST  803     31,3236   56 001 0              XCH     L
 0595   REF  15  LAST  806     31,3237   6 1642 0              AD      TTF/8
 0596   REF 234  LAST  795     31,3240   10 000 0              CCS     A
 0597   REF 117  LAST  806     31,3241   10 001 1              CCS     L
 0598   REF   1                31,3242   1 3273 0              TCF     EXITSPOT
 0599   REF   2  LAST  806     31,3243   1 3273 0              TCF     EXITSPOT
 0600                          31,3244   13 245 0              NOOP

 0601   REF   3  LAST  804     31,3245   0 3636 1              TC      INTPRETX
 0602                          31,3246    53575 0              VLCAD   UNIT
 0603   REF  14  LAST  801     31,3247    03635 1                      LAND
 0604   REF   8  LAST  804     31,3250    16575 1              STODL   CG
 0605   REF  16  LAST  806     31,3251    03643 0                      TTF/8
 0606                          31,3252    74203 0              DMP*    VXSC
 0607   REF   2  LAST  122     31,3253    02433 1                      GAINBRAK,1       NUMERO MYSTERIOSO
 0608   REF   3  LAST  801     31,3254    02265 1                      ANGTERM
 0609                          31,3255    77655 1              VAD
 0610   REF  15  LAST  806     31,3256    03635 1                      LAND
 0611                          31,3257    47051 0              VSU     RTB
 0612   REF  12  LAST  801     31,3260    03521 1                      R
 0613   REF   5  LAST  801     31,3261    21727 0                      NORMUNIT
 0614                          31,3262    47035 1              VXV     RTB
 0615   REF  16  LAST  806     31,3263    03635 1                      LAND
 0616   REF   6  LAST  806     31,3264    21727 0                      NORMUNIT
 0617   REF   9  LAST  806     31,3265    26603 0              STOVL   CG   +6          SECOND ROW
 0618   REF  10  LAST  806     31,3266    02575 1                      CG
 0619                          31,3267    76435 1              VXV     VSL1
 0620   REF  11  LAST  806     31,3270    02603 0                      CG   +6
 0621   REF  12  LAST  806     31,3271    02611 0              STORE   CG   +14
 0622                          31,3272    77776 1              EXIT

 0623   REF   6  LAST  805     31,3273   5 1621 0   EXITSPOT   INDEX   WCHPHOLD
 0624   REF   1                31,3274   1 2402 1              TCF     WHATEXIT

R0625   ****************************************************************************************************************
R0627   ROUTINES FOR EXITING FROM LANDING GUIDANCE
R0628   ****************************************************************************************************************

R0630   1.      EXGSUB IS THE RETURN WHEN GUIDSUB IS CALLED BY THE IGNITION ALGORITHM.

R0632   2.      EXBRAK IS THE EXIT USED DURING THE BRAKING PHASE.   IN THIS CASE UNIT(R) IS THE WINDOW POINTING VECTOR.

R0634   3.      EXNORM IS THE EXIT USED AT OTHER TIMES DURING THE BURN.
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R0635           (EXOVFLOW IS A SUBROUTINE OF EXBRAK AND EXNORM CALLED WHEN OVERFLOW OCCURRED ANYWHERE IN GUIDANCE.)

 0637  REF 126  LAST  801   31,3275  0 6042 1  EXGSUB   TC      INTPRET         COMPUTE TPIM VELOCITY CORRECTION TERM
 0638                       31,3276   47175 1           VLOAD   RTB
 0639  REF  13  LAST  805   31,3277   03253 0                   UNFC/2
 0640  REF   7  LAST  806   31,3300   21727 0                   NORMUNIT
 0641                       31,3301   74361 0           VXSC    VXSC
 0642  REF   5  LAST  783   31,3302   03423 1                   ZOOMTIME
 0643  REF   1              31,3303   22001 0                   TRIMACCL
 0644  REF  14  LAST  807   31,3304   03253 0           STORE   UNFC/2
 0645                       31,3305   77776 1           EXIT

 0646  REF   3  LAST  794   31,3306  11'647 1           CCS     NGUIDSUB
 0647  REF   1              31,3307  1 2421 0           TCF     GUIDSUB
 0648  REF   3  LAST  782   31,3310  11'646 0           CCS     NIGNLOOP
 0649                       31,3311  1 3314 0           TCF     +3
 0650  REF  31  LAST  767   31,3312  0 5567 0           TC      ALARM
 0651                       31,3313   01412 1           OCT     01412

 0652  REF  47  LAST  784   31,3314  0 4635 0    +3     TC      POSTJUMP
 0653  REF   1              31,3315   65104 1           CADR    DDUMCALC

 0654  REF 127  LAST  807   31,3316  0 6042 1  EXBRAK   TC      INTPRET
 0655                       31,3317   77775 1           VLOAD
 0656  REF   8  LAST  774   31,3320   03537 0                   UNIT/R/
 0657  REF   2  LAST  137   31,3321   03261 1           STORE   UNWC/2
 0658                       31,3322   77776 1           EXIT
 0659  REF   2  LAST  793   31,3323  1 3400 1           TCF     STEEP?

 0660  REF 128  LAST  807   31,3324  0 6042 1  EXNORM   TC      INTPRET
 0661                       31,3325   52375 1           VLOAD   VSU
 0662  REF  17  LAST  806   31,3326   03635 1                   LAND
 0663  REF  13  LAST  806   31,3327   03521 1                   P
 0664                       31,3330   77634 0           RTB
 0665  REF   8  LAST  807   31,3331   21727 0                   NORMUNIT
 0666  REF   3  LAST  807   31,3332   03261 1           STORE   UNWC/2          UNIT(LAND - P) IS TENTATIVE CHOICE
 0667                       31,3333   50235 0           VXV     DOT
 0668  REF   3  LAST  801   31,3334   02146 0                   XNBPIP
 0669  REF  13  LAST  806   31,3335   02603 0                   CG +6
 0670                       31,3336   77776 1           EXIT                    WITH PROJ IN MPAC 1/8 REAL SIZE

 0671  REF 308  LAST  803   31,3337  4 0154 0           CS      MPAC            GET COEFFICIENT FOR CG +14
 0672  REF   1              31,3340  6 3714 0           AD      PROJMAX
 0673  REF  19  LAST  804   31,3341  6 4733 1           AD      POSMAX
 0674  REF  67  LAST  804   31,3342  54 130 1           TS      BUF
 0675  REF  68  LAST  807   31,3343  4 0130 1           CS      BUF
 0676  REF  69  LAST  807   31,3344  26 130 1           ADS     BUF             RESULT IS 0 IF PROJMAX - PROJ NEGATIVE

 0677  REF   1              31,3345  4 3715 0           CS      PROJMIN         GET COEFFICIENT FOR UNIT(LAND - R)
 0678  REF 309  LAST  807   31,3346  6 0154 1           AD      MPAC
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L         LUNAR LANDING GUIDANCE EQUATIONS                                                          USER'S PAGE NO.  16       E7 S3

 0679    REF  20  LAST  807    31,3347  6 4733 1               AD       POSMAX
 0680    REF  70  LAST  807    31,3350  54 131 0               TS       BUF  +1
 0681    REF  71  LAST  808    31,3351  4 0131 0               CS       BUF  +1
 0682    REF  72  LAST  808    31,3352  26 131 0               ADS      BUF  +1             RESULT IS 0 IF PROJ - PROJMIN NEGATIVE

 0683    REF  14  LAST  780    31,3353  3 4751 0               CAF      FOUR
 0684    REF  14  LAST  597    31,3354  7 6245 0  UNWCLOOP MASK     SIX
 0685    REF 202  LAST  791    31,3355  54 002 1               TS       Q
 0686    REF   8  LAST  805    31,3356  3 5014 1               CA       EBANK5
 0687    REF  31  LAST  805    31,3357  54 003 0               TS       EBANK
 0688    REF  14  LAST  807    E5,1574                         EBANK=   CG
 0689    REF  73  LAST  808    31,3360  3 0130 0               CA       BUF
 0690                          31,3361  0 0006 1               EXTEND
 0691    REF 203  LAST  808    31,3362  5 0002 0               INDEX    Q
 0692    REF  15  LAST  808    31,3363  7 1610 0               MP       CG   +14
 0693    REF  20  LAST  806    31,3364  24 006 1               INCR     BBANK
 0694    REF   4  LAST  807    E6,1660                         EBANK=   UNWC/2
 0695    REF 204  LAST  808    31,3365  50 002 0               INDEX    Q
 0696    REF   5  LAST  808    31,3366  52'661 0               DXCH     UNWC/2
 0697                          31,3367  0 0006 1               EXTEND
 0698    REF  74  LAST  808    31,3370  7 0131 0               MP       BUF  +1
 0699    REF 205  LAST  808    31,3371  50 002 0               INDEX    Q
 0700    REF   6  LAST  808    31,3372  21'661 0               DAS      UNWC/2
 0701    REF 206  LAST  808    31,3373  10 002 1               CCS      Q
 0702    REF   1                31,3374  1 3354 1               TCF      UNWCLOOP

 07021   REF   2  LAST  139    31,3375  3 1773 0               CA       AZBIAS               SET OUTER GIMBAL
 07022   REF   1                31,3376  55'677 1               TS       DGABIAS                ANGLE BIAS FOR WINDOW BENDING

 0703    REF  21  LAST  808    31,3377  24 006 1               INCR     BBANK
 0704    REF  11  LAST  791    E7,1612                         EBANK=   P1F

 0705    REF  20  LAST  757    31,3400  3 0076 0  STEER?       CA       FLAGWRD2             IF STEERSW DOWN NO OUTPUTS
 0706    REF   1                31,3401  7 4741 0               MASK     STEERBIT
 0707                          31,3402  0 0006 1               EXTEND
 0708    REF   1              . 31,3403  1 3411 1               BZF      RATESTOP

 0709    REF   1                31,3404  3 0121 0  EXVERT       CA       OVFIND               IF OVERFLOW ANYWHERE IN GUIDANCE
 0710                          31,3405  0 0006 1               EXTEND                          DON'T CALL THROTTLE OR FINDCDUW
 0711                          31,3406  1 3421 1               BZF      +13

 0712    REF  32  LAST  807    31,3407  0 5567 0  EXOVFLOW TC       ALARM                SOUND THE ALARM NON-ABORTIVELY.
 0713                          31,3410   01410 0               OCT      01410

 0714    REF  32  LAST  795    31,3411  3 4737 0  RATESTOP CAF      BIT13                ARE WE IN ATTITUDE-HOLD?
 0715                          31,3412  0 0006 1               EXTEND
 0716    REF   4  LAST  795    31,3413  02 031 1           .   RAND     CHAN31
 0717                          31,3414  0 0006 1               EXTEND
 0718    REF   2  LAST  794    31,3415  1 3426 0               BZF      DISPEXIT             YES
 0719   REF 221  LAST  802   31,3416  0 4616 1            TC       BANKCALL         NO:   DO A STOPRATE
 0720   REF   5  LAST  796   31,3417   40166 1            CADR     STOPRATE

 0721   REF   3  LAST  808   31,3420  1 3426 0            TCF      DISPEXIT

 0722   REF   1              31,3421  0 2144 1  GDUMP1    TC       THROTTLE
 0723   REF 129  LAST  907   31,3422  0 6042 1            TC       INTPRET
 0724                        31,3423   77624 1            CALL
 0725   REF   3  LAST  767   31,3424   61100 1                     FINDCDUW -2
 0726                        31,3425   77776 1            EXIT


AD727                                                   (CONTINUE TO DISPEXIT)


RD728   *********************************************************************************************************
R0730   GUIDANCE LOOP DISPLAYS
R0731   *********************************************************************************************************


 0733                        31,3426  0 0006 1  DISPEXIT  EXTEND                    KILL GROUP 3:   DISPLAYS WILL BE
 0734   REF  14  LAST  738   31,3427  3 4755 1            DCA      NEGO               RESTORED BY NEXT GUIDANCE CYCLE
 0735   REF   3  LAST  731   31,3430  52 756 1            DXCH     -PHASE3

 0736   REF   4  LAST  809   31,3431            ENDLLJOB  =        DISPEXIT +3

 0737   REF  12  LAST  733   31,3431  4 0104 0     +3     CS       FLAGWRD8         IF FLUNDISP IS SET, NO DISPLAY THIS PASS
 0738   REF   2  LAST  733   31,3432  7 4742 0            MASK     FLUNDBIT
 0739                        31,3433  0 0006 1            EXTEND
 0740   REF 127  LAST  763   31,3434  1 5165 1            BZF      ENDOFJOB

 0741   REF   7  LAST  806   31,3435   51621 0            INDEX    WCHPHOLD
 0742   REF   1              31,3436  1 2404 1            TCF      WHATDISP

 0743   REF   1              31,3437  3 3716 1  P63DISPS  CAF      V06N63
 0744   REF 222  LAST  809   31,3440  0 4616 1  DISPCOMN  TC       BANKCALL
 0745   REF   3  LAST  739   31,3441   20466 1            CADR     REGODSP

 0746   REF   3  LAST  799   31,3442  3 1666 0  P64DISPS  CA       TREDES           HAS TREDES REACHED ZERO?
 0747                        31,3443  0 0006 1            EXTEND
 0748   REF   1              31,3444  1 3465 1            BZF      RED-OVER         YES:  CLEAR REDESIGNATION FLAG

 0749   REF   5  LAST  799   31,3445  4 0102 0            CS       FLAGWRD6         NO:   IS REDFLAG SET?
 0750   REF   2  LAST  799   31,3446  7 4746 1            MASK     REDFLBIT
 0751                        31,3447  0 0006 1            EXTEND
 0752   REF   1              31,3450  1 3467 0            BZF      REDES-OK         YES:  DO STATIC DISPLAY

 0753   REF   1              31,3451  3 3717 0            CAF      V06N64           OTHERWISE USE FLASHING DISPLAY
 0754   REF 223  LAST  809   31,3452  0 4616 1            TC       BANKCALL
 0755   REF   2  LAST  739   31,3453   20460 1            CADR     REFLASH
 0756   REF  29  LAST  787   31,3454  1 6001 1            TCF      GOTOPOOH         TERMINATE
 0757   REF   1                31,3455  1 3457 0            TCF      P64CEED         PROCEED    PERMIT REDESIGNATIONS
 0758   REF   2  LAST   794    31,3456  1 3442 1            TCF      P64DISPS        RECYCLE

 0759   REF 150  LAST   805    31,3457  3 4755 1  P64CEED   CAF      ZERO
 0760   REF   3  LAST   799    31,3460  55'446 1            TS       ELINCR1
 0761   REF   4  LAST   799    31,3461  55'445 1            TS       AZINCR1

 0762   REF  52  LAST   777    31,3462  0 5504 0            TC       UPFLAG          ENABLE REDESIGNATION LOGIC
 0763   REF   4  LAST   797    31,3463   00143 1            ADRES    REDFLAG

 0764   REF 128  LAST   809    31,3464  1 5155 1            TCF      ENDOFJOB

 0765   REF  86  LAST   797    31,3465  0 5516 0  REDO-OVER TC       DOWNFLAG
 0766   REF   5  LAST   810    31,3466   00143 1            ADRES    REDFLAG
 0767   REF   2  LAST   809    31,3467  3 3717 0  REDES-CK  CAF      V06N64
 0768   REF   1                31,3470  1 3440 0            TCF      DISPCOMN


 0769   REF   1                31,3471  3 3720 1  VERTDISP  CAF      V06N60
 0770   REF 224  LAST   809    31,3472  0 4616 1            TC       BANKCALL
 0771   REF   3  LAST   809    31,3473   20460 1            CADR     REFLASH
 0772   REF  30  LAST   809    31,3474  1 6001 1            TCF      GOTOPOOH        TERMINATE
 0773   REF   1                31,3475  1 3477 1            TCF      STOPFIRE        PROCEED
 0774   REF   2  LAST   810    31,3476  1 3477 1            TCF      STOPFIRE        V32E

 0775                          31,3477  0 0004 0  STOPFIRE  INHINT
 0776   REF 225  LAST   810    31,3500  0 4616 1            TC       BANKCALL
 0777   REF   7  LAST   786    31,3501   40154 0            CADR     ZATTEROR
 0778   REF 129  LAST   810    31,3502  1 5155 1            TCF      ENDOFJOB

R0779   ****************************************************************************************************************
R0781   GUIDANCE FOR R65
R0782   ****************************************************************************************************************

 0784   REF   3  LAST   797    31,3503  11'647 1  VERTGUID  CCS      WCHVERT
 0786   REF   1                31,3504  1 3510 1            TCF      P66VERT               +0

R0787             THE P65 GUIDANCE EQUATION IS AS FOLLOWS:-

R0788                                   -       -
R0789                                   V2FG  - VGU
R0790                              ACG = ----------
R0791                                     TAUVERT

 0792   REF 130  LAST   809    31,3505  0 6042 1  P65VERT   TC       INTPRET
 0793                          31,3506   77650 1            GOTO
 0794   REF   1                31,3507   65272 0                     P65VERTA
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P0795   ******************************************************************************************************
R0797   GUICANCE FDR P66
R0798   ******************************************************************************************************

 0800   REF  48  LAST  807    31,3510  C 4635 0  P66VERT  TC      PCSTJUMF
 0801   REF   1               31,3511   65200 1           CADR    P66VERTA

 0808   REF   1               32,2000                     SETLOC  P66LCC
 0809                         32,3265                     8ANK
 0810   REF   2 LAST   40 TC   41:        1      1*       COUNT*  $$/F2DPS

 0811   REF   4  LAST  708    32,3265  3 7713 0  RCCTASK  CAF     PPI022
 0812   REF  35  LAST  756    32,3266  C 5105 0           TC      FINOVAC
 0813   REF  31  LAST  780    E7,1515                     E8ANK=  OVCNTR
 0814   REF   1               32,3267   C3305 1           2CADR   RODCCMP
 0814   REF   1               32,3270   64C67 1
 0815   REF  55  LAST  777    32,3271  1 5261 0           TCF     TASKOVFR

 0816                         32,3272   52375 1  P65VERTA VLCAD   VSU
 0817   REF   2  LAST  122    32,3273   02511 0                   V2FG
 0818   REF   9  LAST  804    32,3274   03627 1                   VGU
 0819                         32,3275   52141 1           V/SC    GDTC
 0820   REF   2  LAST  122    32,3276   02517 0                   TAUVERT
 0821   REF   1               32,3277   63151 1                   AFCCALCI

 0822   REF  57  LAST  795    32,3300  0 5253 1  P66VERTA TC      PHASCHNG        TERMINATE GROUP 3.
 C823                         32,3301   00C03 1           OCT     00003

 0624   REF  16  LAST  758    32,3302  3 4777 1           CAF     1SEC
 0825   REF  21  LAST  776    32,3303  C 5173 1           TC      TWIODLE
 0826   REF   1               32,3304   03265 0           AORES   ROOTASK

 0827                         32,3305  C 0004 0  ROOCOMP  INHINT
 0828   REF 151  LAST  810    32,3306  3 4755 1           CAF     ZERD
 0829   REF   3  LAST  796    32,3307  57'746 C           XCH     PDCCCUNT
 0830                         32,3310  C 0006 1           FXTENO
 0831   REF   3  LAST  796    32,3311  7 1756 0           MP      RODSCAL1
 0832   REF   2  LAST  795    32,3312  21'645 0           DAS     VDGVERT         UPCATE CESIRED ALTITUDE RATE.

 0833                         32,3313  C 0006 1           EXTENO                  SET DLOPIRAX,Y,Z = PIRAX,Y,Z
 0834   REF   8  LAST  386    32,3314  3 0040 0           OCA     PIPAX
 0835   REF   3  LAST  796    32,3315  53'764 1           OXCH    OLDPIPAX
 0836   REF  22  LAST  524    32,3316  52 071 0           OXCH    RUPTREG1        SET RUPTREG1,2,3 = CLOFIPAX,Y,Z
 0837   REF   3  LAST  386    32,3317  3 CC41 1           CA      PIPAZ
 0838   REF   2  LAST  153    32,3320  57'765 1           XCH     DLOPIPAZ
 0839   REF   2  LAST  374    32,3321  56 072 1           XCH     RUPTREG3

 0840                         32,3322  C 00C6 1           EXTENO                  SNAPSHOT TIME OF PIPA REAOING.
 C841   REF  24  LAST  757    32,3323  3 0025 0           OCA     TIME2
 0842   REF   3  LAST  790    32,3324  53'762 1           OXCH    THISTPIR
 0843    REF   4  LAST  811   32,3325   3 1763 1                CA       OLDPIPAX
 0844    REF   1              32,3326   6 1157 0                AD       PIPATMPX
 0845    REF 310  LAST  807   32,3327  54 154  0                TS       MPAC            MPAC(X) = PIPAX + PIPATMPX
 0846    REF   2  LAST  153   32,3330   3 1764 0                CA       OLDPIPAY
 0847    REF   1              32,3331   6 1160 1                AD       PIPATMPY
 0848    REF 311  LAST  812   32,3332  54 157  0                TS       MPAC +3         MPAC(Y) = PIPAY + PIPATMPY
 0849    REF   3  LAST  811   32,3333   3 1765 1                CA       OLDPIPAZ
 0850    REF   1              32,3334   6 1161 0                AD       PIPATMPZ
 0851    REF 312  LAST  812   32,3335  54 161  0                TS       MPAC +5         MPAC(Z) = PIPAZ + PIPATMPZ

 0852    REF   5  LAST  812   32,3336   4 1763 0                CS       OLDPIPAX
 0853    REF   3  LAST  795   32,3337   6 1253 1                AD       TEMX
 0854    REF  23  LAST  811   32,3340   6 0070 0                AD       RUPTREG1
 0855    REF   3  LAST  796   32,3341  55'766  0                TS       DELVROD
 0856    REF   3  LAST  812   32,3342   4 1764 1                CS       OLDPIPAY
 0857    REF   2  LAST  105   32,3343   6 1254 0                AD       TEMY
 0858    REF   8  LAST  259   32,3344   6 0071 1                AD       RUPTREG2
 0859    REF   4  LAST  812   32,3345  55'770  1                TS       DELVROD +2
 0860    REF   4  LAST  812   32,3346   4 1765 0                CS       OLDPIPAZ
 0861    REF   2  LAST  105   32,3347   6 1255 1                AD       TEMZ
 0862    REF   3  LAST  811   32,3350   6 0072 1                AD       RUPTREG3
 0863    REF   5  LAST  812   32,3351  55'772  0                TS       DELVROD +4

 0864    REF 152  LAST  811   32,3352   3 4755 1                CAF      ZERO
 0865    REF 313  LAST  812   32,3353  54 155  1                TS       MPAC +1         ZERO LO-ORDER MPAC COMPONENTS
 0866    REF 314  LAST  812   32,3354  54 160  1                TS       MPAC +4
 0867    REF 315  LAST  812   32,3355  54 162  0                TS       MPAC +6
 0868    REF   4  LAST  812   32,3356  55'253  0                TS       TEMX            ZERO TEMX, TEMY, AND TEMZ SO WE WILL
 0869    REF   3  LAST  812   32,3357  55'254  1                TS       TEMY                 KNOW WHEN READACCS CHANGES THEM.
 0870    REF   3  LAST  812   32,3360  55'255  0                TS       TEMZ
 0871    REF  88  LAST  805   32,3361   4 4753 0                CS       ONE
 0872    REF   9  LAST  804   32,3362  54 163  1                TS       MODE
 0873    REF 131  LAST  810   32,3363   0 6042 1                TC       INTPRET
 0874                         32,3364    65361 0   ITRPNT1      VXSC     PDDL            SCALE MPAC TO M/CS *2(-7) AND PUSH  (6)
 0875    REF   1              32,3365    26022 0                         KPIP1
 0876    REF   4  LAST  811   32,3366    03762 1                         THISTPIP
 0877                         32,3367    77625 0                DSU
 0878    REF  15  LAST  796   32,3370    01234 0                         PIPTIME
 0879                         32,3371    00037 0                STORE    30D             30-31D CONTAINS TIME IN CS SINCE PIPTIME
 0880                         32,3372    63271 0                DDV      PDVL                                                  (8)
 0881    REF   1              32,3373    27110 1                         4SEC(28)
 0882    REF   6  LAST  804   32,3374    01236 1                         GOT/2
 0883                         32,3375    74251 1                VSU      VXSC                                                  (6)
 0884    REF   2  LAST  795   32,3376    02621 0                         VBIAS
 0885                         32,3377    53352 0                VSL2     VAD
 0886    REF   6  LAST  801   32,3400    03527 1                         V
 0887                         32,3401    45455 1                VAD      STADR                                                 (0)
 0888                         32,3402    53746 1                STOVL    24D             STORE UPDATED VELOCITY IN 24-29D
 0889    REF  14  LAST  807   32,3403    03521 1                         R
 0890                         32,3404    77656 1                UNIT
 0891                          32,3405   00017 1        STORE   14D
 0892                          32,3406   72441 0        DOT     SL1
 0893                          32,3407   00031 0                24D
 0894   REF   8  LAST  795     32,3410   17474 0        STODL   HDOTDISP        UPDATE ALTITUDE RATE FOR NOUN 60
 0895                          32,3411   00037 0                30D
 0896                          32,3412   41261 1        SL      DMP
 0897                          32,3413   20214 1                11D
 0898   REF   9  LAST  813     32,3414   03474 0                HDOTDISP
 0899                          32,3415   45215 0        DAD     DSU
 0900                          32,3416   00045 0                36D
 0901   REF   6  LAST  800     32,3417   02333 0                /LAND/
 0902   REF   4  LAST  319     32,3420   17775 1        STODL   HCALC1          UPDATE ALTITUDE FOR NOUN 60
 0903   REF  10  LAST  813     32,3421   03474 0                HDOTDISP
 0904                          32,3422   56221 0        BDSU    DDV
 0905   REF   3  LAST  811     32,3423   03645 0                VDGVERT
 0906   REF   2  LAST  123     32,3424   02541 0                TAURDD
 0907                          32,3425   51515 1        PDVL    ABVAL                                          (2)
 0908   REF   7  LAST  812     32,3426   01236 1                GDT/2
 0909                          32,3427   60471 0        DDV     SR2
 0910   REF   2  LAST  804     32,3430   05652 0                GSCALE
 0911                          32,3431   00025 0        STORE   20D
 0912                          32,3432   77615 0        DAD                                                    (0)
 0913                          32,3433   45115 0        PDVL    CALL                                           (2)
 0914   REF  10  LAST  787     32,3434   06522 1                UNITX
 0915   REF   2  LAST  707     32,3435   47663 1                CDU*NBSM
 0916                          32,3436   77641 1        DOT
 0917                          32,3437   00017 1                14D
 0918                          32,3440   00027 1        STORE   22D
 0919                          32,3441   45465 1        BDDV    STADR                                          (0)
 0920   REF   4  LAST  804     32,3442   50313 0        STOVL   /AFC/
 0921   REF   6  LAST  812     32,3443   03767 1                DELVROD
 0922                          32,3444   53361 0        VXSC    VAD
 0923   REF   2  LAST  812     32,3445   26022 0                KPIP1
 0924   REF   3  LAST  812     32,3446   02621 0                VBIAS
 0925                          32,3447   65246 1        ABVAL   PDDL                                           (2)
 0926   REF   5  LAST  812     32,3450   03762 1                THISTPIP
 0927                          32,3451   65225 1        DSU     PDDL                                           (4)
 0928   REF   3  LAST  796     32,3452   03760 0                LASTTPIP
 0929   REF   6  LAST  813     32,3453   03762 1                THISTPIP
 0930   REF   4  LAST  813     32,3454   17760 0        STODL   LASTTPIP                                       (2)
 0931                          32,3455   55271 0        DDV     BDDV                                           (0)
 0932   REF   1                32,3456   25530 0                SHFTFACT
 0933                          32,3457   41325 0        PDDL    DMP                                            (2)
 0934   REF   7  LAST  796     32,3460   03611 1                FWEIGHT
 0935   REF   1                32,3461   25527 0                BIT1H
 0936                          32,3462   56271 0        DDV     DDV
 0937   REF   7  LAST  805     32,3463   01244 1                MASS
 0938   REF   2  LAST  792     32,3464   22006 1                SCALEFAC
 0939                          32,3465   65215 1        DAD     PDDL                                           (4)
 0940                          32,3466   00001 0                00
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0941                            32,3467   00D25 0                   2DC
0942                            32,347C   45271 1           OOV     DSU                                                         (2)
D943                            32,3471   C0027 1                   22D
0944                            32,3472   432D5 1           OMP     DAC
D945   REF   2  LAST  123       32,3473   C2543 1                   LAG/TAU
0946   REF   5  LAST  813       32,3474   03464 1                   /AFC/
0947                            32,3475   56325 0           PODL    DDV                                                         (4)
0948   REF   2  LAST  123       32,3476   02547 D                   MAXFCRCE
D949   REF   8  LAST  813       32,3477   01244 1                   MASS
0950                            32,3500   56325 D           PDDL    DDV                                                         (6)
0951   REF   2  LAST  123       32,3501   02545 1                   MINFDRCE
0952   REF   9  LAST  814       32,3502   01244 1                   MASS
0953                            32,3503   44206 0           PUSH    BOSU                                                        (8)
0954                            32,3504   000D3 1                   2D
0955                            32,3505   71240 1           8MN     OLCAO                                                       (6)
0956   REF   1                  32,3506   65514 1                   AFCSPOT
0957                            32,3507   41545 D           DLDAO   PUSH                                                        (6)
D956                            32,3510   51C21 C           BDSU    BPL
0959                            32,3511   C0003 1                   2D
D960   REF   2  LAST  814       32,3512   65514 1                   AFCSPCT
0961                            32,3513   77745 1           DLCAO                                                               (4)
0962                            32,3514   77745 1  AFCSPDT  CLDAD                                                   (2),(4),OR (6)
D963                            32,3515   776C1 D           SETPO                                                               (2)
D964                            32,3516   00003 1                   2D
C965   REF   6  LAST  814       32,3517   17464 1           STDDL   /AFC/                                                       (0)
0966                            32,3520   77776 1  I1RPNT2  EXIT
0967   REF 316  LAST  812       32,3521   52 155 1          OXCH    MPAC              MPAC = MEASURED ACCELERATION.
D968   REF 226  LAST  810       32,3522   C 4616 1          TC      8ANKCALL
0969   REF   2  LAST  809       32,3523   62147 1           CADR    THRCTTLE +3
D963   REF 227  LAST  814       32,3524   C 4616 1          TC      BANKCALL          PUT UP V06N60 DISPLAY 8LT AVOIO PHASCHNG
0984   REF   5  LAST  809       32,3525   63431 1           CACR    OISPEXIT +3

0985                            32,3526   00001 0  8IT1H    OCT     0D001
0986                            32,3527   0D000 1  SHFTFACT 2DEC    1 8-17
D986                            32,3530   C4000 0
0987                            32,3531   00000 1  BIASFACT 2DEC    655.36 8-26
0987                            32,3532   05D75 D
RD988    ************************************************************************************************
R0990    REOESIGNATDR TRAP
R0991    ************************************************************************************************

D993                            11,2302                     8ANK    11
0994   REF   1                  11,2000                     SETLOC  F2CPS*11
0995                            11,2302                     8ANK

0996   REF   1                                              COUNT*  $$/F20PS

0997   REF   4  LAST  559       11,2302   56 016 0 PITFALL  XCH     BANKRUPT
0998                            11,2303   0 0006 1          EXTENO
0999   REF   4  LAST  559       11,2304   22 012 1          QXCH    QRUPT
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L        LUNAR LANDING GUIDANCE EQUATIONS                                                         USER'S PAGE NO.  23       E7 S3

 1000    REF    5  LAST   735    11,2305  0 5321 1             TC      CHECKMM            IF NOT IN P64, NO REASON TO CONTINUE
 1001                            11,2306   00100 0             DEC     64
 1002    REF   18  LAST   560    11,2307  1 5270 0             TCF     RESUME

 1003                            11,2310  0 0006 1             EXTEND
 1004    REF    5  LAST   808    11,2311  00 031 0             READ    CHAN31
 1005                            11,2312  4 0000 0             COM
 1006    REF    1                11,2313  7 2401 1             MASK    ALL4BITS
 1007    REF    3  LAST   156    11,2314  55'444 0             TS      ELVIRA
 1008    REF   49  LAST   802    11,2315  3 4752 0             CAF     TWO
 1009    REF    2  LAST   142    11,2316  55'443 1             TS      ZERLINA
 1010    REF   15  LAST   680    11,2317  3 4756 1             CAF     FIVE
 1011    REF   22  LAST   811    11,2320  0 5173 1             TC      TWIDDLE
 1012    REF    1                11,2321   02326 1             ADRES   REDESMON
 1013    REF   19  LAST   815    11,2322  1 5270 0             TCF     RESUME


R1014    REDESIGNATION MONITOR  (INITIATED BY PITFALL)


 1015    REF    3  LAST   815    11,2323  55'443 1  PREMON1    TS      ZERLINA
 1016    REF    9  LAST   559    11,2324  3 4757 0  PREMON2    CAF     SEVEN
 1017    REF    7  LAST   776    11,2325  0 5224 0             TC      VARDELAY
 1018                            11,2326  0 0006 1  REDESMON   EXTEND
 1019                            11,2327  00 031 0             READ    31
 1020                            11,2330  4 0000 0             COM
 1021    REF    2  LAST   815    11,2331  7 2401 1             MASK    ALL4BITS
 1022    REF    4  LAST   815    11,2332  57'444 1             XCH     ELVIRA
 1023    REF  118  LAST   806    11,2333  54 001 1             TS      L
 1024    REF    5  LAST   815    11,2334  11'444 0             CCS     ELVIRA             DO ANY BITS APPEAR THIS PASS?
 1025    REF    1                11,2335  1 2324 1             TCF     PREMON2              Y: CONTINUE MONITOR

 1026    REF  119  LAST   815    11,2336  10 001 1             CCS     L                    N: ANY LAST PASS?
 1027    REF    1                11,2337  1 2347 1             TCF     COUNT'EM                Y: COUNT 'EM, RESET RUPT, TERMINATE
 1028    REF    4  LAST   815    11,2340  11'443 1             CCS     ZERLINA                 N: HAS ZERLINA REACHED ZERO YET?
 1029    REF    1                11,2341  1 2323 0             TCF     PREMON1                    N: DIMINISH ZERLINA, CONTINUE
 1030    REF    5  LAST   797    11,2342  0 6022 1  RESETRPT   TC      C13STALL                   Y: RESET RUPT, TERMINATE
 1031    REF   28  LAST   797    11,2343  3 4740 0             CAF     BIT12
 1032                            11,2344  0 0006 1             EXTEND
 1033    REF   16  LAST   797    11,2345  05 013 0             WOR     CHAN13
 1034    REF   56  LAST   811    11,2346  1 5261 0             TCF     TASKOVER

 1035    REF   33  LAST   808    11,2347  3 4737 0  COUNT'EM   CAF     BIT13              ARE WE IN ATTITUDE-HOLD?
 1036                            11,2350  0 0006 1             EXTEND
 1037    REF    6  LAST   815    11,2351  02 031 1             RAND    CHAN31
 1038                            11,2352  0 0006 1             EXTEND
 1039    REF    1                11,2353  1 2342 1             BZF     RESETRPT           YES:  SKIP REDESIGNATION LOGIC.

 1040    REF  120  LAST   815    11,2354  3 0001 0             CA      L                  NO
 1041    REF    1                11,2355  7 4746 1             MASK    -AZBIT
 1042   REF 235  LAST  806    11,2356  10 000 0            CCS     A
 1043   REF   1               11,2357  4 2402 1     -AZ    CS      AZEACH
 1044   REF   5  LAST  810    11,2360  27'445 1            ADS     AZINCR1
 1045   REF 121  LAST  815    11,2361  3 0001 0            CA      L
 1046   REF   1               11,2362  7 4747 0            MASK    +AZBIT
 1047   REF 236  LAST  816    11,2363  10 000 0            CCS     A
 1048   REF   2  LAST  816    11,2364  3 2402 0     +AZ    CA      AZEACH
 1049   REF   6  LAST  816    11,2365  27'445 1            ADS     AZINCR1
 1050   REF 122  LAST  816    11,2366  3 0001 0            CA      L
 1051   REF   1               11,2367  7 4753 0            MASK    -ELBIT
 1052   REF 237  LAST  816    11,2370  10 000 0            CCS     A
 1053   REF   1               11,2371  4 2403 0     -EL    CS      ELEACH
 1054   REF   4  LAST  810    11,2372  27'446 1            ADS     ELINCR1
 1055   REF 123  LAST  816    11,2373  3 0001 0            CA      L
 1056   REF   1               11,2374  7 4752 1            MASK    +ELBIT
 1057   REF 238  LAST  816    11,2375  10 000 0            CCS     A
 1058   REF   2  LAST  816    11,2376  3 2403 1     +EL    CA      ELEACH
 1059   REF   5  LAST  816    11,2377  27'446 1            ADS     ELINCR1
 1060   REF   2  LAST  815    11,2400  1 2342 1            TCF     RESETRPT

R1061   THESE EQUIVALENCIES ARE BASED ON GSOP CHAPTER 4, REVISION 16 OF P64LM

 1062   REF  38  LAST  717       4752             +ELBIT    =      BIT2             -PITCH

 1063   REF  38  LAST  755       4753             -ELBIT    =      BIT1             +PITCH

 1064   REF  36  LAST  746       4747             +AZBIT    =      BIT5

 1065   REF  43  LAST  791       4746             -AZBIT    =      BIT6

 1066                         11,2401   00063 1   ALL4BITS OCT     00063

 1067                         11,2402   01074 0   AZEACH   DEC     .03491           2 DEGREES

 1068                         11,2403   00217 0   ELEACH   DEC     .00873           1/2 DEGREE

R1069   ******************************************************************************************************
R1071   R.O.D. TRAP
R1072   *****************************************************************************

 1073   REF   1               23,2000                      SETLOC  RODTRAP
 1074                            23,2455                     BANK
 1075   REF   1                                              COUNT* $$/F2DPS        ***************************************

 1077   REF  26  LAST  567       23,2455  7 4745 1  DESCBITS MASK    BIT7           COME HERE FROM MARKRUPT CODING WITH BIT
 1078   REF 239  LAST  816       23,2456  10 000 0           CCS     A                7 OR 6 OF CHANNEL 16 IN A: BIT 7 MEANS
 1079   REF  50  LAST  815       23,2457  4 4752 1           CS      TWO              - RATE INCREMENT, BIT 6 + INCREMENT
 1080   REF  89  LAST  812       23,2460  6 4753 1           AD      ONE
 1081   REF   4  LAST  811       23,2461  27 746 1           ADS     RODCOUNT
 1082   REF  20  LAST  815       23,2462  1 5270 0           TCF     RESUME         TRAP IS RESET WHEN SWITCH IS RELEASED


 1083                            31,3512                     BANK    31
 1084   REF   2  LAST   39       31,2000                     SETLOC  F2DPS*31
 1085                            31,3512                     BANK

 1086   REF   4 LAST  796 TO  811:   499    544*             COUNT* $$/F2DPS

R1087   ***********************************************************************************************************
R1089   DOUBLE PRECISION ROOT FINDER SUBROUTINE (BY ALLAN KLUMPP)
R1090   ***********************************************************************************************************

R1092                                                             N          N-1
R1093           ROOTPSRS FINDS ONE ROOT OF THE POWER SERIES A  X   + A    X     + ... + A X + A
R1095                                                        N        N-1                 1     0

R1097   USING NEWTON'S METHOD STARTING WITH AN INITIAL GUESS FOR THE ROOT. THE ENTERING DATA MUST BE AS FOLLOWS:

A1099                                               A        SR      LOC-3          ADRES FOR REFERENCING PWR COF TABL
A1100                                               L        SR      N-1            N IS THE DEGREE OF THE POWER SERIES
A1101                                               MPAC     DP      X              INITIAL GUESS FOR ROOT

A1102                                               LOC-2N   DP      A(0)
A1103                                                        ...
A1104                                               LOC      DP      A(N)
A1105                                               LOC+2    SR      PRECROOT       PREC RQD OF ROOT (AS FRACT OF 1ST GUESS)

R1106   THE DP RESULT IS LEFT IN MPAC UPON EXIT, AND A SP COUNT OF THE ITERATIONS TO CONVERGENCE IS LEFT IN MPAC+2.
R1108   RETURN IS NORMALLY TO LOC(TC ROOTPSRS)+3.   IF ROOTPSRS FAILS TO CONVERGE IN 8 PASSES, RETURN IS TO LOC+1 AND
R1110   OUTPUTS ARE NOT TO BE TRUSTED.

R1111           PRECAUTION: ROOTPSRS MAKES NO CHECKS FOR OVERFLOW OR FOR IMPROPER USAGE. IMPROPER USAGE COULD
R1113   PRECLUDE CONVERGENCE OR REQUIRE EXCESSIVE ITERATIONS. AS A SPECIFIC EXAMPLE, ROOTPSRS FORMS A DERIVATIVE
R1115   COEFFICIENT TABLE BY MULTIPLYING EACH A(I) BY I, WHERE I RANGES FROM 1 TO N. IF AN ELEMENT OF THE DERIVATIVE
R1117   COEFFICIENT TABLE = 1 OR > 1 IN MAGNITUDE, ONLY THE EXCESS IS RETAINED. ROOTPSRS MAY CONVERGE ON THE CORRECT
R1119   ROOT NONETHELESS, BUT IT MAY TAKE AN EXCESSIVE NUMBER OF ITERATIONS. THEREFORE THE USER SHOULD RECOGNIZE:

R1121   1. USER'S RESPONSIBILITY TO ASSURE THAT I X A(I) < 1 IN MAGNITUDE FOR ALL I.

R1123   2. USER'S RESPONSIBILITY TO ASSURE OVERFLOW WILL NOT OCCUR IN EVALUATING EITHER THE RESIDUAL OR THE DERIVATIVE
R1125      POWER SERIES.   THIS OVERFLOW WOULD BE PRODUCED BY SUBROUTINE POWRSERS, CALLED BY ROOTPSRS, AND MIGHT NOT
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R1127      PRECLUDE EVENTUAL CONVERGENCE.

R1128   3. AT PRESENT, ERASABLE LOCATIONS ARE RESERVED ONLY FOR N UP TO 5.   AN N IN EXCESS OF 5 WILL PRODUCE CHAOS.
R1130      ALL ERASABLES USED BY ROOTPSRS ARE UNSWITCHED LOCATED IN THE REGION FROM MPAC-33 OCT TO MPAC+7.

R1132   4. THE ITERATION COUNT RETURNED IN MPAC+2 MAY BE USED TO DETECT ABNORMAL PERFORMANCE.

A1134                                                                                     STORE ENTERING DATA, INITLIZE ERASABLES

 1135                              31,3512  0 0006 1  ROOTPSRS EXTEND
 1136   REF   1                    31,3513 22 132 1           QXCH    RETROOT             RETURN ADRES
 1137   REF   1                    31,3514 54 117 1           TS      PWRPTR              PWR TABL POINTER
 1138   REF 317  LAST  814         31,3515 52 160 1           DXCH    MPAC      +3        PWR TABL ADRES, N-1
 1139   REF   1                    31,3516  3 3635 1          CA      DERTABLL
 1140   REF   1                    31,3517 54 141 1           TS      DERPTR              DER TABL POINTER
 1141   REF 318  LAST  818         31,3520 54 161 0           TS      MPAC      +5        DER TABL ADRES
 1142   REF 319  LAST  818         31,3521 10 160 1           CCS     MPAC      +4        NO POWER SERIES OF DEGREE 1 OR LESS
 1143   REF 320  LAST  818         31,3522 54 162 0           TS      MPAC      +6        N-2
 1144   REF 153  LAST  812         31,3523  3 4755 1          CA      ZERO                MODE USED AS ITERATION COUNTER. MODE
 1145   REF  10  LAST  812         31,3524 54 163 1           TS      MODE                MUST BE POS SO ABS WON'T COMP MPAC+3 ETC

A1146                                                                                     COMPUTE CRITERION TO STOP ITERATING

 1147                              31,3525  0 0006 1          EXTEND
 1148   REF 321  LAST  818         31,3526  3 0155 0          DCA     MPAC                FETCH ROOT GUESS, KEEPING IT IN MPAC
 1149   REF   1                    31,3527 52 127 1           DXCH    ROOTPS              AND IN ROOTPS
 1150   REF 322  LAST  818         31,3530 50 157 1           INDEX   MPAC      +3        PWR TABL ADRES
 1151                              31,3531  3 0005 1          CA      5                   PRECROOT TO A
 1152   REF   7  LAST  466         31,3532  0 7312 0          TC      SHORTMP             YIELDS DP PRODUCT IN MPAC
 1153   REF   2  LAST  606         31,3533  0 4713 0          TC      USPRCADR
 1154   REF   1                    31,3534   01226 0          CADR    ABS                 YIELDS ABVAL OF CRITERION ON DX IN MPAC
 1155   REF 323  LAST  818         31,3535 52 155 1           DXCH    MPAC
 1156   REF   1                    31,3536 52 125 0           DXCH    DXCRIT              CRITERION

A1157                                                                                     SET UP DER COF TABL

 1158                              31,3537  0 0006 1          EXTEND
 1159   REF   2  LAST  818         31,3540  5 0117 0          INDEX   PWRPTR
 1160                              31,3541  3 0004 0          DCA     3
 1161   REF 324  LAST  818         31,3542 52 155 1           DXCH    MPAC                A(N) TO MPAC

 1162   REF 325  LAST  818         31,3543  3 0160 0          CA      MPAC      +4        N-1 TO A

 1163   REF   1                    31,3544 54 140 0  DERCLOOP TS      PWRCNT              LOOP COUNTER
 1164   REF  90  LAST  817         31,3545  6 4753 1          AD      ONE
 1165   REF   1                    31,3546  0 7321 0          TC      DMPNSUB             YIELDS DERCOF = I X A(I) IN MPAC
 1166                              31,3547  0 0006 1          EXTEND
 1167   REF   3  LAST  818         31,3550  5 0117 0          INDEX   PWRPTR
 1168                              31,3551  3 0002 0          DCA     1
 1169   REF 326  LAST  818         31,3552 52 155 1           DXCH    MPAC                A(I-1) TO MPAC, FETCHING DERCOF
 1170   REF   2  LAST  818    31,3553  50 141 0             INDEX   DERPTR
 1171                         31,3554  52 004 1             DXCH    3                    DERCOF TO DER TABL
 1172   REF  51  LAST  817    31,3555  4 4752 1             CS      TWO
 1173   REF   4  LAST  818    31,3556  26 117 1             ADS     PWRPTR               DECREMENT PWR POINTER
 1174   REF  52  LAST  819    31,3557  4 4752 1             CS      TWO
 1175   REF   3  LAST  819    31,3560  26 141 1             ADS     DERPTR               DECREMENT DER POINTER
 1176   REF   2  LAST  818    31,3561  10 140 0             CCS     PWRCNT
 1177   REF   1               31,3562  1 3544 0             TCF     DERCLOOP

A1178                                                                                    CONVERGE ON ROOT

 1179                         31,3563  0 0006 1   ROOTLOOP  EXTEND
 1180   REF   2  LAST  818    31,3564  3 0127 0             DCA     ROOTPS               FETCH CURRENT ROOT
 1181   REF 327  LAST  818    31,3565  52 155 1             DXCH    MPAC                 LEAVE IN MPAC
 1182                         31,3566  0 0006 1             EXTEND
 1183   REF 328  LAST  819    31,3567  3 0162 1             DCA     MPAC     +5          LOAD A, L WITH DER TABL ADRES, N-2
 1184   REF   1               31,3570  0 7220 0             TC      POWRSERS             YIELDS DERIVATIVE IN MPAC

 1185                         31,3571  0 0006 1             EXTEND
 1186   REF   3  LAST  819    31,3572  3 0127 0             DCA     ROOTPS
 1187   REF 329  LAST  819    31,3573  52 155 1             DXCH    MPAC                 CURRENT ROOT TO MPAC, FETCHING DERIVTIVE
 1188   REF  75  LAST  808    31,3574  52 131 0             DXCH    BUF                  LEAVE DERIVATIVE IN BUF AS DIVISOR
 1189                         31,3575  0 0006 1             EXTEND
 1190   REF 330  LAST  819    31,3576  3 0160 0             DCA     MPAC     +3          LOAD A, L WITH PWR TABL ADRES, N-1
 1191   REF   2  LAST  819    31,3577  0 7220 0             TC      POWRSERS             YIELDS RESIDUAL IN MPAC

 1192   REF   3  LAST  818    31,3600  0 4713 0             TC      USPRCADR
 1193   REF   1               31,3601   00353 1             CADR    DDV/BDDV             YIELDS -DX IN MPAC

 1194                         31,3602  0 0006 1             EXTEND
 1195   REF 331  LAST  819    31,3603  4 0155 1             DCS     MPAC                 FETCH DX, LEAVING -DX IN MPAC
 1196   REF   4  LAST  819    31,3604  20 127 1             DAS     ROOTPS               CORRECTED ROOT NOW IN ROOTPS

 1197   REF   4  LAST  819    31,3605  0 4713 0             TC      USPRCADR
 1198   REF   2  LAST  818    31,3606   01226 0             CADR    ABS                  YIELDS ABS(DX) IN MPAC
 1199                         31,3607  0 0006 1             EXTEND
 1200   REF   2  LAST  818    31,3610  4 0125 0             DCS     DXCRIT
 1201   REF 332  LAST  819    31,3611  20 155 1             DAS     MPAC                 ABS(DX)-ABS(DXCRIT) IN MPAC

 1202   REF  11  LAST  818    31,3612  3 0163 0             CA      MODE
 1203   REF  33  LAST  799    31,3613  7 4750 0             MASK    BIT4                 KLUMPP SAYS GIVE UP AFTER EIGHT PASSES
 1204   REF 240  LAST  817    31,3614  10 000 0             CCS     A
 1205   REF   2  LAST  818    31,3615  0 0132 1   BADROOT   TC      RETROOT

 1206   REF  12  LAST  819    31,3616  24 163 0             INCR    MODE                 INCREMENT ITERATION COUNTER
 1207   REF 333  LAST  819    31,3617  10 154 0             CCS     MPAC                 TEST HI ORDER DX
 1208   REF   1               31,3620  1 3563 0             TCF     ROOTLOOP
 1209   REF   1               31,3621  1 3623 1             TCF     TESTLODX
 1210   REF   1               31,3622  1 3627 0             TCF     ROOTSTOR
 1211   REF 334  LAST  819    31,3623  10 155 1   TESTLODX  CCS     MPAC     +1          TEST LO ORDER DX
 1212    REF    2  LAST  819    31,3624   1 3563 0             TCF      PCCTLCCF
 1213    REF    2  LAST  819    31,3625   1 3627 0             TCF      ROOTSTCP
 1214    PEF    3  LAST  820    31,3626   1 3627 0             TCF      PODTSTOP
 1215    REF    5  LAST  819    31,3627  52 127 1   ROOTSTOR  DXCH     RCCTPS
 1216    REF  335  LAST  819    31,3630  52 155 1             DXCH     MPAC
 1217    REF   13  LAST  819    31,3631   3 0163 0             CA       MDCE
 1218    REF  336  LAST  820    31,3632  54 156 1             TS       MPAC      +2     STORE SP ITERATICN CCUNT IN MPAC+2
 1219    REF    3  LAST  819    31,3633  50 132 1             INDEX    RETPOOT
 1220                           31,3634   1 0CC2 1             TCF      2

 1221    REF    1               31,3635    00147 0  DERTABLL  ADRES    DEPCCEN   -3


R1222    *****************************************************************************************************************************
R1224    TRASHY LITTLE SUBROUTINES
R1225    *****************************************************************************************************************************

 1227    REF   13  LAST  805    31,3636  51'346 1   INTPRETX  INDEX    WCHPHASE         SET X1 ON THE WAY TO THE INTERPRETER
 1228    REF    2  LAST  806    31,3637   4 2413 1             CS       TARGTDEX
 1229    REF   24  LAST  804    31,3640  50 120 1             INDEX    FIXLOC
 1230    REF   22  LAST  773    31,3641  54 046 1             TS       X1
 1231    REF  132  LAST  812    31,3642   1 6042 0             TCF      INTPPET


 1232    REF   17  LAST  806    31,3643   3 1642 0  TOISPSET  CA       TTF/8
 1233                           31,3644   0 0006 1             EXTEND
 1234    REF    1               31,3645   7 4750 0             MP       TSCALINV
 1235    REF    4  LAST  317    31,3646  53'476 1             DXCH     TTFDISP

 1236    REF    9  LAST  808    31,3647   3 5014 1             CA       EBANK5           TREDES 8ECCMES ZEPC TWC PASSES
 1237    REF   32  LAST  808    31,3650  54 003 0             TS       EBANK              BEFORE TCGFAPPP IS REACHED
 1238    PEF    2  LAST  122    E5,1470                        E8ANK=   TCGFAPFP
 1239    REF    3  LAST  820    31,3651   3 1470 0             CA       TCGFAPPR
 1240    REF   22  LAST  808    31,3652  24 006 1             INCR     88ANK
 1241    REF   23  LAST  820    31,3653  24 006 1             INCR     B8ANK
 1242    REF   18  LAST  820    E7,1642                        E8ANK=   TTF/8
 1243    REF   19  LAST  820    31,3654   6 1642 0             AD       TTF/8
 1244                           31,3655   0 0006 1             EXTEND
 1245    REF    1               31,3656   7 3711 1             MP       TREDESCL
 1246    REF    1               31,3657   6 3706 0             AD       -DEC103
 1247    REF    3  LAST  602    31,3660   6 4735 1             AD       NEGMAX
 1248    REF  124  LAST  816    31,3661  54 001 1             TS       L
 1249    REF  125  LAST  820    31,3662   4 0001 1             CS       L
 1250    REF  126  LAST  820    31,3663   6 0001 0             AD       L
 1251    PEF    1               31,3664   6 3710 1             AC       +DEC99
 1252    REF   21  LAST  808    31,3665   6 4733 1             AD       POSMAX
 1253    REF    4  LAST  809    31,3666  55'666 1             TS       TREDES
 1254    REF    5  LAST  820    31,3667   4 1666 1             CS       TPEDES
 1255    REF    6  LAST  820    31,3670  27'666 1             ADS      TREDES
 1256    PEF  207  LAST  808    31,3671   0 0002 0             TC       Q
 1257    REF   3  LAST  450    31,3672  0 5642 1  1406POO  TC      POODOO
 1258                          31,3673   21406 0           OCT     21406
 1259    REF  33  LAST  808    31,3674  0 5567 0  1406ALM  TC      ALARM
 1260                          31,3675   01406 1           OCT     01406
 1261    REF   2  LAST  808    31,3676  1 3411 1           TCF     RATESTOP

R1262    ************************************************************************************************
R1264    SPECIALIZED "PHASCHNG" SUBROUTINE
R1265    ************************************************************************************************

 1267    REF   1               E3,1440                     EBANK=  PHSNAME2
 1268    REF   2  LAST  225    31,3677  3 5007 0  FASTCHNG CA      EBANK3             SPECIALIZED 'PHASCHNG' ROUTINE
 1269    REF  33  LAST  820    31,3700  56 003 1           XCH     EBANK
 1270    REF 127  LAST  820    31,3701  52 002 1           DXCH    L
 1271    REF   1               31,3702  55 442 0           TS      PHSNAME3
 1272    REF  34  LAST  821    31,3703  22 003 1           LXCH    EBANK
 1273    REF   3  LAST  793    E7,1621                     EBANK=  E2DPS
 1274    REF 241  LAST  819    31,3704  0 0000 1           TC      A


R1275    ************************************************************************************************
R1277    PARAMETER TABLE INDIRECT ADDRESSES
R1278    ************************************************************************************************

 1280    REF   2  LAST  122    E5,1402            RDG      =       RBRFG
 1281    REF   2  LAST  122    E5,1410            VDG      =       VBRFG
 1282    REF   2  LAST  122    E5,1416            ADG      =       ABRFG
 1283    REF   2  LAST  122    E5,1424            VDG2TTF  =       VBRFG*
 1284    REF   2  LAST  122    E5,1426            ADG2TTF  =       ABRFG*
 1285    REF   2  LAST  122    E5,1430            JDG2TTF  =       JBRFG*

R1286    ************************************************************************************************
R1288    LUNAR LANDING CONSTANTS
R1289    ************************************************************************************************

 1291    REF   7  LAST  802    31,3705   01565 0  TABLTTFL ADRES   TABLTTF  +3        ADDRESS FOR REFERENCING TTF TABLE


 1292    REF  29  LAST  815       4740            TTFSCALE =       BIT12


 1293    REF  34  LAST  819       4750            TSCALINV =       BIT4


 1294                          31,3706   77630 1  -DEC103  DEC     -103


 1295                          31,3707   00155 0  P64DB    OCT     00155              0.3 DEGREES SCALED AT CDU SCALING
 1296                    31,3710   00143 1  +DEC99    DEC     +99

 1297                    31,3711   75340 1  TREDESCL  DEC     -.08

 1298                    31,3712   00264 1  180DEGS   DEC     +180

 1299                    31,3713   00056 1  1/2DEG    DEC     +.00278

 1300                    31,3714   01542 0  PROJMAX   DEC     .42262 B-3        SIN(25')/8 TO COMPARE WITH PROJ

 1301                    31,3715   01022 0  PROJMIN   DEC     .25882 B-3        SIN(15')/8 TO COMPARE WITH PROJ

 1302                    31,3716   01477 1  V06N63    VN      0663              P63

 1303                    31,3717   01500 0  V06N64    VN      0664              P64

 1304                    31,3720   01474 1  V06N60    VN      0660              P65, P66, P67

 1305                    22,3647                      BANK    22
 1306   REF    1         22,2000                      SETLOC  LANDCNST
 1307                    22,3647                      BANK
 1308   REF    1                                      COUNT*  $$/F2DPS

 1309                    22,3647   00021 1  HIGHESTF  2DEC    4.34546769 B-12
 1309                    22,3650   14161 1
 1310                    22,3651   01440 0  GSCALE    2DEC    100 B-11
 1310                    22,3652   00000 1
 1311                    22,3653   14000 1  3/8DP     2DEC    .375
 1311                    22,3654   00000 1
 1312                    22,3655   30000 1  3/4DP     2DEC    .750
 1312                    22,3656   00000 1
 1313                    22,3657   77534 0  DEPRCRIT  2DEC    -.02 B-1
 1313                    22,3660   45074 0
R1314   **************************************************************************************************************************************************************
R1316   **************************************************************************************************************************************************************
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L          P70-P71                                                                                    USER'S PAGE NO.   1        EQ 53

 0001                               21,2006                              BANK    21
 0002    REF    1                   21,2000                              SETLOC  R11
 0003                               21,2006                              BANK

 0004    REF   32  LAST   811       E7,1515                              EBANK=  OVCNTR
 0005    REF    1                                                        COUNT*  $$/R11

 0006    REF   17  LAST   757       21,2006   4 0103 1  R10,R11   CS      FLAGWRD7          IS SERVICER STILL RUNNING?
 0007    REF    4  LAST   706       21,2007   7 4747 0            MASK    AVEGFBIT
 0008    REF  242  LAST   821       21,2010   10 000 0            CCS     A
 0009    REF   57  LAST   815       21,2011   1 5261 0            TCF     TASKOVER          LET AVGEND TAKE CARE OF GROUP 2.
 0010    REF    3  LAST   609       21,2012   11'055 1            CCS     PIPCTR
 0011                               21,2013   1 2015 0            TCF     +2
 0012    REF    1                   21,2014   1 2125 1            TCF     LRHTASK           LAST PASS. CALL LRHTASK.
 0013    REF    1                   21,2015   55'714 0     +2     TS      PIPCTR1

 0014    REF    2  LAST   153       E7,1714             PIPCTR1   =       LADQSAVE
 0015    REF    3  LAST   510         1355              PIPCTR    =       PHSPRDT2
 0016    REF    3  LAST   439       21,2016   3 6010 0            CAF     OCT31        25
 0017    REF   23  LAST   815       21,2017   0 5173 1            TC      TWIDDLE
 0018    REF    2  LAST   241       21,2020    02006 0            ADRES   R10,R11
 0019    REF    3  LAST   617       21,2021   3 4753 1  R10,R11A  CAF     HFLSHBIT
 0020    REF    8  LAST   617       21,2022   7 0107 0  FLASHH?   MASK    FLGWRD11
 0021                               21,2023   0 0006 1            EXTEND
 0022    REF    1                   21,2024   1 2030 1            BZF     FLASHV?           H FLASH OFF, SO LEAVE ALONE

 0023    REF    2  LAST   617       21,2025   3 4747 1            CA      HLITE
 0024    REF  128  LAST   821       21,2026   54 001 1            TS      L
 0025    REF    1                   21,2027   0 4606 0            TC      FLIP              FLIP H LITE

 0026    REF    1                   21,2030   3 4752 0  FLASHV?   CA      VFLSHBIT          VFLASHBIT MUST BE BIT 2.
 0027    REF    9  LAST   823       21,2031   7 0107 0            MASK    FLGWRD11
 0028                               21,2032   0 0006 1            EXTEND
 0029    REF    1                   21,2033   1 2037 0            BZF     10,11             V FLASH OFF

 0030    REF    2  LAST   617       21,2034   3 4751 0            CA      VLITE
 0031    REF  129  LAST   823       21,2035   54 001 1            TS      L
 0032    REF    2  LAST   823       21,2036   0 4606 0            TC      FLIP              FLIP V LITE


 0033    REF    3  LAST   733       21,2037   3 0105 0  10,11     CA      FLAGWRD9          IS THE LETABORT FLAG SET ?
 0034    REF    2  LAST   733       21,2040   7 4743 1            MASK    LETABBIT
 0035                               21,2041   0 0006 1            EXTEND
 0036    REF    1                   21,2042   1 2145 1            BZF     LANDISP           NO.  PROCEED TO R10.

 0037    REF   13  LAST   795       21,2043   4 1010 0  P71NOW?   CS      MODREG            YES.  ARE WE IN P71 NOW?
 0038    REF    1                   21,2044   6 2104 0            AD      1DEC71
 0039                               21,2045   0 0006 1            EXTEND
 0040    REF    2  LAST   823       21,2046   1 2145 1            BZF     LANDISP           YES.  PROCEED TO R10.
 0041                            21,2047   0 0006 1             EXTEND                  NO.  IS AN ABORT STAGE COMMANDED?
 0042    REF   5  LAST  742      21,2050   00 030 1             READ     CHAN30
 0043                            21,2051   4 0000 0             COM
 0044    REF 130  LAST  823      21,2052   54 001 1             TS       L
 0045    REF  35  LAST  821      21,2053   7 4750 0             MASK     BIT4
 0046    REF 243  LAST  823      21,2054   10 000 0             CCS      A
 0047    REF   2  LAST  243      21,2055   1 2073 0             TCF      P71A           YES.

 0048    REF  14  LAST  823      21,2056   4 1010 0  P70NOW?    CS       MODREG         NO.  ARE WE IN P70 NOW?
 0049    REF   1                 21,2057   6 2103 1             AD       1DEC70
 0050                            21,2060   0 0006 1             EXTEND
 0051    REF   3  LAST  823      21,2061   1 2145 1             BZF      LANDISP        YES.  PROCEED TO R10.

 0052    REF 131  LAST  824      21,2062   3 0001 0             CA       L              NO.  IS AN ABORT COMMANDED?
 0053    REF  39  LAST  816      21,2063   7 4753 0             MASK     BIT1
 0054    REF 244  LAST  824      21,2064   10 000 0             CCS      A
 0055    REF   2  LAST  243      21,2065   1 2070 0             TCF      P70A           YES.
 0056    REF   4  LAST  824      21,2066   1 2145 1             TCF      LANDISP        NO.  PROCEED TO R10.

 0057    REF   1                                                COUNT*   $$/P70

 0058    REF   1                 21,2067   0 2105 1  P70        TC       LEGAL?
 0059    REF 154  LAST  818      21,2070   4 4755 0  P70A       CS       ZERO
 0060                            21,2071   1 2074 1             TCF      +3
 0061    REF   2  LAST  824      21,2072   0 2105 1  P71        TC       LEGAL?
 0062    REF  53  LAST  819      21,2073   3 4752 0  P71A       CAF      TWO
 0063    REF 208  LAST  820      21,2074   54 002 1      +3     TS       Q
 0064                            21,2075   0 0004 0             INHINT
 0065                            21,2076   0 0006 1             EXTEND
 0066    REF   1                 21,2077   3 2102 0             DCA      CNTABTAD
 0067                            21,2100   52 006 0             DTCB

 0068    REF  33  LAST  823      E7,1515                        EBANK=   OVCNTR
 0069    REF   1                 21,2101    03413 1  CNTABTAD   2CADR    CONTABRT
 0069    REF   1                 21,2102    12067 0
 0070                            21,2103    00106 0  1DEC70     DEC      70
 0071                            21,2104    00107 1  1DEC71     DEC      71

 0072                            05,3413                        BANK     05
 0073    REF   1                 05,2000                        SETLOC   ABORTS1
 0074                            05,3413                        BANK
 0075    REF   1                                                COUNT*   $$/P70

 0076    REF   1                 05,3413   3 3416 1  CONTABRT   CAF      ABRTJADR
 0077    REF   1                 05,3414   54 017 0             TS       BRUPT
 0078                            05,3415   5 0017 1             RESUME

 0079    REF   1                 05,3416   1 3417 1  ABRTJADR   TCF      ABRTJASK

 0080    REF   1                 05,3417   3 3477 0  ABRTJASK   CAF      OCTAL27
 0081   REF 209  LAST  924   05,3420   6 0002 0         AD      Q
 0082   REF 132  LAST  824   05,3421   54 001 1         TS      L
 0083                        05,3422   4 0000 0         COM
 0084   REF   6  LAST  742   05,3423   52 760 1         DXCH    -PHASE4
 0085   REF 210  LAST  825   05,3424   50 002 0         INDEX   Q
 0086   REF   1              05,3425   3 3476 1         CAF     MODE70
 0087   REF  15  LAST  824   05,3426   55'010 0         TS      MODREG

 0088   REF  24  LAST  752   05,3427   55'162 1         TS      DISPDEX          INSURE DISPDEX IS POSITIVE.

 0089   REF 211  LAST  825   05,3430   10 002 1         CCS     Q                SET APSFLAG IF P71.
 0090   REF  16  LAST  752   05,3431   4 0106 1         CS      FLGWRD10         SET APSFLAG PRIOR TO THE ENEMA.
 0091   REF  11  LAST  752   05,3432   7 4737 1         MASK    APSFLBIT
 0092   REF  17  LAST  825   05,3433   26 106 1         ADS     FLGWRD10
 0093   REF   1              05,3434   4 3501 1         CS      DAPBITS          DAPBITS = OCT 40640 = BITS 6,8,9,15
 0094   REF  23  LAST  755   05,3435   7 0111 1         MASK    DAPBOOLS         RESET ULLAGE,DRIFT,XOVRIINH,AND PULSES
 0095   REF  24  LAST  825   05,3436   54 111 1         TS      DAPBOOLS

 0096   REF   1              05,3437   3 3502 0         CAF     1DEGDB           INSURE DAP DEADBAND IS SET TO 1 DEGREE
 0097   REF   3  LAST  797   05,3440   55'343 0         TS      DB

 0098   REF  25  LAST  794   05,3441   4 0101 0         CS      FLAGWRD5         SET ENGONFLG.
 0099   REF   5  LAST  755   05,3442   7 4745 1         MASK    ENGONBIT
 0100   REF  26  LAST  825   05,3443   26 101 0         ADS     FLAGWRD5

 0101   REF   8  LAST  755   05,3444   4 4355 1         CS      PRIO30           INSURE THAT THE ENGINE IS ON, IF ARMED.
 0102                        05,3445   0 0006 1         EXTEND
 0103   REF  26  LAST  755   05,3446   02 011 0         RAND    DSALMOUT
 0104   REF  34  LAST  815   05,3447   6 4737 0         AD      BIT13
 0105                        05,3450   0 0006 1         EXTEND
 0106   REF  27  LAST  825   05,3451   01 011 0         WRITE   DSALMOUT

 0107   REF   5  LAST  559   05,3452   3 4735 1         CAF     LRBYBIT          TERMINATE R12.
 0108   REF  10  LAST  823   05,3453   54 107 0         TS      FLGWRD11

 0109   REF  23  LAST  597   05,3454   4 0074 0         CS      FLAGWRD0         SET R10FLAG TO SUPPRESS OUTPUTS TO THE
 0110   REF   1              05,3455   7 4752 1         MASK    R10FLBIT         CROSS-POINTER DISPLAY.
 0111   REF  24  LAST  825   05,3456   26 074 0         ADS     FLAGWRD0         THE FOLLOWING ENEMA WILL REMOVE THE
A0112                                                                            DISPLAY INERTIAL DATA OUTBIT.

 0113                        05,3457   0 0006 1         EXTEND                   LOAD TEVENT FOR THE DOWNLINK.
 0114   REF  25  LAST  811   05,3460   3 0025 0         DCA     TIME2
 0115   REF   6  LAST  755   05,3461   53'342 1         DXCH    TEVENT

 0116                        05,3462   0 0006 1         EXTEND
 0117   REF   1              05,3463   3 3475 1         DCA     SVEXITAD
 0118   REF   3  LAST  734   05,3464   53'252 1         DXCH    AVGEXIT

 0119   REF   1              05,3465   0 2653 0         TC      ABTKLEAN         KILL GROUPS 1,3, AND 6.
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0120  REF  24  LAST  730   05,3466  3 6250 0           CAF     THREF        SET UP 4.3SPOT FOR GOABORT
0121  REF 133  LAST  825   05,3467  54 001 1           TS      L
0122                       05,3470  4 0000 0           COM
0123  REF   7  LAST  825   05,3471  52 760 1           DXCH    -PHASE4

0124  REF  49  LAST  811   05,3472  0 4635 0           TC      POSTJUMP
0125  REF   1              05,3473   12763 0           CADR    ENEMA

0126  REF  34  LAST  824   E7,1515                     EBANK=  DVCNTR
0127  REF   6  LAST  757   05,3474   03746 1  SVEXITAD 2CADR   SERVEXIT
0127                       05,3475   64067 1
0128                       05,3476   00106 0  MODE70   DEC     70
0129                       05,3477   00027 1  OCTAL27  OCT     27
0130                       05,3500   00107 1  MODE71   DEC     71

0131                       05,3501   40640 1  DAPBITS  OCT     40640

0132                       05,3502   00554 0  1DEG08   OCT     00554
0133                       32,3533                     BANK    32
0134  REF   1              32,2000                     SETLOC  ABORTS
0135                       32,3533                     BANK

0136  REF   1                                          COUNT*  $$/P70

0137  REF  15  LAST  808   32,3533  3 4751 0  GOABORT  CAF     FOUR
0138  REF  35  LAST  826   32,3534  55 515 0           TS      DVCNTR

0139  REF   1              32,3535  3 3743 1           CAF     WHICHADR
0140  REF  27  LAST  780   32,3536  55 455 0           TS      WHICH

0141  REF 133  LAST  820   32,3537  0 6042 1           TC      INTPRET
0142                       32,3540   43014 0           CLEAR   CLEAR
0143  REF   1              32,3541   04665 0                   FLRCS
0144  REF   4  LAST  741   32,3542   04265 1                   FLUNDISP
0145                       32,3543   43014 0           CLEAR   SET
0146  REF   5  LAST  757   32,3544   03670 0                   IDLEFLAG
0147  REF   1              32,3545   06464 1                   ACC4-2FL
0148                       32,3546   45014 0           SET     CALL
0149  REF   1              32,3547   04462 0                   P7071FLG
0150  REF   2  LAST  728   32,3550   61071 0                   INITCDUW
0151                       32,3551   77776 1           EXIT

0152  REF   6  LAST  915   32,3552  0 5321 1           TC      CHECKMM
0153                       32,3553   00106 0  70DEC    DEC     70
0154  REF   1              32,3554  1 3667 1           TCF     P71RET

0155  REF 134  LAST  826   32,3555  0 6042 1  P70INIT  TC      INTPRET
0156                       32,3556   77624 1           CALL
0157  REF   1              32,3557   65716 1                   TGOCOMP
0158                       32,3560   54345 1           DLOAD   SL
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 0159   REF   1                 32,3561   34003 0                  MDOTDPS
 0160                           32,3562   20205 1                  4D
 0161                           32,3563   77665 1           BOV
 0162   REF  10  LAST   814     32,3564   01244 1                  MASS
 0163   REF   2  LAST   120     32,3565   16271 1           STODL  TBUP
 0164   REF  11  LAST   827     32,3566   01244 1                  MASS
 0165                           32,3567   70471 1           DDV    SR1
 0166   REF   1                 32,3570   16015 1                  K(1/DV)
 0167   REF   2  LAST   154     32,3571   03635 1           STORE  1/DV1
 0168   REF   2  LAST   154     32,3572   03637 0           STORE  1/DV2
 0169   REF   2  LAST   154     32,3573   03641 1           STORE  1/DV3
 0170                           32,3574   77665 1           BOV
 0171   REF   1                 32,3575   25742 1                  K(AT)
 0172   REF   3  LAST   202     32,3576   16263 1           STODL  AT
 0173   REF   1                 32,3577   34015 1                  1DOPCTTD
 0174   REF   2  LAST   120     32,3600   02267 0           STORE  TTC
 0175                           32,3601   57535 0           SLOAD  DCDMP
 0176   REF   2  LAST   749     32,3602   26002 1                  DPSVEX
 0177                           32,3603   77702 1           SR2
 0178   REF   2  LAST   120     32,3604   36265 0           STCALL VE
 0179   REF   1                 32,3605   60275 1                  COMMINIT
 0180                           32,3606   77745 1  INJTARG  DLOAD
 0181   REF   2  LAST   123     32,3607   02567 1                  ABTRDOT
 0182   REF   3  LAST   318     32,3610   36273 1           STCALL RDOTD              INITIALIZE RDOTD.
 0183   REF   1                 32,3611   57313 1                  YCDMP              COMPUTE Y
 0184                           32,3612   45246 0           ABS    DSU
 0185   REF   2  LAST   123     32,3613   02565 0                  YLIM               /Y/-DYMAX
 0186                           32,3614   75240 0           BMN    SIGN               IF <0, XR<.5DEG, LEAVE YCD AT 0
 0187   REF   1                 32,3615   65620 0                  YOK                IF >0, FIX SIGN OF DEFICIT, THIS IS YCD.
 0188   REF   2  LAST   120     32,3616   02335 0                  Y
 0189   REF   2  LAST   154     32,3617   03633 1           STORE  YCD
 0190                           32,3620   45345 1  YOK      DLOAD  DSU
 0191   REF   3  LAST   827     32,3621   03633 1                  YCD
 0192   REF   3  LAST   827     32,3622   02335 0                  Y
 0193                           32,3623   77661 0           SR
 0194                           32,3624   20606 0                  50
 0195   REF   3  LAST   318     32,3625   03643 0           STORE  XRANGE
 0196                           32,3626   45014 0           SET    CALL
 0197   REF   1                 32,3627   04461 0                  FLVR
 0198   REF   1                 32,3630   71554 0                  THETCCMP
 0199                           32,3631   51025 1           DSU    BPL
 0200   REF   2  LAST   123     32,3632   02561 1                  THETCRIT
 0201                           32,3633   65637 0                  +4
 0202                           32,3634   52175 0           VLOAD  GOTO
 0203   REF   2  LAST   123     32,3635   02551 1                  J1PARM
 0204  *REF   1                 32,3636   65642 1                  STORPARM
 0205                           32,3637   43175 0    +4     VLOAD  SET                IF J2 IS USED, SET THE
 0206   REF   2  LAST   123     32,3640   02555 0                  J2PARM             ABORT TARGETING FLAG
 02061  REF   2  LAST   231     32,3641   04470 0                  ABTTGFLG
 0207  *REF   2  LAST   123     32,3642   16621 0  STORPARM STODL  JPARM
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0208  REF   2  LAST  154   32,3643   03631 0                     RCO
0209  REF   1              32,3644   02625 1            STORE    RP
0210                       32,3645   77414 0            SET      EXIT
0211  REF   1              32,3646   04471 1                     ROTFLAG

0212  REF   1              32,3647   0 3725 1  UPTHROT  TC       THROTUP

0213  REF  58  LAST  811   32,3650   0 5353 1           TC       PHASCHNG
0214                       32,3651   04024 0            OCT      04024

0215  REF  53  LAST  810   32,3652   0 5504 0           TC       UPFLAG
0216  REF   1              32,3653   00216 1            ADRES    FLAP

0217  REF 228  LAST  814   32,3654   0 4616 1  UPTHROT1 TC       BANKCALL     VERIFY THAT THE PANEL SWITCHES
0218  REF   2  LAST  727   32,3655   73707 0            CADR     P40AUTO      ARE PROPERLY SET.

0219  REF   2  LAST  828   32,3656   0 3725 1           TC       THROTUP

0220  REF   4  LAST  741   32,3657   3 5027 1           CAF      PRIO17       LET SERVICER FINISH BEFORE CONNECTING
0221  REF  15  LAST  799   32,3660   0 5146 1           TC       PRIOCHNG         ASCENT GUIDANCE EQUATIONS.

0222                       32,3661   0 0006 1           EXTEND
0223  REF   1              32,3662   3 3745 1           DCA      ATMAGAD
0224  REF   4  LAST  825   32,3663   53'252 1           DXCH     AVGEXIT

0225  REF  59  LAST  828   32,3664   0 5353 1  GRP4OFF  TC       PHASCHNG     TERMINATE USE OF GROUP 4.
0226                       32,3665   00004 0            OCT      00004

0227  REF 130  LAST  810   32,3666   1 5155 1           TCF      ENDOFJOB

0228  REF  87  LAST  810   32,3667   0 5516 0  P71RET   TC       DOWNFLAG
0229  REF   2  LAST  786   32,3670   00215 1            ADRES    LETABORT

0230  REF   2  LAST  753   32,3671   3 6000 1           CAF      THRESH2      SET DVMON THRESHOLD TO THE ASCENT VALUE.
0231  REF   5  LAST  780   32,3672   55'250 0           TS       DVTHRUSH

0232  REF 135  LAST  826   32,3673   0 6042 1           TC       INTPRET
0233                       32,3674   77624 1            CALL
0234  REF   1              32,3675   60251 1                     P12INIT
0235                       32,3676   45014 0            BON      CALL
0236  REF   2  LAST  828   32,3677   04707 0                     FLAP
0237  REF   1              32,3700   65704 1                     OLDTIME
0238  REF   2  LAST  826   32,3701   65716 1                     TGOCOMP      IF FLAP=0, TGO=T-TIG
0239                       32,3702   77650 1            GOTO
0240  REF   1              32,3703   65606 1                     INJTARG
0241                       32,3704   72545 0   OLDTIME  DLOAD    SL1          IF FLAP=1,TGO=2 TGO
0242  REF  15  LAST  770   32,3705   03517 1                     TGO
0243  REF   1              32,3706   03502 0            STORE    TGO1
0244                       32,3707   77776 1            EXIT
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 0245   REF  60  LAST  828   32,3710  0 5353 1             TC      PHASCHNG
 0246                        32,3711   04024 0             OCT     04024

 0247                        32,3712  0 0006 1             EXTEND
 0248   REF   2  LAST  828   32,3713  3 1502 1             OCA     TGC1
 0249   REF  16  LAST  828   32,3714  5 3517 1             OXCH    TGO
 0250   REF   1              32,3715  1 3654 1             TCF     UPTHRCT1

 0251   REF   9  LAST  752   E7,1501            TG01       =       VG800Y
R0252   **********************************************************

 0253                        21,2105                       BANK    21
 0254   REF   2  LAST  823   21,2000                       SETLOC  R11
 0255                        21,2105                       BANK

 0256   REF   2 LAST  824 TO  824:    14     14*           COUNT*  $$/P70

 0257   REF  10  LAST  233   21,2105  4 0774 1  LEGAL?     CS      MMNUMBER        IS THE DESIRED PGM ALREADY IN PROGRESS?
 0258   REF  16  LAST  825   21,2106  6 1010 1             AD      MODREG
 0259                        21,2107  0 0006 1             EXTEND
 0260   REF   1              21,2110  1 2121 0             BZF     ABORTALM

 0261   REF   4  LAST  823   21,2111  4 0105 1             CS      FLAGWRD9        ARE THE ABORTS ENABLED?
 0262   REF   3  LAST  823   21,2112  7 4743 1             MASK    LETABBIT
 0263   REF 245  LAST  824   21,2113  10 000 0             CCS     A
 0264   REF   2  LAST  829   21,2114  1 2121 0             TCF     ABORTALM

 0265   REF  18  LAST  823   21,2115  3 0103 0             CA      FLAGWRD7        IS SERVICER ON THE AIR?
 0266   REF   5  LAST  823   21,2116  7 4747 0             MASK    AVEGFBIT
 0267   REF 246  LAST  829   21,2117  10 000 0             CCS     A
 0268   REF 212  LAST  825   21,2120  0 0002 0             TC      Q               YES.  ALL IS WELL.
 0269   REF   7  LAST  501   21,2121  0 4364 1  ABORTALM   TC      FALTON
 0270   REF  10  LAST  462   21,2122  0 4457 0             TC      RELOSP
 0271   REF  50  LAST  826   21,2123  0 4635 0             TC      POSTJUMP
 0272   REF   6  LAST  568   21,2124   21051 0             CADR    PINBRNCH

 0273                        32,3716                       BANK    32
 0274   REF   2  LAST  826   32,2000                       SETLOC  ABORTS
 0275                        32,3716                       BANK

 0276   REF   2 LAST  826 TO  829:   115    115*           COUNT*  $$/P70

R0277   **********************************************************

 0278                        32,3716   45234 0  TGCCOMR    RTB     DSU
 0279   REF  22  LAST  717   32,3717   21574 1                     LOADTIME
 0280   REF  37  LAST  783   32,3720   03442 0                     TIG
 0281                        32,3721   77661 0             SL
 0282                        32,3722   20214 1                     110
 0283   REF  17  LAST  829   32,3723   03517 1             STORE   TGO
 0284                          32,3724   77616 0            RVQ

R0285   ************************************************************************

 0286   REF  35  LAST  825     32,3725   3 4737 0  THROTUP  CAF      BIT13
 0287   REF   5  LAST  790     32,3726   54 055 0           TS       THRUST
 0288   REF  36  LAST  824     32,3727   3 4750 1           CAF      BIT4
 0289                          32,3730   0 0006 1           EXTEND
 0290   REF  11  LAST  790     32,3731   05 014 1           WOR      CHAN14
 0291   REF 213  LAST  829     32,3732   0 0002 0           TC       Q

R0292   ************************************************************************

 0293                          32,3733    00000 1  10SECS   2DEC     1000
 0293                          32,3734    01750 1
 0294                          32,3735    00021 1  HINJECT  2DEC     18288 B-24      60,000 FEET EXPRESSED IN METERS.
 0294                          32,3736    33400 0
 0295                          32,3737    11021 1  (TGO)A   2DEC     37000 B-17
 0295                          32,3740    00000 1
 0296                          32,3741    00507 0  K(AT)    2DEC     .02             SCALING CONSTANT
 0296                          32,3742    25605 0
 0297   REF   1                32,3743    02114 1  WHICHADR REMADR   ABRTABLE

R0298   ************************************************************************

 0299   REF  36  LAST  826     E7,1515                      EBANK=   OVCNTR
 0300   REF   2  LAST  743     32,3744    03372 1  ATMAGAD  2CADR    ATMAG
 0300                          32,3745    70067 1
 0001                       24,3700                     BANK    24
 0002   REF   1             30,2000                     SETLOC  P12
 0003                       30,2061                     BANK

 0004   REF  37  LAST  830  E7,1515                     EBANK=  DVCNTR
 0005   REF   1                                         COUNT*  $$/P12

 0006   REF  61  LAST  829  30,2061  0 5353 1  P12LM    TC      PHASCHNG
 0007                       30,2062   04024 0           OCT     04024

 0008   REF 229  LAST  828  30,2063  0 4616 1           TC      BANKCALL
 0009   REF   9  LAST  780  30,2064   11233 0           CADR    R02BOTH         CHECK THE STATUS OF THE IMU.

 0010   REF  10  LAST  547  30,2065  0 6011 1           TC      CLRADMOD        INITIALIZE RADMODES FOR R29.

 0011   REF   3  LAST  828  30,2066  3 6000 1           CAF     THRESH2         INITIALIZE DVMON
 0012   REF   6  LAST  828  30,2067  55'250 0           TS      DVTHRUSH
 0013   REF  16  LAST  826  30,2070  3 4751 0           CAF     FOUR
 0014   REF  38  LAST  831  30,2071  55'515 0           TS      DVCNTR

 0015   REF 155  LAST  824  30,2072  3 4755 1           CA      ZERO
 0016   REF  10  LAST  755  30,2073  55'462 1           TS      TRKMKCNT        SHOW THAT R29 DOWNLINK DATA IS NOT READY

 0017   REF   1             30,2074  3 3022 1           CAF     V06N33A
 0018   REF 230  LAST  831  30,2075  0 4616 1           TC      BANKCALL        FLASH TIG
 0019   REF  22  LAST  786  30,2076   20477 1           CADR    GOFLASH
 0020   REF  31  LAST  810  30,2077  1 6001 1           TCF     GOTOPOOH
 0021                       30,2100  1 2102 1           TCF     +2              PROCEED
 0022                       30,2101  1 2074 1           TCF     -5              ENTER

 0023   REF  62  LAST  831  30,2102  0 5353 1           TC      PHASCHNG
 0024                       30,2103   04024 0           OCT     04024

 0025   REF 136  LAST  828  30,2104  0 6042 1           TC      INTPRET
 0026                       30,2105   43014 0           SET     SET
 0027   REF   5  LAST  780  30,2106   03067 0                   MUNFLAG
 0028   REF   2  LAST  826  30,2107   06464 1                   ACC4-2FL
 0029                       30,2110   43014 0           SET     CLEAR
 0030   REF   1             30,2111   00075 0                   R10FLAG
 0031   REF   6  LAST  780  30,2112   00270 1                   RNDVZFLG
 0032                       30,2113   43014 0           SET     SET
 0033   REF   1             30,2114   04464 0                   FLPI
 0034   REF   2  LAST  827  30,2115   04461 0                   FLVR
 0035                       30,2116   77624 1           CALL                    INITIALIZE WM AND /LAND/
 0036   REF   2  LAST  781  30,2117   71343 0                   GUIDINIT
 0037                       30,2120   77624 1           CALL
 0038   REF   2  LAST  828  30,2121   60251 1                   P12INIT
 0039                       30,2122   77745 1  P12LMB   DLOAD
 0040   REF   1             30,2123   25740 0                   (TGO)A          SET TGO TO AN INITIAL NOMINAL VALUE.
 0041   REF  18  LAST  829  30,2124   17517 1           STODL   TGO
 0042   REF  38  LAST  829   30,2125   03442 0                       TIG
 0043   REF  46  LAST  783   30,2126   34041 0              STCALL  TDEC1
 0044   REF   9  LAST  781   30,2127   27056 1                      LEMPREC           ROTATE THE STATE VECTORS TO THE
 0045                        30,2130   64375 1              VLOAD   MXV               IGNITION TIME.
 0046   REF  21  LAST  761   30,2131   00007 0                      VATT
 0047   REF  28  LAST  801   30,2132   01734 0                      REFSMMAT
 0048                        30,2133   77772 0              VSL1
 0049   REF   2  LAST  149   30,2134   27601 0              STCVL   V1S               COMPUTE V1S = VEL(TIG)*2(-7)M/CS.
 0050   REF  25  LAST  761   30,2135   00001 0                      RATT
 0051                        30,2136   52521 0              MXV     VSL6
 0052   REF  29  LAST  832   30,2137   01734 0                      REFSMMAT
 0053   REF  15  LAST  812   30,2140   37521 0              STCALL  R                 COMPUTE R = POS(TIG)*2(-24)M.
 0054   REF   3  LAST  781   30,2141   67067 1                      MUNGRAV           COMPUTE GDT1/2(TIG)*2(-7)M/CS.
 0055                        30,2142   53575 0              VLOAD   UNIT
 0056   REF  16  LAST  832   30,2143   03521 1                      R
 0057   REF   9  LAST  807   30,2144   37537 1              STCALL  UNIT/R/           COMPUTE UNIT/R/ FOR YCOMP.
 0058   REF   2  LAST  827   30,2145   57313 1                      YCOMP
 0059                        30,2146   57461 0              SR      OCCMP
 0060                        30,2147   20606 0                      5D
 0061   REF   4  LAST  827   30,2150   17643 0              STODL   XRANGE            INITIALIZE XRANGE FOR NOUN 76.
 0062   REF   1              30,2151   31367 1                      V1NJNCM
 0063   REF   4  LAST  318   30,2152   16277 1              STODL   ZDOTD
 0064   REF   1              30,2153   31371 0                      RDOTDNCM
 0065   REF   4  LAST  827   30,2154   02273 0              STORE   RDOTD
 0066                        30,2155   77776 1              EXIT

 0067   REF  63  LAST  831   30,2156  0 5353 1              TC      PHASCHNG
 0068                        30,2157   04024 0              OCT     04024

 0069   REF   1              30,2160  2 3021 1   NEWLOAD    CAF     V06N76            FLASH CROSS-RANGE AND APOLUNE VALUES.
 0070   REF 231  LAST  831   30,2161  0 4616 1              TC      BANKCALL
 0071   REF  23  LAST  831   30,2162   20477 1              CADR    GOFLASH
 0072   REF  32  LAST  831   30,2163  1 6001 1              TCF     GOTOPOOH
 0073                        30,2164  1 2166 0              TCF     +2                PROCEED
 0074   REF   1              30,2165  1 2160 0              TCF     NEWLOAD           ENTER NEW DATA.

 0075   REF   1              30,2166  3 2314 0              CAF     P12ADRES
 0076   REF  28  LAST  826   30,2167   55455 0              TS      WHICH

 0077   REF  64  LAST  832   30,2170  0 5353 1              TC      PHASCHNG
 0078                        30,2171   04024 0              OCT     04024

 0079   REF 137  LAST  831   30,2172  0 6042 1              TC      INTPRET
 0080                        30,2173   54345 1              DLOAD   SL
 0081   REF   5  LAST  832   30,2174   03643 0                      XRANGE
 0082                        30,2175   20206 1                      5D
 0083                        30,2176   77615 0              DAD
 0084   REF   4  LAST  827   30,2177   02335 0                      Y
 0085   REF   4  LAST  827   30,2200   27633 1              STOVL   YCO
 0086   REF  10  LAST  832   30,2201   03537 0                      UNIT/R/
 0087                                30,2202    53361 0            VXSC    VAD
 0088     REF    1                   30,2203    31365 0                    49FPS
 0089     REF    3   LAST   832      30,2204    03601 0                    VIS
 0090     REF    7   LAST   812      30,2205    03527 1            STORE   V                     V(TIPOVER) = V(IGN) + 57FPS (UNIT/R/)
 0091                                30,2206    72441 0            DOT     SL1
 0092     REF   11   LAST   832      30,2207    03537 0                    UNIT/R/
 0093     REF    1                   30,2210    27474 0            STOVL   RDOT                  RDOT * 2(-7)
 0094     REF   12   LAST   833      30,2211    03537 0                    UNIT/R/
 0095                                30,2212    53435 0            VXV     UNIT
 0096     REF    1                   30,2213    03720 1                    QAXIS
 0097     REF    1                   30,2214    37726 0            STCALL  ZAXIS1
 0098     REF    1                   30,2215    60315 0                    ASCENT
 0099                                30,2216    77745 1  P12RET    DLOAD
 0100     REF    2   LAST   121      30,2217    02361 1                    ATP                   ATP(2)*2(18)
 0101                                30,2220    65316 0            DSQ     POOL
 0102     REF    2   LAST   121      30,2221    02355 0                    ATY                   ATY(2)*2(18)
 0103                                30,2222    43316 1            DSQ     DAD
 0104                                30,2223    75454 0            BZE     SQRT
 0105     REF    1                   30,2224    60230 0                    YAWDUN
 0106                                30,2225    55352 0            SL1     BDDV
 0107     REF    3   LAST   833      30,2226    02355 0                    ATY
 0108                                30,2227    77736 0            ARCSIN
 0109     REF    3   LAST   318      30,2230    26363 0  YAWDUN    STOVL   YAW
 0110     REF   15   LAST   807      30,2231    03253 0                    UNFC/2
 0111                                30,2232    50256 0            UNIT    DOT
 0112     REF   13   LAST   833      30,2233    03537 0                    UNIT/R/
 0113                                30,2234    65552 0            SL1     ARCCOS
 0114                                30,2235    77676 0            DCOMP
 0115     REF    2   LAST   318      30,2236    02365 0            STORE   PITCH
 0116                                30,2237    77776 1            EXIT
 0117     REF   65   LAST   832      30,2240    0 5353 1           TC      PHASCHNG
 0118                                30,2241    04024 0            OCT     04024

 0119                                30,2242    0 0004 0           INHINT
 0120     REF   39   LAST   783      30,2243    0 4674 0           TC      IBNKCALL
 0121     REF    3   LAST   783      30,2244    40143 0            CADR    PFLITEDB
 0122     REF   88   LAST   828      30,2245    0 5516 0           TC      DOWNFLAG
 0123     REF    2   LAST   831      30,2246    00213 1            ADRES   FLPI

 0124     REF   51   LAST   829      30,2247    0 4635 0           TC      POSTJUMP
 0125     REF    3   LAST   784      30,2250    74130 0            CADR    BURNBABY

 0126                                30,2251    77745 1  P12INIT   DLOAD                         INITIALIZE ENGINE DATA. USED FOR P12 AND
 0127     REF    1                   30,2252    16013 1                    (1/DV)A               P71.
 0128     REF    3   LAST   827      30,2253    03641 1            STORE   1/DV3
 0129     REF    3   LAST   827      30,2254    03637 0            STORE   1/DV2
 0130     REF    3   LAST   827      30,2255    17635 1            STODL   1/DV1
 0131     REF    1                   30,2256    16017 0                    (AT)A
 0132     REF    4   LAST   827      30,2257    16263 1            STODL   AT
 0133     REF    1                   30,2260    16021 0                    (TBUP)A
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                                                                                                   USER'S PAGE NO.   4       E7 S3
L          P12

 0134   REF    3  LAST   827    30,2261    16271 1            STOOL  T8UP
 0135   REF    1                30,2262    34013 1                   ATCECAY
 0136                           30,2263    54276 0            OCOMP  SL
 0137                           30,2264    20214 1                   110
 0138   REF    3  LAST   827    30,2265    02267 0            STORE  TTC
 0139                           30,2266    57535 0            SLOAD  OCOMP
 0140   REF    2  LAST   753    30,2267    26001 1                   APSVEX
 0141                           30,2270    77702 1            SR2
 0142   REF    3  LAST   827    30,2271    02265 1            STORE  VE
 0143                           30,2272    43414 1            8OFF   RVQ
 0144   REF    3  LAST   828    30,2273    04747 1                   FLAP
 0145   REF    2  LAST   827    30,2274    60275 1                   COMMINIT
 0146                           30,2275    43345 1   COMMINIT OLOAO  OAO            INITIALIZE TARGET DATA. USED BY P12, P70
 0147   REF    1                30,2276    25736 1                   HINJECT        AND P71 IF IT DOES NOT FOLLOW P70.
 0148   REF    7  LAST   813    30,2277    02333 0                   /LAND/
 0149   REF    3  LAST   828    30,2300    17631 0            STOOL  RCC
 0150   REF    8  LAST   781    30,2301    06524 1                   HI6ZEROS
 0151   REF    2  LAST   154    30,2302    03654 0            STORE  TXC
 0152   REF    5  LAST   832    30,2303    03633 1            STORE  YCO
 0154   REF    2  LAST   120    30,2304    26275 0            STOVL  YOOTD
 0155   REF    1                30,2305    01563 0                   VRECTCSM
 0156                           30,2306    64235 1            VXV    MXV
 0157   REF    5  LAST   241    30,2307    01555 0                   PRECTCSM
 0158   REF   30  LAST   832    30,2310    01734 0                   REFSMMAT
 0159                           30,2311    77656 1            UNIT
 0160   REF    2  LAST   833    30,2312    03720 1            STORE  OAXIS
 0161                           30,2313    77616 0            RVQ

 0162   REF    1                30,2314    02024 0   P12ACRES REMADR P12TABLE

 0163   REF    1                34,2000                       SETLOC ASENT8
 0164                           34,3343                       BANK
 0165   REF    1                                              COUNT* $$/P12

 0166                           34,3343    40220 0   GUIOINIT STQ    SETPO
 0167   REF    6  LAST   743    34,3344    01163 1                   TEMPR60
 0168                           34,3345    00001 0                   00
 0169                           34,3346    41575 0            VLOAO  PUSH
 0170   REF    8  LAST   781    34,3347    06516 0                   UNITZ
 0171                           34,3350    41434 1            RTB    PUSH
 0172   REF   23  LAST   829    34,3351    21574 1                   LOADTIME
 0173                           34,3352    77624 1            CALL
 0174   REF    2  LAST   781    34,3353    55716 1                   RP-TO-R
 0175                           34,3354    74321 1            MXV    VXSC
 0176   REF   31  LAST   834    34,3355    01734 0                   REFSMMAT
 0177   REF    1                34,3356    16027 0                   MOONRATE
 0178   REF    4  LAST   801    34,3357    26325 1            STOVL  WM
 0179   REF    8  LAST   786    34,3360    02023 1                   RLS
 0180                           34,3361    52446 0            ABVAL  SL3
 0181   REF    8  LAST   834    34,3362    36333 1            STCALL /LAND/
 0182    REF    7  LAST   834    34,3363    01163 1                 TEMPR60

 0183                            34,3364    00046 0  49FPS     2DEC   .149352 B-6      EXPECTED RDOT AT TIPOVER
 0183                            34,3365    07374 0
 0184                            34,3366    04145 0  VINJNOM   2DEC   16.7924 B-7      5509.5 FPS(APO=30NM WITH RDOT=19.5FPS)
 0184                            34,3367    15527 0
 0185                            34,3370    00007 0  RDOTDNOM  2DEC   .059436 B-7      19.5 FPS
 0185                            34,3371    23346 1
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L        ASCENT GUIDANCE                                                                         USER'S PAGE NO.   1       E0 S3

 0001                           34,3372                                    BANK    34
 0002   REF    1                34,2000                                    SETLOC  ASCFILT
 0003                           34,3372                                    BANK

 0004   REF   39  LAST   831    E7,1515                                    EBANK=  DVCNTR

 0005   REF    1                                                           COUNT*  $$/ASENT

 0006   REF   66  LAST   833    34,3372   0 5353 1   ATMAG                 TC      PHASCHNG
 0007                           34,3373   00035 1                          OCT     00035
 0008   REF  138  LAST   832    34,3374   0 6042 1                         TC      INTPRET
 0009                           34,3375   77614 1                          BON
 0010   REF    2  LAST   826    34,3376   04705 1                                  FLRCS
 0011   REF    2  LAST   833    34,3377   60315 0                                  ASCENT
 0012                           34,3400   45345 1                          DLOAD   DSU
 0013   REF    2  LAST   149    34,3401   03514 1                                  ABDVCONV
 0014   REF    1                34,3402   26203 1                                  MINABDV
 0015                           34,3403   43040 1                          BMN     CLEAR
 0016   REF    1                34,3404   60756 0                                  ASCTERM4
 0017   REF   15  LAST   786    34,3405   04267 0                                  SURFFLAG
 0018                           34,3406   67214 1                          CLEAR   SLOAD
 0019   REF   10  LAST   614    34,3407   02676 1                                  RENDWFLG
 0020   REF    1                34,3410   31446 0                                  BIT3H
 0021                           34,3411   77471 0                          BOV     EXIT
 0022   REF    3  LAST   836    34,3412   03514 1                                  ABDVCONV
 0023   REF  337  LAST   820    34,3413   52 155 1                         DXCH    MPAC
 0024   REF    4  LAST   833    34,3414   53'641 1                         DXCH    1/DV3
 0025   REF    4  LAST   833    34,3415   53'637 0                         DXCH    1/DV2
 0026   REF    4  LAST   833    34,3416   53'635 1                         DXCH    1/DV1
 0027   REF    1                34,3417   53'571 1                         DXCH    1/DV0
 0028   REF  139  LAST   836    34,3420   0 6042 1                         TC      INTPRET
 0029                           34,3421   43345 1                          DLDAD   DAD
 0030   REF    2  LAST   836    34,3422   03571 1                                  1/DV0
 0031   REF    5  LAST   836    34,3423   03635 1                                  1/DV1
 0032                           34,3424   43215 0                          DAD     DAD
 0033   REF    5  LAST   836    34,3425   03637 0                                  1/DV2
 0034   REF    5  LAST   836    34,3426   03641 1                                  1/DV3
 0035                           34,3427   41205 0                          DMP     DMP
 0036   REF    4  LAST   834    34,3430   02265 1                                  VE
 0037   REF    1                34,3431   21017 1                                  2SEC(9)
 0038                           34,3432   65252 1                          SL3     PDDL
 0039   REF    4  LAST   834    34,3433   02271 1                                  TBUP
 0040                           34,3434   43342 0                          SR1     DAD
 0041                           34,3435   77625 0                          DSU
 0042   REF    1                34,3436   21014 1                                  6SEC(18)
 0043   REF    5  LAST   836    34,3437   16271 1                          STODL   TBUP
 0044   REF    5  LAST   836    34,3440   02265 1                                  VE
 0045                           34,3441   56342 1                          SR1     DDV
 0046   REF    6  LAST   836    34,3442   02271 1                                  TBUP
 0047   REF    5  LAST   833    34,3443   36263 0                          STCALL  AT
 0048   REF    3  LAST  836    34,3444    60315 0                     ASCENT
 0049                          34,3445    00004 0  BIT3H    OCT     4
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P0050


 0051                                30,2315                         BANK    30
 0052   REF    2  LAST    39         30,2000                         SETLOC  ASENT
 0053                                30,2315                         BANK
 0054   REF    2 LAST    39  TO    39:       2       2*              COUNT*  $$/ASENT


 0055                                30,2315   51575 1  ASCENT       VLOAD   ABVAL
 0056   REF   17  LAST   832         30,2316   03521 1                       R
 0057   REF    2  LAST   120         30,2317   26301 1               STOVL   /R/MAG
 0058   REF    2  LAST   833         30,2320   03726 1                       ZAXIS1
 0059                                30,2321   72441 0               DOT     SL1
 0060   REF    8  LAST   833         30,2322   03527 1                       V                  Z.V = ZDOT*2(-8).
 0061   REF    2  LAST   120         30,2323   26313 1               STOVL   ZDOT               ZDOT*2(-7)
 0062   REF    3  LAST   838         30,2324   03726 1                       ZAXIS1
 0063                                30,2325   76435 1               VXV     VSL1
 0064   REF   14  LAST   833         30,2326   03537 0                       UNIT/R/            Z X UR = LAXIS*2(-2)
 0065   REF    2  LAST   120         30,2327   02303 0               STORE   LAXIS              LAXIS*2(-1)
 0066                                30,2330   72441 0               DOT     SL1
 0067   REF    9  LAST   838         30,2331   03527 1                       V                  L.V = YDOT*2(-8).
 0068   REF    3  LAST   318         30,2332   36311 1               STCALL  YDOT               YDOT * 2(-7)
 0069   REF    3  LAST   832         30,2333   57313 1                       YCOMP
 0070                                30,2334   77775 1               VLOAD
 0071   REF    2  LAST   149         30,2335   03563 1                       GDT1/2             LOAD GDT1/2*2(-7)M/CS.
 0072                                30,2336   50341 1               V/SC    DOT
 0073   REF    1                     30,2337   27104 1                       2SEC(18)
 0074   REF   15  LAST   838         30,2340   03537 0                       UNIT/R/            G.UR*2(9) = GR*2(9).
 0075                                30,2341   47315 0               PDVL    VXV                STORE IN PDL(0)                      (2)
 0076   REF   16  LAST   838         30,2342   03537 0                       UNIT/R/            LOAD UNIT/R/*2(-1).
 0077   REF   10  LAST   838         30,2343   03527 1                       V                  UR*2(-1) X V*2(-7) = H/R*2(-8).
 0078                                30,2344   56236 0               VSQ     DDV                H(2)/R(2)*2(-16).
 0079   REF    3  LAST   838         30,2345   02301 1                       /R /MAG            H(2)/R(3)*2(9).
 0080                                30,2346   43352 1               SL1     DAD
 0081                                30,2347   77626 0               STADR
 0082   REF    2  LAST   121         30,2350   75462 0               STORE   GEFF               GEFF*2(10)M/CS/CS
 0083                                30,2351   45014 0               BOFF    CALL               IF P7071FLG = 1 (I.E. P70 OR P71)
 0084   REF    2  LAST   826         30,2352   04742 1                       P7071FLG               CALL ZDOTDCMP TO UPDATE ZDOTD
 0085                                30,2353   60355 1                       +2                     ON THE BASIS OF THE LAST RP.
 0086   REF    1                     30,2354   71524 1                       ZDOTDCMP
 0087                                30,2355   45345 1       +2      DLOAD   DSU
 0088   REF    5  LAST   832         30,2356   02277 1                       ZDOTD
 0089   REF    3  LAST   838         30,2357   02313 1                       ZDOT
 0090   REF    2  LAST   121         30,2360   02343 1               STORE   DZDOT              DZDOT = (ZDOTD - ZDOT)*2(7)M/CS.
 0091                                30,2361   65361 0               VXSC    PDDL
 0092   REF    4  LAST   838         30,2362   03726 1                       ZAXIS1
 0093   REF    3  LAST   834         30,2363   02275 0                       YDOTD
 0094                                30,2364   77625 0               DSU
 0095   REF    4  LAST   838         30,2365   02311 0                       YDOT
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0096   REF  2  LAST  121   30,2366   02341 0           STORE   DYDOT      DYDOT = (YDOTD - YDOT)*2(7)M/CS.
0097                       30,2367   65361 0           VXSC    PDDL
0098   REF  3  LAST  838   30,2370   02303 0                   LAXIS
0099   REF  5  LAST  832   30,2371   02273 0                   RDOTD
0100                       30,2372   77625 0           DSU
0101   REF  2  LAST  833   30,2373   03474 0                   RDOT
0102   REF  2  LAST  121   30,2374   02337 1           STORE   DRDOT      DRDOT = (RDOTD - RDOT)*2(7)M/CS.
0103                       30,2375   53361 0           VXSC    VAD
0104   REF 17  LAST  838   30,2376   03537 0                   UNIT/R/
0105                       30,2377   76455 1           VAD     VSL1
0106                       30,2400   77626 0           STADR
0107   REF  3  LAST  202   30,2401   74131 1           STORE   VGVECT     VG = (DRDOT)R + (DYDOT)L + (DZDOT)Z.
0108                       30,2402   41345 0           DLOAD   DMP        LOAD TGO
0109   REF 19  LAST  831   30,2403   03517 1                   TGO        TGO GEFF
0110   REF  3  LAST  838   30,2404   02315 1                   GEFF
0111                       30,2405   76561 1           VXSC    VSL1
0112   REF 18  LAST  839   30,2406   03537 0                   UNIT/R/    TGO GEFF UR
0113                       30,2407   77645 0           BVSU
0114   REF  4  LAST  839   30,2410   03646 0                   VGVECT     COMPENSATED FOR GEFF
0115   REF  5  LAST  839   30,2411   03646 0           STORE   VGVECT     STORE FOR DOWNLINK
0116                       30,2412   76521 0           MXV     VSL1       GET VGBODY FOR N85 DISPLAY
0117   REF  4  LAST  807   30,2413   02146 0                   XNBPIP
0118   REF 10  LAST  829   30,2414   27502 0           STOVL   VGBODY
0119   REF  6  LAST  839   30,2415   03646 0                   VGVECT
0120                       30,2416   43046 1           ABVAL   BOFF       MAGNITUDE OF VGVECT
0121   REF  3  LAST  836   30,2417   04745 0                   FLRCS      IF FLRCS=0,DO NORMAL GUIDANCE
0122   REF  1              30,2420   60427 0                   MAINENG
0123                       30,2421   77671 1           DDV                USE TGO=VG/AT  WITH RCS
0124   REF  1              30,2422   20001 1                   AT/RCS
0125   REF 20  LAST  839   30,2423   37517 0           STCALL  TGO        THIS WILL BE USED ON NEXT CYCLE
0126   REF  1              30,2424   71475 1                   RPCOMP1    COMPUTE NEW RP FOR NEXT CYCLE.
0127                       30,2425   77650 1           GOTO
0128   REF  1              30,2426   60754 1                   ASCTERM2
0129                       30,2427   41471 0  MAINENG  DDV     PUSH       VG/VE IN PDL(0)                       (2)
0130   REF  6  LAST  836   30,2430   02265 1                   VE
0131                       30,2431   44342 1           SR1     BDSU       1 - VG / 2 VE
0132   REF  1              30,2432   17772 0                   NEARONE
0133                       30,2433   41205 0           DMP     DMP        TBUP VG(1-KT VG/VE)/VE                (0)
0134   REF  7  LAST  836   30,2434   02271 1                   TBUP         = TGO
0135                       30,2435   77625 0           DSU                COMPENSATE FOR TAILOFF
0136   REF  4  LAST  834   30,2436   02267 0                   TTO
0137   REF 21  LAST  839   30,2437   03517 1           STORE   TGO
0138                       30,2440   57461 0           SR      DCOMP
0139                       30,2441   20614 0                   11D
0140   REF 25  LAST  741   30,2442   17454 1           STODL   TTOGO      TGO*2(-28)CS
0141   REF 22  LAST  839   30,2443   03517 1                   TGO
0142                       30,2444   45214 1           BON     DSU
0143   REF  6  LAST  826   30,2445   03710 1                   IDLEFLAG
0144   REF  1              30,2446   60452 1                   T2TEST
0145   REF  2  LAST  768   30,2447   21006 1                   4SEC(17)   ( TGO - 4 )*2(-17)CS.
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0146                           30,2450   77640 0                BMN
0147    REF   1                30,2451   30347 1                        ENGOFF
0148                           30,2452   77745 1  T2TEST     DLOAD
0149    REF  23  LAST  839     30,2453   03517 1                        TGO
0150                           30,2454   50025 0             DSU      BMN                IF TGO - T2 NEG., GO TO CMPONENT
0151    REF   1                30,2455   21010 0                        T2A
0152    REF   1                30,2456   60612 1                        CMPONENT
0153                           30,2457   45345 1             DLOAD    DSU
0154    REF   8  LAST  839     30,2460   02271 1                        TBUP
0155    REF  24  LAST  840     30,2461   03517 1                        TGO
0156                           30,2462   45071 0             DDV      CALL               1-TGO/TBUP
0157    REF   9  LAST  840     30,2463   02271 1                        TBUP
0158    REF   1                30,2464   61023 1                        LOGSUB
0159                           30,2465   41461 1             SL       PUSH               -L IN PDL(0)                  (2)
0160                           30,2466   20206 1                        5
0161                           30,2467   44265 0             BDDV     BDSU               -TGO/L*2(-17)
0162    REF  25  LAST  840     30,2470   03517 1                        TGO
0163    REF  10  LAST  840     30,2471   02271 1                        TBUP               TBUP + TGO/L = D12*2(-17)
0164                           30,2472   43006 0             PUSH     BON                STORE IN PDL(2)               (4)
0165    REF   1                30,2473   04703 1                        FLPC               IF FLPC = 1, GO TO CONST
0166    REF   1                30,2474   60503 1                        NORATES
0167                           30,2475   45345 1             DLOAD    DSU
0168    REF  26  LAST  840     30,2476   03517 1                        TGO
0169    REF   1                30,2477   21012 1                        T3
0170                           30,2500   43044 0             BPL      SET                FLPC=1
0171    REF   1                30,2501   60510 0                        RATES
0172    REF   2  LAST  840     30,2502   04463 1                        FLPC
0173                           30,2503   77745 1  NORATES    DLOAD
0174    REF   9  LAST  834     30,2504   06524 1                        HI6ZEROS
0175    REF   2  LAST  121     30,2505   02351 1             STORE    PRATE              B = 0
0176    REF   2  LAST  121     30,2506   36353 1             STCALL   YRATE              D = 0
0177    REF   1                30,2507   60572 1                        CONST              GO TO CONST
0178                           30,2510   45345 1  RATES      DLOAD    DSU
0179    REF  27  LAST  840     30,2511   03517 1                        TGO
0180                           30,2512   00003 1                        02D                TGO - D12 = D21*2(-17)
0181                           30,2513   72406 0             PUSH     SL1                IN PDL(4)                     (6)
0182                           30,2514   52421 1             BDSU     SL3                (1/2TGO - D21)*2(-13) = E * 2(-13)
0183    REF  28  LAST  840     30,2515   03517 1                        TGO                                              (8)
0184                           30,2516   41325 0             PDDL     DMP                IN PDL(6)
0185    REF  29  LAST  840     30,2517   03517 1                        TGO
0186    REF   3  LAST  839     30,2520   03474 0                        RDOT               RDOT TGO * 2(-24)
0187                           30,2521   45215 0             DAD      DSU                R + RDOT TGO
0188    REF   4  LAST  838     30,2522   02301 1                        /R/MAG             R + RDOT TGO - RCO
0189    REF   4  LAST  834     30,2523   03631 0                        RCO                MPAC = - DR*2(-24).
0190                           30,2524   41325 0             PDDL     DMP                -DR IN PDL(8)                 (10)
0191    REF   3  LAST  839     30,2525   02337 1                        DRDOT
0192                           30,2526   00005 1                        04D                D21 DRDOT*2(-24)
0193                           30,2527   62415 0             DAD      SL2                (D21 DRDOT-DR)*2(-22)         (8)
0194                           30,2530   56271 0             DDV      DDV
0195                           30,2531   00007 0                        06D                (D21 DRDOT-DR)/E*2(-9)
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 0196    REF  30  LAST  840    30,2532    03517 1                    TGO
 0197    REF   3  LAST  840    30,2533    02351 1           STORE    RRATE                B * 2(8)
 0198                          30,2534    71240 1           BMN      DLOAD                B>0 NOT PERMITTED
 0199    REF   1               30,2535    60541 1                    CHKBMAG
 0200    REF  10  LAST  840    30,2536    06524 1                    HI6ZEROS
 0201    REF   4  LAST  841    30,2537    36351 0           STCALL   RRATE
 0202    REF   1               30,2540    60553 1                    RRCK
 0203                          30,2541    56202 1  CHKBMAG  SR4      DDV                  B*2(4)
 0204    REF  11  LAST  840    30,2542    02271 1                    TBUP                 (B / TAU) * 2(21)
 0205                          30,2543    51025 1           DSU      BPL
 0206    REF   1               30,2544    26201 0                    RRLIMIT              ( B/ TAU) * 2(21) MAX.
 0207    REF   2  LAST  841    30,2545    60553 1                    RRCK
 0208                          30,2546    41345 0           DLOAD    DMP
 0209    REF   2  LAST  841    30,2547    26201 0                    RRLIMIT
 0210    REF  12  LAST  841    30,2550    02271 1                    TBUP                 B MAX. * 2(4)
 0211                          30,2551    77612 1           SL4                           BMAX*2(8)
 0212    REF   5  LAST  841    30,2552    02351 1           STORE    RRATE
 0213                          30,2553    77745 1  RRCK     DLOAD
 0214    REF  31  LAST  841    30,2554    03517 1                    TGO
 0215                          30,2555    43205 1           DMP      DAD                  YDOT TGO
 0216    REF   5  LAST  838    30,2556    02311 0                    YDOT
 0217    REF   5  LAST  832    30,2557    02335 0                    Y                    Y + YDOT TGO
 0218                          30,2560    65225 1           DSU      PDDL                 Y + YDOT TGO - YCO
 0219    REF   6  LAST  834    30,2561    03633 1                    YCO                  MPAC = - DY*2(-24.) IN PDL(8)        (10)
 0220    REF   3  LAST  839    30,2562    02341 0                    DYDOT
 0221                          30,2563    43205 1           DMP      DAD                  D21 DYDOT - DY                        (8)
 0222                          30,2564    00005 1                    04D
 0223                          30,2565    56312 1           SL2      DDV                  (D21 DYDOT - DY)/E*2(-9)
 0224                          30,2566    40271 1           DDV      SETPD                (D21 DYDOT - DY)/E TGO*2(8)
 0225    REF  32  LAST  841    30,2567    03517 1                    TGO                    = D*2(8)
 0226                          30,2570    00005 1                    04
 0227    REF   3  LAST  840    30,2571    02353 0           STORE    YRATE
 0228                          30,2572    41345 0  CONST    DLOAD    DMP                  LOAD B*2(8)
 0229    REF   6  LAST  841    30,2573    02351 1                    RRATE                B D12*2(-9)
 0230                          30,2574    00003 1                    02D
 0231                          30,2575    56325 0           PDDL     DDV                  D12 B IN PDL(4)                       (6)
 0232    REF   4  LAST  840    30,2576    02337 1                    DRDOT                LOAD DRDOT*2(-7)
 0233                          30,2577    00001 0                    00D                  -DRDOT/L*2(-7)
 0234                          30,2600    45302 1           SR2      DSU                  (-DRDOT/L-D12 B)=A*2(-9)               (4)
 0235                          30,2601    77626 0           STADR
 0236    REF   2  LAST  121    30,2602    61432 0           STODL    PCONS
 0237    REF   4  LAST  841    30,2603    02353 0                    YRATE                D*2(8)
 0238                          30,2604    65205 0           DMP      PDDL                 D12 D,EXCH WITH -L IN PDL(0)       (2,2)
 0239                          30,2605    60465 0           BDDV     SR2                  -DYDOT/L*2(-9)
 0240    REF   4  LAST  841    30,2606    02341 0                    DYDOT
 0241                          30,2607    77625 0           DSU                           (-DYDOT/L-D12 D)=C*2(-9)
 0242                          30,2610    00001 0                    00D
 0243    REF   2  LAST  121    30,2611    02347 0           STORE    YCONS
 0244                          30,2612    43001 1  CMPONENT SETPD    BOFF
 0245                          30,2613    00001 0                    00D
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0246  REF   3  LAST  838   30,2614   04742 1                      P7071FLG
0247                       30,2615   60620 0                      +3         IF P7071FLG = 1 (I.E. P70 OR P71)
0248                       30,2616   77624 1              CALL                  COMPUTE NEW RP FOR NEXT CYCLE.
0249  REF   1              30,2617   71501 0                      RPCCMP2
0250                       30,2620   41345 0      +3      DLDAD   DMP
0251  REF   1              30,2621   27104 1                      100CS
0252  REF   7  LAST  841   30,2622   02351 1                      PRATE      B(T-T0)*2(-9)
0253                       30,2623   56215 1              DAD     DDV        (A+B(T-T0))*2(-9)
0254  REF   3  LAST  841   30,2624   02345 1                      PCONS      (A+B(T-T0))/TBUP*2(8)
0255  REF  13  LAST  841   30,2625   02271 1                      TBUP
0256                       30,2626   45352 1              SL1     DSU
0257  REF   4  LAST  839   30,2627   02315 1                      GEFF       ATR*2(9)
0258  REF   2  LAST  121   30,2630   16357 1              STODL   ATR
0259  REF   2  LAST  842   30,2631   27104 1                      100CS
0260                       30,2632   43205 1              DMP     DAD
0261  REF   5  LAST  841   30,2633   02353 0                      YRATE
0262  REF   3  LAST  841   30,2634   02347 0                      YCONS      (C+D(T-T0))*2I-9)
0263                       30,2635   72471 0              DDV     SL1
0264  REF  14  LAST  842   30,2636   02271 1                      TBUP
0265  REF   4  LAST  833   30,2637   02355 0              STORE   ATY        ATY*2(9)
0266                       30,2640   65361 0              VXSC    PDDL       ATY UY*2(8)                    I6)
0267  REF   4  LAST  839   30,2641   02303 0                      LAXIS
0268  REF   3  LAST  842   30,2642   02357 1                      ATR
0269                       30,2643   53361 0              VXSC    VAD                                       (0)
0270  REF  19  LAST  839   30,2644   03537 0                      UNIT/R/
0271                       30,2645   41572 1              VSL1    PUSH       AH*2(9) IN PDL(0)              (6)
0272                       30,2646   65246 1              ABVAL   PDDL       AH(2) IN PDL(34)
0273  REF   6  LAST  836   30,2647   02263 1                      AT         AHMAG IN PDL(6)                I8)
0274                       30,2650   45316 1              DSQ     DSU        (AT(2)-AH(2))*2(18)
0275                       30,2651   00043 0                      34D        =ATP2*2(18)
0276                       30,2652   41525 0              PDDL    PUSH                                      (12)
0277  REF   7  LAST  842   30,2653   02263 1                      AT
0278                       30,2654   45316 1              DSQ     DSU        (AT(2)KR(2)-AH(2))*2(18)       I10)
0279                       30,2655   00043 0                      34D        =ATP3*2I18)
0280                       30,2656   71240 1              BMN     DLDAD      IF ATP3 NEG,GO TO NO-ATP
0281  REF   1              30,2657   60663 1                      NO-ATP     LOAD ATP2,IF ATP3 POS
0282                       30,2660   00011 1                      8D
0283                       30,2661   52166 1              SQRT    GOTO       ATP*2(9)
0284  REF   1              30,2662   60671 1                      AIMER
0285                       30,2663   55345 0  NO-ATP      DLOAD   BDDV       KR AT/AH = KH                  (8)
0286                       30,2664   00007 0                       6D
0287                       30,2665   77761 1              VXSC               KH AH*2I9)
0288                       30,2666   00001 0                      00D
0289                       30,2667   14001 0              STODL   00D        STORE NEW AH IN PDL(0)
0290  REF  11  LAST  841   30,2670   06524 1                      HI6ZEROS
0291                       30,2671   77765 0  AIMER       SIGN
0292  REF   3  LAST  838   30,2672   02343 1                      DZDOT
0293  REF   3  LAST  833   30,2673   02361 1              STORE   ATP
0294                       30,2674   77761 1              VXSC
0295  REF   5  LAST  838   30,2675   03726 1                      ZAXIS1     ATP ZAXIS *2I8).
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0296                           30,2676   53372 1            VSL1   VAD                AT*2(9)
0297                           30,2677   00001 0                   000
0298   REF  16  LAST  833      30,2700   03253 0            STORE  UNFC/2             WILL BE OVERWRITTEN IF IN VERT. RISE.
0299                           30,2701   43001 1            SETPD  BON
0300                           30,2702   00001 0                   000
0301   REF   3  LAST  833      30,2703   04704 0                   FLPI
0302   REF   1                 30,2704   60216 1                   P12RET
0303                           30,2705   77614 1            BON
0304   REF   3  LAST  831      30,2706   04701 0                   FLVR
0305   REF   1                 30,2707   60763 0                   CHECKALT
0306                           30,2710   57575 1   MAINLINE VLOAD  VCOMP
0307   REF  20  LAST  842      30,2711   03537 0                   UNIT/R/
0308   REF   7  LAST  808      30,2712   17261 1            STODL  UNWC/2
0309   REF   3  LAST  834      30,2713   03654 0                   TXO
0310                           30,2714   51025 1            DSU    BRL
0311   REF  16  LAST  812      30,2715   01234 0                   PIPTIME
0312   REF   1                 30,2716   60730 0                   ASCTERM
0313                           30,2717   77614 1            BON
0314   REF   2  LAST  828      30,2720   04711 1                   ROTFLAG
0315   REF   1                 30,2721   57273 0                   ANG1CHEK
0316                           30,2722   43014 0   CLRXFLAG CLEAR  BON                ALLOW X-AXIS OVERRIDE
0317   REF   5  LAST  797      30,2723   06666 1                   XOVINFLG
0318   REF   4  LAST  842      30,2724   04702 0                   P7071FLG           ONLY ACTIVATE R29 IF IN P12.
0319   REF   2  LAST  843      30,2725   60730 0                   ASCTERM
0320                           30,2726   77614 1            CLEAR
0321   REF   1                 30,2727   01664 1                   NOR29FLG
0322                           30,2730   77776 1   ASCTERM  EXIT
0323   REF   5  LAST  829      30,2731  3 0105 0            CA     FLAGWRD9
0324   REF   1                 30,2732  7 4742 0            MASK   FLRCSBIT
0325   REF 247  LAST  829      30,2733  10 000 0            CCS    A
0326   REF   1                 30,2734  1 2755 0            TCF    ASCTERM3
0327   REF 140  LAST  836      30,2735  0 6042 1            TC     INTPRET
0328                           30,2736   77624 1            CALL
0329   REF   4  LAST  809      30,2737   61100 1                   FINDCDUW -2
0330                           30,2740   77776 1   ASCTERM1 EXIT
0331   REF   6  LAST  843      30,2741  3 0105 0      +1    CA     FLAGWRD9           INSURE THAT THE NOUN 63 DISPLAY IS
0332   REF   2  LAST  843      30,2742  7 4742 0            MASK   FLRCSBIT           BYPASSED IF WE ARE IN THE RCS TRIMMING
0333   REF 248  LAST  843      30,2743  10 000 0            CCS    A                  MODE OF OPERATION
0334   REF   2  LAST  843      30,2744  1 2755 0            TCF    ASCTERM3
0335   REF  13  LAST  809      30,2745  3 0104 1            CA     FLAGWRD8           BYPASS DISPLAYS IF ENGINE FAILURE IS
0336   REF   3  LAST  809      30,2746  7 4742 0            MASK   FLUNDBIT           INDICATED.
0337   REF 249  LAST  843      30,2747  10 000 0            CCS    A
0338   REF   3  LAST  843      30,2750  1 2755 0            TCF    ASCTERM3
0339   REF   1                 30,2751  3 3020 0            CAF    V06N63*
0340   REF 232  LAST  832      30,2752  0 4616 1            TC     BANKCALL
0341   REF   1                 30,2753   20444 1            CADR   GODSP
0342                           30,2754   77776 1   ASCTERM2 EXIT
0343   REF 131  LAST  828      30,2755  1 5155 1   ASCTERM3 TCF    ENDOFJOB
0344                           30,2756   77776 1   ASCTERM4 EXIT
0345                           30,2757  0 0004 0            INHINT
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L        ASCENT GUIDANCE

 0346   REF  40  LAST  833    30,2760  0 4674 0               TC      IBNKCALL                  NO GUIDANCE THIS CYCLE -- HENCE ZERO
 0347   REF   6  LAST  809    30,2761   40166 1               CADR    STOPRATE                  THE DAP COMMANDED RATES.
 0348   REF   1               30,2762  1 2741 0               TCF     ASCTERM1 +1

 0349                         30,2763   45345 1  CHECKALT     DLOAD   DSU
 0350   REF   5  LAST  840    30,2764   02301 1                       /R/MAG
 0351   REF   9  LAST  834    30,2765   02333 0                       /LAND/                    IF H LT 25K CHECK Z AXIS ORIENTATION.
 0352                         30,2766   50025 0               DSU     BMN
 0353   REF   1               30,2767   26205 1                       25KFT
 0354   REF   1               30,2770   16666 0                       CHECKYAW
 0355                         30,2771   43014 0  EXITVR       CLEAR   BON
 0356   REF   4  LAST  843    30,2772   04661 1                       FLVR
 0357   REF   3  LAST  843    30,2773   04711 1                       ROTFLAG
 0358   REF   1               30,2774   60710 1                       MAINLINE
 0359                         30,2775   43345 1               DLOAD   DAD
 0360   REF  17  LAST  843    30,2776   01234 0                       PIPTIME
 0361   REF   1               30,2777   25734 0                       10SECS
 0362   REF   4  LAST  843    30,3000   37654 1               STCALL  TXC
 0363   REF   2  LAST  844    30,3001   60710 1                       MAINLINE
 0364                         30,3002   77614 1  EXITVR1      CLRGO
 0365   REF   4  LAST  844    30,3003   04631 1                       ROTFLAG
 0366   REF   1               30,3004   60771 0                       EXITVR

 0367   REF   3  LAST   44    27,2000                         SETLOC  ASENT1
 0368                         27,3273                         BANK
 0369   REF   1                                               COUNT*  $$/ASENT

 0370                         27,3273   53575 0  ANG1CHEK     VLOAD   UNIT
 0371   REF  17  LAST  843    27,3274   03253 0                       UNFC/2
 03715                        27,3275   77641 1               DOT
 0372   REF   5  LAST  839    27,3276   02146 0                       XNBPIP
 0373                         27,3277   51025 1               DSU     BPL
 0374   REF   2  LAST  123    27,3300   02571 0                       COSTHET1
 0375   REF   1               27,3301   57310 1                       OFFROT
 0376                         27,3302   50375 0               VLOAD   DOT
 0377   REF   6  LAST  844    27,3303   02146 0                       XNBPIP
 0378   REF  21  LAST  843    27,3304   03537 0                       UNIT/R/
 0379                         27,3305   50025 0               DSU     BMN
 0380   REF   2  LAST  123    27,3306   02573 1                       COSTHET2
 0381   REF   1               27,3307   71450 0                       KEEPVR1
 0382                         27,3310   77614 1  OFFROT       CLRGO
 0383   REF   5  LAST  844    27,3311   04631 1                       ROTFLAG
 0384   REF   1               27,3312   60722 0                       CLRXFLAG

                                                              BANK    7
 0385                         07,2666                         SETLOC  ASENT2
 0386   REF   1               07,2000                         BANK
 0387                         07,2666                         COUNT*  $$/ASENT
 0388   REF   1

 0389   REF   2  LAST  844    07,2666            SETXFLAG =           CHECKYAW
```

```
0390                        07,2666  77614 1  CHECKYAW SET
0391   REF   6  LAST  843   07,2667  06466 0                  XOVINFLG       PROHIBIT X-AXIS OVERRIDE
0392                        07,2670  74345 0           DLOAD  VXSC
0393   REF   5  LAST  842   07,2671  02355 0                  ATY
0394   REF   5  LAST  842   07,2672  02303 0                  LAXIS
0395                        07,2673  74325 0           PDDL   VXSC
0396   REF   4  LAST  842   07,2674  02361 1                  ATP
0397   REF   6  LAST  842   07,2675  03726 1                  ZAXIS1
0398                        07,2676  53455 0           VAD    UNIT
0399                        07,2677  45325 1           PDDL   DSU
0400   REF   4  LAST  840   07,2700  03474 0                  ROOT
0401   REF   1              07,2701  13504 1                  40FPS
0402                        07,2702  52044 0           BPL    GOTO
0403   REF   1              07,2703  61002 1                  EXITVR1
0404   REF   1              07,2704  71446 1                  KEEPVR

0405                        05,3503                    BANK   5
0406   REF   1              05,2000                    SETLOC ASENT3
0407                        05,3503                    BANK
0408   REF   1                                         COUNT* $$/ASENT

0409                        05,3503  00017 1  40FPS    2DEC   0.12192 B-7
0409                        05,3504  23305 0
0410                        34,3446                    BANK   34
0411   REF   2  LAST  834   34,2000                    SETLOC ASENTB
0412                        34,3446                    BANK
0413   REF   2 LAST  836 TO  838:    44     44*        COUNT* $$/ASENT

0414                        34,3446  45575 1  KEEPVR   VLOAD  STADR          RECALL LOSVEC FROM PUSHLIST
0415   REF   8  LAST  843   34,3447  74516 0           STORE  UNWC/2
0416                        34,3450  77775 1  KEEPVR1  VLOAD
0417   REF  22  LAST  844   34,3451  03537 0                  UNIT/R/
0418   REF  18  LAST  844   34,3452  37253 1           STCALL UNFC/2
0419   REF   3  LAST  843   34,3453  60730 0                  ASCTERM


0420                        14,2347                    BANK   14
0421   REF   1              14,2000                    SETLOC ASENT4
0422                        14,2347                    BANK
0423   REF   1                                         COUNT* $$/ASENT

0424                        14,2347  77634 0  ENGOFF   RTB
0425   REF  24  LAST  834   14,2350  21574 1                  LOADTIME
0426                        14,2351  43225 0           DSU    DAD
0427   REF  18  LAST  844   14,2352  01234 0                  PIPTIME
0428   REF  26  LAST  839   14,2353  03454 1                  TTOGO
0429                        14,2354  77476 1           DCOMP  EXIT
0430   REF  11  LAST  792   14,2355  0 7262 0          TC     TPAGREE        FORCE SIGN AGREEMENT ON MPAC, MPAC +1.
0431   REF  10  LAST  799   14,2356  3 5016 0          CAF    EBANK7
0432   REF  35  LAST  821   14,2357  54 003 0          TS     EBANK
```

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 0433   REF  33  LAST  841    E7,1516                          EBANK= TGO
 0434                         14,2360  0 0004 0                INHINT
 0435   REF 338  LAST  836    14,2361 10 155 1                 CCS    MPAC +1           C(A) = DT - 1 BIT
 0436                         14,2362  1 2365 1                TCF    +3                C(A) = 0
 0437                         14,2363  1 2365 1                TCF    +2                C(A) = 0
 0438   REF 156  LAST  831    14,2364  3 4755 1                CAF    ZERO              C(A) = 1 BIT OR DT.
 0439   REF  40  LAST  824    14,2365  6 4753 1                AD     BIT1
 0440   REF   2  LAST  154    14,2366 55 644 1                 TS     ENGOFFDT
 0441   REF  24  LAST  823    14,2367  0 5173 1                TC     TWIDDLE
 0442   REF   1               14,2370   02402 0                ADRES  ENGOFF1
 0443   REF  67  LAST  836    14,2371  0 5353 1                TC     PHASCHNG
 0444                         14,2372   47014 1                OCT    47014
 0445   REF   3  LAST  846    14,2373   76133 1               -GENADR ENGOFFDT
 0446   REF  34  LAST  846    E7,1516                          EBANK= TGO
 0447   REF   2  LAST  846    14,2374   02402 0                2CADR  ENGOFF1
 0447                         14,2375   30067 0

 0448   REF 141  LAST  843    14,2376  0 6042 1                TC     INTPRET
 0449                         14,2377   52014 0                SET    GOTO
 0450   REF   7  LAST  839    14,2400   03470 1                       IDLEFLAG          DISABLE DELTA-V MONITOR
 0451   REF   2  LAST  839    14,2401   60452 1                       T2TEST

 0452   REF  41  LAST  844    14,2402  0 4674 0  ENGOFF1       TC     IBNKCALL          SHUT OFF THE ENGINE.
 0453   REF   1               14,2403   75555 0                CADR   ENGINOF2

 0454   REF   5  LAST  828    14,2404  3 5027 1                CAF    PRIO17            SET UP A JOB FOR THE ASCENT GUIDANCE
 0455   REF  36  LAST  811    14,2405  0 5105 0                TC     FINDVAC           POSTBURN LOGIC.
 0456   REF  29  LAST  832    E7,1455                          EBANK= WHICH
 0457   REF   3  LAST  741    14,2406   02416 0                2CADR  CUTOFF
 0457                         14,2407   30067 0
 0458   REF  68  LAST  846    14,2410  0 5353 1                TC     PHASCHNG
 0459                         14,2411   07024 0                OCT    07024
 0460                         14,2412   17000 1                OCT    17000
 0461   REF  35  LAST  846    E7,1516                          EBANK= TGO
 0462   REF   4  LAST  846    14,2413   02416 0                2CADR  CUTOFF
 0462                         14,2414   30067 0
 0463   REF  58  LAST  823    14,2415  1 5261 0                TCF    TASKOVER

 0464   REF  54  LAST  828    14,2416  0 5504 0  CUTOFF        TC     UPFLAG            SET FLRCS FLAG.
 0465   REF   4  LAST  839    14,2417   00214 0                ADRES  FLRCS

 0466   REF   1               14,2420  3 2437 0     -5         CAF    V16N63
 0467   REF 233  LAST  843    14,2421  0 4616 1                TC     BANKCALL
 0468   REF  24  LAST  832    14,2422   20477 1                CADR   GOFLASH
 0469                         14,2423  1 2426 1                TCF    +3
 0470   REF   1               14,2424  1 2430 0                TCF    CUTOFF1
 0471                         14,2425  1 2420 1                TCF    -5

 0472   REF  52  LAST  833    14,2426  0 4635 0     +3         TC     POSTJUMP
 0473   REF   1               14,2427   71464 1                CADR   TERMASC
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0474                           14,2430  0 0004 0  CUTOFF1  INHINT                      ZERO ATTITUDE ERRORS BEFORE REDUCING DB.
0475   REF  42  LAST  846      14,2431  0 4674 0           TC       IBNKCALL
0476   REF   8  LAST  810      14,2432   40154 0           CADR     ZATTERCR
0477   REF  43  LAST  847      14,2433  0 4674 0           TC       IBNKCALL
0478   REF   5  LAST  751      14,2434   40141 1           CADR     SETMINDB
0479   REF  53  LAST  846      14,2435  0 4635 0           TC       POSTJUMP
0480   REF   1                 14,2436   71454 1           CADR     CUTOFF2

0481                           14,2437   04077 0  V16N63   VN       1663
0482                           34,3454                     BANK     34
0483   REF   3  LAST  845      34,2000                     SETLOC   ASENT8
0484                           34,3454                     BANK
0485   REF   3 LAST  845 TO   845:      6     50*          COUNT*   $$/ASENT

0486   REF  69  LAST  846      34,3454  0 5353 1  CUTOFF2  TC       PHASCHNG
0487                           34,3455   04024 0           OCT      04024

0488   REF   1                 34,3456  3 3474 0           CAF      V16N85C
0489   REF 234  LAST  846      34,3457  0 4616 1           TC       BANKCALL
0490   REF  25  LAST  846      34,3460   20477 1           CADR     GOFLASH
0491   REF   2  LAST  846      34,3461  1 3464 0           TCF      TERMASC
0492                           34,3462  1 3464 0           TCF      +2                 PROCEED
0493   REF   2  LAST  847      34,3463  1 3454 0           TCF      CUTOFF2

0494   REF  70  LAST  847      34,3464  0 5353 1  TERMASC  TC       PHASCHNG
0495                           34,3465   04024 0           OCT      04024

0496                           34,3466  0 0004 0           INHINT                      RESTORE DEADBAND DESIRED BY ASTRONAUT.
0497   REF  44  LAST  847      34,3467  0 4674 0           TC       IBNKCALL
0498   REF   7  LAST  750      34,3470   40115 0           CADR     RESTORDB
0499   REF  89  LAST  833      34,3471  0 5516 0           TC       DOWNFLAG           DISALLOW ABORTS AT THIS TIME.
0500   REF   3  LAST  828      34,3472   00215 1           ADRES    LETABORT
0501   REF  33  LAST  832      34,3473  1 6001 1           TCF      GOTOPOOH

0502                           34,3474   04125 0  V16N85C  VN       1685

0503                           34,3475   77745 1  RPCOMP1  DLOAD                       FLRCS = 1 (TRIM MODE)
0504   REF  12  LAST  842      34,3476   06524 1                    HI6ZEROS
0505   REF   4  LAST  842      34,3477   02345 1           STORE    PCONS              SET PCONS = PRATE = 0 SO THAT
0506   REF   8  LAST  842      34,3500   02351 1           STORE    PRATE                 RP = R + RDOT TGO
0507                           34,3501   41345 0  RPCOMP2  DLOAD    DMP                FLRCS = 0 (GUIDANCE MODE)
0508   REF   9  LAST  847      34,3502   02351 1                    PRATE              LEAVE PCONS AND PRATE ALONE SO THAT
0509   REF  36  LAST  846      34,3503   03517 1                    TGO                   RP = R + RDOT TGO + (PCONS*TGO**2)/
0510                           34,3504   43205 1           DMP      DAD                   (2 TBUP) + (PRATE*TGO**3)/(6 TBUP)
0511   REF   2  LAST  671      34,3505   33645 0                    THIRD
0512   REF   5  LAST  847      34,3506   02345 1                    PCONS
0513                           34,3507   41205 0           DMP      DMP
0514   REF  37  LAST  847      34,3510   03517 1                    TGO
0515   REF  38  LAST  847      34,3511   03517 1                    TGO
0516                           34,3512   72471 0           DDV      SL1
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 0517   REF  15  LAST  842    34,3513   02271 1                     TBUP
 0518                         34,3514   65215 1             DAD     PDDL
 0519   REF   6  LAST  844    34,3515   02301 1                     /R/MAG
 0520   REF   5  LAST  845    34,3516   03474 0                     RDOT
 0521                         34,3517   43205 1             DMP     DAD
 0522   REF  39  LAST  847    34,3520   03517 1                     TGC
 0523                         34,3521   77626 0             STADR
 0524   REF   2  LAST  828    34,3522   75152 0             STORE   RP
 0525                         34,3523   77616 0             RVQ

 0526                         34,3524   45020 1  ZDOTDCMP   STQ     CALL                COMPUTE CENTRAL ANGLE               (0)
 0527   REF   1               34,3525   02574 0                     ASCSAVE
 0528   REF   2  LAST  827    34,3526   71554 0                     THETCOMP
 0529                         34,3527   43205 1             DMP     DAD                 CENTRAL ANGLE IN MPAC
 0530   REF   2  LAST  123    34,3530   02623 1                     KPARM
 0531   REF   3  LAST  827    34,3531   02621 0                     JPARM
 0532                         34,3532   41425 1             DSU     PUSH                RA IN MPAC AND IN PUSHLIST          (2)
 0533   REF   3  LAST  848    34,3533   02625 1                     RP
 0534                         34,3534   51025 1             DSU     BPL
 0535   REF   2  LAST  123    34,3535   02563 0                     RAMIN
 0536                         34,3536   71541 1                     +3
 0537                         34,3537   65345 0             DLOAD   PDDL                RA < RAMIN.  SET RA = RAMIN.        (2)
 0538   REF   3  LAST  848    34,3540   02563 0                     RAMIN
 0539                         34,3541   41345 0       +3    DLOAD   DMP
 0540                         34,3542   00001 0                     00
 0541   REF   1               34,3543   16025 1                     MUM(-37)
 0542                         34,3544   77725 1             PDDL
 0543                         34,3545   41215 1             DAD     DMP
 0544   REF   4  LAST  848    34,3546   02625 1                     RP
 0545   REF   5  LAST  848    34,3547   02625 1                     RP
 0546                         34,3550   75465 1             BOVB    SQRT                                                    (0)
 0547                         34,3551   77626 0             STADR
 0548   REF   6  LAST  838    34,3552   41500 1             STCALL  ZDOTD               UPDATE ZDOTD FOR GUIDANCE AND DOWNLINK.
 0549   REF   2  LAST  848    34,3553   02574 0                     ASCSAVE

 0550                         34,3554   53575 0  THETCOMP   VLOAD   UNIT
 0551   REF  18  LAST  838    34,3555   03521 1                     R
 0552                         34,3556   53515 0             PDVL    UNIT                                                    (6)
 0553   REF   4  LAST  728    34,3557   01720 0                     R(CSM)
 0554                         34,3560   47206 0             PUSH    VXV                                                     (12)
 0555                         34,3561   00001 0                     00
 0556                         34,3562   77641 1             DOT
 0557   REF   5  LAST  834    34,3563   02325 1                     WM
 0558                         34,3564   24037 0             STOVL   30D                                                     (6)
 0559                         34,3565   72441 0             DOT     SL1                                                     (0)
 0560                         34,3566   75326 1             ARCCOS  SIGN
 0561                         34,3567   00037 0                     30D
 0562                         34,3570   77616 0             RVQ

 0563   REF  16  LAST  808    E5,1574            ASCSAVE    =       CG
 0564                           27,3313                      BANK    27
 0565   REF    4  LAST   844    27,2000                      SETLOC  ASENT1
 0566                           27,3313                      BANK
 0567   REF    2 LAST   844 TO  844:     16     16*          COUNT*  $$/ASENT

 0568                           27,3313   50375 0  YCOMP     VLOAD   DDT
 0569   REF   23  LAST   845    27,3314   03537 0                    UNIT/R/
 0570   REF    3  LAST   834    27,3315   03720 1                    QAXIS
 0571                           27,3316   41312 1            SL2     DMP
 0572   REF    5  LAST   840    27,3317   03621 0                    RCC
 0573   REF    6  LAST   841    27,3320   02335 0            STORE   Y
 0574                           27,3321   77616 0            RVQ

R0575
 0576                           30,3005                      BANK    30
 0577   REF    3  LAST   838    30,2000                      SETLOC  ASENT
 0578                           30,3005                      BANK
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P0579    ASCENT GUIDANCE CONSTANTS

 0580    REF    2  LAST   838     33,3103                100CS      EQUALS 2SEC(18)
 0581    REF    1                 30,3007                T2A        EQUALS 2SEC(17)
 0582                             30,3005   00062 0      4SEC(17)   2DEC    400 B-17
 0582                             30,3006   00000 1
 0583                             30,3007   00031 0      2SEC(17)   2DEC    200 B-17
 0583                             30,3010   00000 1
 0584                             30,3011   00175 1      T3         2DEC    1000 B-17
 0584                             30,3012   00000 1
 0585                             30,3013   00045 0      6SEC(18)   2DEC    600 B-18
 0585                             30,3014   20000 0
 0586                             30,3015   00010 0      BIT4H      OCT     10

 0587                             30,3016   14400 0      2SEC(9)    2DEC    200 B-9
 0587                             30,3017   00000 1
 0588                             30,3020   01477 1      V06N63*    VN      0663
 0589                             30,3021   01514 0      V06N76     VN      0676
 0590                             30,3022   01441 1      V06N33A    VN      0633

 0591                             33,2200                           BANK    33
 0592    REF    1                 33,2000                           SETLOC  ASENT6
 0593                             33,2200                           BANK
 0594    REF    1                                                   COUNT*  $$/ASENT

 0595                             33,2200   75751 0      PRLIMIT    2DEC    -.0639              (B/TBUP)MIN=-.1FT.SEC(-3)
 0595                             33,2201   41775 1
 0596                             33,2202   00022 1      MINABDV    2DEC    .0356 B-5           10 PERCENT BIGGER THAN GRAVITY
 0596                             33,2203   07212 1
 0597                             33,2204   00007 0      25KFT      2DEC    7620 B-24
 0597                             33,2205   16100 1
 0598    REF    2  LAST   149     E7,1570                1/DV0      =       MASS1
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P0599    THE LOGARITHM SUBROUTINE

 0600                           24,3700                       BANK    24
 0601    REF   1                30,2000                       SETLOC  FLOGSUB
 0602                           30,3023                       BANK

R0603    INPUT ..... X IN MPAC
R0604    OUTPUT ..... -LOG(X) IN MPAC

 0605                           30,3023  44301 0  LOGSUB      NORM    8DSU
 0606    REF 339  LAST  846     30,3024  00163 0                      MPAC +6
 0607    REF   2  LAST  839     30,3025  17772 0                      NEARONE
 0608                           30,3026  77776 1              EXIT
 0609    REF   1                30,3027  0 7225 0             TC      POLY
 0610                           30,3030  00006 1              DEC     6
 0611                           30,3031  00000 1              2DEC    .0000000060
 0611                           30,3032  00002 0
 0612                           30,3033  76777 1              2DEC    -.0312514377
 0612                           30,3034  77175 1
 0613                           30,3035  77400 0              2DEC    -.0155686771
 0613                           30,3036  75416 0
 0614                           30,3037  77507 0              2DEC    -.0112502068
 0614                           30,3040  65515 0
 0615                           30,3041  77741 0              2DEC    -.0018545108
 0615                           30,3042  63547 1
 0616                           30,3043  77052 0              2DEC    -.0286607906
 0616                           30,3044  55373 0
 0617                           30,3045  61167 0              2DEC    .0385598563
 0617                           30,3046  30361 0
 0618                           30,3047  76520 1              2DEC    -.0419361902
 0618                           30,3050  75267 0
 0619    REF 157  LAST  846     30,3051  3 4755 1             CAF     ZERO
 0620    REF 340  LAST  851     30,3052  54 156 1             TS      MPAC +2
 0621                           30,3053  0 0006 1             EXTEND
 0622    REF   1                30,3054  3 3070 0             DCA     CLOG2/32
 0623    REF 341  LAST  851     30,3055  52 155 1             DXCH    MPAC
 0624    REF  76  LAST  819     30,3056  52 132 0             DXCH    BUF +1
 0625    REF 342  LAST  851     30,3057  3 0162 1             CA      MPAC +6
 0626    REF   8  LAST  818     30,3060  0 7312 0             TC      SHORTMP
 0627    REF 343  LAST  851     30,3061  52 156 1             DXCH    MPAC +1
 0628    REF 344  LAST  851     30,3062  52 155 1             DXCH    MPAC
 0629    REF  77  LAST  851     30,3063  52 132 0             DXCH    BUF +1
 0630    REF 345  LAST  851     30,3064  20 155 1             DAS     MPAC
 0631    REF 142  LAST  846     30,3065  0 6042 1             TC      INTPRET
 0632                           30,3066  43476 0              DCOMP   RVQ

 0633                           30,3067  00542 1  CLOG2/32    2DEC    .0216608494
 0633                           30,3070  34414 1
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L         SERVICER                                                                         USER'S PAGE NO.   1       EC  S3

 0001                            37,3410                              BANK    37
 0002    REF   1                 37,2000                              SETLOC  SERV1
 0003                            37,3410                              BANK

 0004    REF  40   LAST  836     E7,1515                              EBANK=  DVCNTR
R0005    ***********************************    PREREAD    ************************************************************
R0007

 0008    REF   1                                                      COUNT*  $$/SERV

 0009    REF  10   LAST  815     37,3410  3 4757 0  PREREAD  CAF     SEVEN             5.7 SPOT TO SKIP LASTBIAS AFTER
 0010    REF   1                 37,3411  0 3527 1           TC      GNUFAZE5          RESTART.
 0011    REF   4   LAST  604     37,3412  3 5031 0           CAF     PRIO21
 0012    REF  21   LAST  776     37,3413  0 5072 1           TC      NOVAC
 0013    REF   5   LAST  326     E3,1460                     EBANK=  NBDX
 0014    REF   1                 37,3414   03671 1           2CADR   LASTBIAS          DO LAST GYRO COMPENSATION IN FREE FALL
 0014    REF   1                 37,3415   14063 1

 0015    REF   2   LAST  336     37,3416  0 3541 1  BIBIBIAS TC      PIPASR +3         CLEAR + READ PIPS LAST TIME IN FRES+F133
A0016                                                                                  DO NOT DESTROY VALUE OF PIPTIME1

 0017    REF  19   LAST  829     37,3417  4 0103 1           CS      FLAGWRD7
 0018    REF   1                 37,3420  7 4773 1           MASK    SUPER011          SET V37FLAG AND AVEGFLAG (BITS 5 AND 6
 0019    REF  20   LAST  852     37,3421  26 103 1           ADS     FLAGWRD7             OF FLAGWRD7)

 0020    REF   2   LAST  167     37,3422  4 4735 0           CS      DRFTBIT
 0021    REF  21   LAST  808     37,3423  7 0076 1           MASK    FLAGWRD2          RESET DRIFTFLAG
 0022    REF  22   LAST  852     37,3424  54 076 1           TS      FLAGWRD2

 0023    REF  17   LAST  831     37,3425  3 4751 0           CAF     FOUR              INITIALIZE DV MONITOR
 0025    REF   2   LAST  107     37,3426  55'256 0           TS      PIPAGE

 0028    REF   5   LAST  811     37,3427  3 7713 0           CAF     PRIO22
 0029    REF  37   LAST  846     37,3430  0 5105 0           TC      FINDVAC           TO FIRST ENTRY TO AVERAGE G.
 0030    REF  41   LAST  852     E7,1515                     EBANK=  DVCNTR
 0031    REF   2   LAST  243     37,3431   02463 1           2CADR   NORMLIZE
 0031                            37,3432   46067 1

 0032    REF  54   LAST  824     37,3433  3 4752 0           CA      TWO               5.2SPOT FOR REREADAC AND NORMLIZE
 0033    REF   1                 37,3434  0 3523 0  GOREADAC TC      GNUTFAZ5
 0034    REF   4   LAST  791     37,3435  3 5000 1           CA      2SECS             WAIT TWO SECONDS FOR READACCS
 0035    REF   8   LAST  815     37,3436  0 5224 0           TC      VARDELAY
```

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P0036    ***********************************  READACCS   ***********************************************************
 0038    REF   1                  37,3437  4 3535 0  READACCS CS       OCT37771        THIS PIECE OF CODING ATTEMPTS TO
 0039    REF   2  LAST  221       37,3440  6 0030 1           AD       TIME5           SYNCHRONIZE READACCS WITH THE DIGITAL
 0040    REF 250  LAST  843       37,3441  10 000 0           CCS      A               AUTOPILOT SO THAT A PAXIS RUPT WILL
 0041    REF  91  LAST  818       37,3442  4 4753 0           CS       ONE             OCCUR APPROXIMATELY 70 MILLISECONDS
 0042                             37,3443  1 3445 0           TCF      +2              FOLLOWING THE READACCS RUPT.  THE 70 MS
 0043    REF  92  LAST  853       37,3444  3 4753 1           CA       ONE             OFFSET WAS CHOSEN SO THAT THE PAXIS
 0044    REF   3  LAST  853       37,3445  26 030 0     +2    ADS      TIME5           RUPT WOULD NOT OCCUR SIMULTANEOUSLY
A0045                                                                                  WITH ANY OF THE 8 SUBSEQUENT R10,R11
A0046                                                                                  INTERRUPTS -- THUS MINIMIZING THE POSS-
A0047                                                                                  IBILITY OF LOSING DOWNRUPTS.

 0048    REF   3  LAST  852       37,3446  0 3536 1           TC       PIPASR          READ THE PIPAS.

 0049    REF  16  LAST  815       37,3447  3 4756 1  PIPSDONE CA       FIVE
 0050    REF   2  LAST  852       37,3450  0 3527 1           TC       GNUFAZE5
 0051    REF  93  LAST  853       37,3451  3 4753 1  REDO5.5  CAF      ONE
 0052    REF   3  LAST  852       37,3452  55'256 0           TS       PIPAGE

 0053    REF   8  LAST  799       37,3453  3 4736 1           CA       PRIO20
 0054    REF  38  LAST  852       37,3454  0 5105 0           TC       FINDVAC
 0055    REF  42  LAST  852       E7,1515                     EBANK=   DVCNTR
 0056    REF   2  LAST  243       37,3455   02206 1           2CADR    SERVICER        SET UP SERVICER JOB
 0056                             37,3456   66067 0

 0057    REF  20  LAST  739       37,3457  3 4743 0           CA       BIT6
 0058                             37,3460  0 0006 1           EXTEND
 0059    REF  28  LAST  825       37,3461  05 011 1           WOR      DSALMOUT        TURN ON TEST CONNECTOR OUTBIT

 0060    REF  21  LAST  852       37,3462  3 0103 0           CA       FLAGWRD7
 0061    REF   6  LAST  829       37,3463  7 4747 0           MASK     AVEGFBIT
 0062                             37,3464  0 0006 1           EXTEND
 0063    REF   1                  37,3465  1 3515 1           BZF      AVEGOUT         AVEGFLAG DOWN - SET UP FINAL EXIT

 0064    REF   6  LAST  809       37,3466  3 0102 1           CA       FLAGWRD6
 0065    REF   3  LAST  709       37,3467  7 4744 0           MASK     MUNFLBIT
 0066                             37,3470  0 0006 1           EXTEND
 0067    REF   1                  37,3471  1 3513 1           BZF      MAKEACCS        MUNFLAG CLEAR - BYPASS LR AND DISP.

 0068    REF   2  LAST  756       37,3472  10 754 0           CCS      PHASE2
 0069    REF   2  LAST  853       37,3473  1 3513 1           TCF      MAKEACCS        PHASE 2 ACTIVATED - AVOID MULTIPLE R10.

 0070    REF  11  LAST  852       37,3474  3 4757 0           CAF      SEVEN           SET PIPCTR FOR 4X/SEC RATE.
 0071    REF   4  LAST  823       37,3475  55'055 1           TS       PIPCTR

 0072    REF  11  LAST  791       37,3476  4 0025 1           CS       TIME1           SET TBASE2 .05 SECONDS IN THE PAST.
 0073    REF  17  LAST  853       37,3477  6 4756 1           AD       FIVE
 0074    REF   2  LAST  223       37,3500  6 4734 0           AD       NEG1/2
 0075    REF   3  LAST  853       37,3501  6 4734 0           AD       NEG1/2
 0076    REF   3  LAST  479       37,3502  57'054 1           XCH      TBASE2
 0077   REF   3  LAST  377   37,3503  3 4361 1              CAF      DEC17       2.21SPOT FOR R10,R11
 0078   REF 134  LAST  826   37,3504  54 001 1              TS       L
 0079                        37,3505  4 0000 0              COM
 0080   REF   5  LAST  731   37,3506  52 754 0              DXCH     -PHASE2

 0081   REF   5  LAST  501   37,3507  3 6007 0              CAF      OCT24       FIRST R10,R11 IN .200 SECONDS.
 0082   REF  35  LAST  755   37,3510  0 5203 0              TC       WAITLIST
 0083   REF  24  LAST  849   E7,1536                        EBANK=   UNIT/R/
 0084   REF   3  LAST  823   37,3511   02006 0              2CADR    R10,R11
 0084                        37,3512   42067 0
 0085   REF  18  LAST  852   37,3513  3 4751 0  MAKEACCS    CA       FOUR
 0086   REF   1              37,3514  1 3434 0              TCF      GOREADAX    DO PHASE CHANGE AND RECALL READACCS


 0087                        37,3515  0 0006 1  AVEGOUT     EXTEND
 0088   REF   1              37,3516  3 3534 0              DCA      AVCUTCAD    SET UP FINAL SERVICER EXIT
 0089   REF   5  LAST  828   37,3517  53'252 1              DXCH     AVGEXIT

 0090   REF  19  LAST  854   37,3520  3 4751 0              CA       FOUR        SET 5.4 SPOT FOR REREADAC AND SERVICER
 0091   REF   2  LAST  852   37,3521  0 3523 0              TC       GNUTFAZ5    IF REREADAC IS CALLED, IT WILL EXIT
 0092   REF  59  LAST  846   37,3522  0 5261 1              TC       TASKOVER    END TASK WITHOUT CALLING READACCS


 0093   REF 135  LAST  854   37,3523  54 001 1  GNUTFAZ5    TS       L           SAVE INPUT IN L
 0094   REF  12  LAST  853   37,3524  4 0025 1              CS       TIME1
 0095   REF   1              37,3525  55'062 0              TS       TBASE5      SET TBASE5
 0096                        37,3526  1 3530 0              TCF      +2

 0097   REF 136  LAST  854   37,3527  54 001 1  GNUFAZE5    TS       L           SAVE INPUT IN L
 0098   REF 137  LAST  854   37,3530  4 0001 1              CS       L           -PHASE IN A, PHASE IN L
 0099   REF   2  LAST  216   37,3531  52 762 0              DXCH     -PHASE5     SET -PHASE5,PHASE5
 0100   REF 214  LAST  830   37,3532  0 0002 0              TC       Q


 0101   REF  43  LAST  853   E7,1515                        EBANK=   OVCNTR
 0102   REF   1              37,3533   03661 0  AVCUTCAD    2CADR    AVGEND
 0102   REF   1              37,3534   44067 0

 0104                        37,3535   37771 1  OCT37771    OCT      37771

 0105                        33,2206                        BANK     33
 0106   REF   4  LAST   44   33,2300                        SETLOC   SERVICES
 0107                        33,2206                        BANK

 0108   REF   4 LAST    44 TO   45:     12     37*           COUNT*   $$/SERV
```

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P0109    ************************************   SERVICER   **********************************************************
R0111

 0112    REF  71  LAST  847    33,2206   0 5353 1   SERVICER  TC       PHASCHNG        RESTART PEREADAC + SERVICER
 0113                          33,2207    16035 0             OCT      16035
 0114                          33,2210    20000 0             OCT      20000
 0115    REF  44  LAST  854    E7,1515                        EBANK=   DVCNTR
 0116    REF   1               33,2211    02217 1             2CADR    GETABVAL
 0116    REF   1               33,2212    66067 0
 0117    REF   3  LAST  798    33,2213   3 7721 1             CAF      PRIO31          INITIALIZE 1/PIPADT IN CASE RESTART HAS
 0118    REF   7  LAST  338    33,2214   55'074 1             TS       1/PIPADT        CAUSED LASTBIAS TO BE SKIPPED.


 0119    REF 235  LAST  847    33,2215   0 4616 1             TC       BANKCALL        PIPA COMPENSATION CALL
 0120    REF   2  LAST  387    33,2216    15271 1             CADR     1/PIPA

 0121    REF 143  LAST  851    33,2217   0 6042 1   GETABVAL  TC       INTPRET
 0122                          33,2220    51575 1             VLCAD    ABVAL
 0123    REF   5  LAST  197    33,2221    00325 0                      DELV
 0124                          33,2222    77776 1             EXIT
 0125    REF 346  LAST  851    33,2223   3 0154 1             CA       MPAC
 0126    REF   4  LAST  788    33,2224   55'245 1             TS       ABDELV          ABDELV = CM/SEC*2(-14).
 0127                          33,2225   0 0006 1             EXTEND
 0128    REF   1               33,2226   7 2020 0             MP       KPIP
 0129    REF   4  LAST  836    33,2227   53'514 1             DXCH     ABDVCONV        ABDVCONV = M/CS *2(-5).
 01292                         33,2230   0 0006 1             EXTEND
 01294   REF  12  LAST  827    33,2231   3 1244 1             DCA      MASS
 01296   REF   3  LAST  850    33,2232   53'571 1             DXCH     MASS1           INITIALIZE MASS1 IN CASE WE SKIP MASSMON
 0130    REF  14  LAST  943    33,2233   4 0104 0   MASSMON   CS       FLAGWRD8        ARE WE ON THE SURFACE?
 0131    REF   9  LAST  706    33,2234   7 4744 0             MASK     SURFFBIT
 0132                          33,2235   0 0006 1             EXTEND
 0133    REF   1               33,2236   1 2254 1             BZF      MOONSPOT        YES:  BYPASS MASS MESS

 0134    REF  18  LAST  825    33,2237   3 0106 0             CA       FLGWRD10        NO:   WHICH VEX SHOULD BE USED?
 0135    REF  12  LAST  825    33,2240   7 4737 1             MASK     APSFLBIT
 0136    REF 251  LAST  853    33,2241   10 000 0             CCS      A
 0137                          33,2242   0 0006 1             EXTEND                   IF EXTEND IS EXECUTED, APSVEX --> A,
 0138    REF   3  LAST  834    33,2243   3 2001 1             DCA      APSVEX            OTHERWISE DPSVEX --> A
 0139    REF 215  LAST  854    33,2244   54 002 1             TS       Q

 0140                          33,2245   0 0006 1             EXTEND
 0141    REF   5  LAST  855    33,2246   3 1514 0             DCA      ABDVCONV
 0142                          33,2247   0 0006 1             EXTEND
 0143    REF 216  LAST  855    33,2250   10 002 1   OCT10002  DV       Q               WHERE APPROPRIATE VEX RESIDES
 0144                          33,2251   0 0006 1             EXTEND
 0145    REF  13  LAST  855    33,2252   7 1243 1             MP       MASS
 0149    REF   4  LAST  855    33,2253   21'571 1             DAS      MASS1

 0150    REF   3  LAST  813    33,2254   3 2021 0   MOONSPOT  CA       KPIP1           TP MPAC = ABDELV AT 2(14) CM/SEC
 0151    REF   9  LAST  851    33,2255   0 7312 0             TC       SHORTMP         MULTIPLY BY KPIP1 TO GET
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-061        17:53 DEC. 19,1969  FLY      153  PAGE  856
                                                                                           USER'S PAGE NO.   5      E7 S3
L         SERVICER

 0152   REF 347  LAST  855    33,2256  52 155 1                 DXCH    MPAC            ABDELV AT 2(7) M/CS
 0153   REF   6  LAST  727    33,2257  21'510 0                 DAS     DVTOTAL         UPDATE DVTOTAL FOR DISPLAY

 0156   REF   1               33,2260  0 2440 0                 TC      TMPTOSPT

 0157   REF 236  LAST  855    33,2261  0 4616 1                 TC      BANKCALL
 0158   REF   2  LAST  606    33,2262   47617 1                 CADR    QUICTRIG

 0159   REF   1               33,2263  3 2414 1                 CAF     XNBPIPAD
 0160   REF 237  LAST  856    33,2264  0 4616 1                 TC      BANKCALL
 0161   REF   1               33,2265   20037 1                 CADR    FLESHPCT
 0166   REF 144  LAST  855    33,2266  0 6042 1                 TC      INTPRET
 0167                         33,2267   45014 0       AVERAGEG  BON     CALL
 0168   REF   6  LAST  831    33,2270   03307 0                         MUNFLAG
 0169   REF   1               33,2271   66771 0                         RVBOTH
 0170   REF   1               33,2272   66735 0                         CALCRVG
 0171                         33,2273   77776 1                 EXIT
 0172   REF   1               33,2274  0 3512 1       GOSERV    TC      QUIKFAZ5

 0173   REF   1               33,2275  0 2423 0       COPYCYCL  TC      COPYCYC

A0174                                                           CA      ZERO            A IS ZERO ON RETURN FROM COPYCYC
 0175   REF   2  LAST  812    33,2276  55'157 1                 TS      PIPATMPX        STILL UNDER INHINT
 0176   REF   2  LAST  812    33,2277  55'160 0                 TS      PIPATMPY
 0177   REF   2  LAST  812    33,2300  55'161 1                 TS      PIPATMPZ

 0178   REF   2  LAST  808    33,2301  4 4741 0                 CS      STEERBIT        CLEAR STEERSW PRIOR TO DVMON.
 0179   REF  23  LAST  852    33,2302  7 0076 1                 MASK    FLAGWRD2
 0180   REF  24  LAST  856    33,2303  54 076 1                 TS      FLAGWRD2

 0181   REF   3  LAST  757    33,2304  3 4745 0                 CAF     IDLEFBIT        IS THE IDLE FLAG SET?
 0182   REF  22  LAST  853    33,2305  7 0103 1                 MASK    FLAGWRD7
 0183   REF 252  LAST  855    33,2306  10 000 0                 CCS     A
 0184   REF   1               33,2307  1 2342 1                 TCF     NODVMON1        IDLEFLAG = 1, HENCE SET AUXFLAG TO 0.

 0185   REF   7  LAST  853    33,2310  4 0102 0                 CS      FLAGWRD6
 0186   REF   1               33,2311  7 4752 1                 MASK    AUXFLBIT
 0187   REF 253  LAST  856    33,2312  10 000 0                 CCS     A
 0188   REF   1               33,2313  1 2346 0                 TCF     NODVMON2        AUXFLAG = 0, HENCE SET AUXFLAG TO 1.

 0189   REF   7  LAST  831    33,2314  4 1250 0       DVMON     CS      DVTHRUSH
 0190   REF   5  LAST  855    33,2315  6 1245 0                 AD      ABDELV
 0191                         33,2316  0 0006 1                 EXTEND
 0192   REF   1               33,2317  6 2352 1                 BZMF    LOTHRUST

 0193   REF  25  LAST  856    33,2320  4 0076 1                 CS      FLAGWRD2        SET STEERSW.
 0194   REF   3  LAST  856    33,2321  7 4741 0                 MASK    STEERBIT
 0195   REF  26  LAST  856    33,2322  26 076 1                 ADS     FLAGWRD2

 0196   REF  94  LAST  853    33,2323  3 4753 1       DVCNTSET  CAF     ONE             ALLOW TWO PASSES MAXIMUM NOW THAT
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0197    REF  45  LAST  855    33,2324  55'515 0                TS       DVCNTR          THRUST HAS BEEN DETECTED.

0198    REF  19  LAST  855    33,2325   3 0106 0               CA       FLGWRD10        BRANCH IF APSFLAG IS SET.
0199    REF  13  LAST  855    33,2326   7 4737 1               MASK     APSFLBIT
0200    REF 254  LAST  856    33,2327  10 000 0                CCS      A
0201    REF   1               33,2330   1 2375 0               TCF      USEJETS

0202    REF  21  LAST  853    33,2331   3 4743 0               CA       BIT9            CHECK GIMBAL FAIL BIT
0203                          33,2332   0 0006 1               EXTEND
0204    REF   3  LAST  193    33,2333  02 032 1                RAND     CHAN32
0205                          33,2334   0 0006 1               EXTEND
0206    REF   2  LAST  857    33,2335   1 2375 0               BZF      USEJETS

0207    REF   2  LAST  755    33,2336   4 4736 0   USEGTS      CS       USEQRJTS
0208    REF  25  LAST  825    33,2337   7 0111 1               MASK     DAPBOOLS
0209    REF  26  LAST  857    33,2340  54 111 1                TS       DAPBOOLS
0210    REF   1               33,2341   1 2400 0               TCF      SERVOUT

0211    REF   2  LAST  856    33,2342   4 4752 1   NODVMON1    CS       AUXFLBIT        SET AUXFLAG TO 0.
0212    REF   8  LAST  856    33,2343   7 0102 0               MASK     FLAGWRD6
0213    REF   9  LAST  857    33,2344  54 102 0                TS       FLAGWRD6
0214    REF   3  LAST  857    33,2345   1 2375 0               TCF      USEJETS
0215    REF  10  LAST  857    33,2346   4 0102 0   NODVMON2    CS       FLAGWRD6        SET AUXFLAG TO 1.
0216    REF   3  LAST  857    33,2347   7 4752 1               MASK     AUXFLBIT
0217    REF  11  LAST  857    33,2350  26 102 0                ADS      FLAGWRD6
0218    REF   4  LAST  857    33,2351   1 2375 0               TCF      USEJETS

0219    REF   2  LAST  856    33,2352   0 3512 1   LOTHRUST    TC       QUIKFAZ5
0220    REF  46  LAST  857    33,2353  11'515 0                CCS      DVCNTR
0221    REF   1               33,2354   1 2366 1               TCF      DECCNTR

0222    REF   1               33,2355  10 760 1                CCS      PHASE4          COMFAIL JOB ACTIVE?
02222   REF   2  LAST  857    33,2356   1 2400 0               TCF      SERVOUT         YES   WON'T NEED ANOTHER.

02224   REF  72  LAST  855    33,2357   0 5353 1               TC       PHASCHNG        4.37SPOT FOR COMFAIL.
02226                         33,2360    00374 1               OCT      00374

02228   REF   4  LAST  718    33,2361   3 7716 0               CAF      PRIO25
0223    REF  22  LAST  852    33,2362   0 5072 1               TC       NOVAC
02232   REF  30  LAST  846    E7,1455                          EBANK=   WHICH
02234   REF   2  LAST  243    33,2363    02575 1               2CADR    COMFAIL
02234                         33,2364    74067 0
02236   REF   3  LAST  857    33,2365   1 2400 0               TCF      SERVOUT

0224    REF   1               33,2366  55'570 0    DECCNTR     TS       DVCNTR1
0225    REF   3  LAST  857    33,2367   0 3512 1               TC       QUIKFAZ5
0226    REF   2  LAST  857    33,2370   3 1570 1               CA       DVCNTR1
0227    REF  47  LAST  857    33,2371  55'515 0                TS       DVCNTR
0228                          33,2372   0 0004 0               INHINT
0229    REF  45  LAST  847    33,2373   0 4674 0               TC       IBNKCALL        IF THRUST IS LOW, NO STEERING IS DONE
```

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0230   REF   7  LAST  844   33,2374   40166 1            CADR    STOPRATE      AND THE DESIRED RATES ARE SET TO ZERO.
0231   REF  27  LAST  857   33,2375  4 0111 1  USEJETS   CS      DAP8OCLS
0232   REF   3  LAST  857   33,2376  7 4736 0            MASK    USEQRJTS
0233   REF  28  LAST  858   33,2377  26 111 1            ADS     DAP8DOLS
0234                        33,2400  C 0003 1  SERVOUT   RELINT
0235   REF 238  LAST  856   33,2401  0 4616 1            TC      BANKCALL
0236   REF   1              33,2402   40463 1            CADR    1/ACCS

0239   REF  11  LAST  270   33,2403  3 0167 1            CA      PRIORITY
0240   REF   8  LAST  434   33,2404  7 5004 1            MASK    LOW9
0241   REF   8  LAST  802   33,2405  54 166 1            TS      PUSHLOC
0242                        33,2406  22 007 0            ZL
0243   REF  25  LAST  820   33,2407  52 121 1            DXCH    FIXLOC        FIXLOC AND OVFIND

0244   REF   4  LAST  857   33,2410  0 3512 1            TC      QUIKFAZ5
0245                        33,2411  0 0006 1            EXTEND                EXIT TO SELECTED ROUTINE WHETHER THERE
0246   REF   6  LAST  854   33,2412  3 1252 0            DCA     AVGEXIT       IS THRUST OR NOT.  THE STATE OF STEERSW
0247   REF  21  LAST  750   33,2413  52 006 0            DXCH    Z             WILL CONVEY THIS INFORMATION.

02475  REF   7  LAST  844   33,2414   02145 0  XN8PIPAO  ECADR   XN8PIP

0248                        32,3746                      BANK    32
0249   REF   1              22,2000                      SETLOC  SERV2
0250                        22,3661                      BANK
0251   REF   1                                           COUNT*  $$/SERV

0252   REF  19  LAST  845   22,3661  3 1234 0  AVGEND    CA      PIPTIME +1    FINAL AVERAGE G EXIT
0253   REF   8  LAST  855   22,3662  55 074 1            TS      1/PIPADT      SET UP FREE FALL GYRO COMPENSATION.

0254   REF  55  LAST  846   22,3663  0 5504 0            TC      UPFLAG        SET DRIFT FLAG.
0255   REF   1              22,3664   00036 1            ADRES   DRIFTFLG

0256   REF 239  LAST  858   22,3665  0 4616 1            TC      BANKCALL
0257   REF   1              22,3666   17301 0            CADR    PIPFREE

0258   REF  22  LAST  857   22,3667  4 4743 1            CS      BIT9
0259                        22,3670  0 0006 1            EXTEND
0260   REF  29  LAST  853   22,3671  03 011 1            WAND    DSALMOUT

0261   REF  10  LAST  757   22,3672  0 5327 1            TC      2PHSCHNG
0262                        22,3673   00005 1            OCT     5             GROUP 5 OFF
0263                        22,3674   05022 1            OCT     05022         GROUP 2 ON
0264                        22,3675   20000 0            OCT     20000

0265   REF 145  LAST  856   22,3676  0 6042 1            TC      INTPRET
0266                        22,3677   43014 0            SET     CLEAR
0267   REF   2  LAST  843   22,3700   01464 0                    NOR29FLG      SHUT OFF R29 WHEN SERVICER ENDS.
0268   REF   1              22,3701   03664 0                    SWANDISP      SHUT OFF R10 WHEN SERVICER ENDS.
0269                        22,3702   45014 0            CLEAR   CALL          RESET MUNFLAG.
0270   REF   7  LAST  856   22,3703   03267 1                    MUNFLAG
```

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 0271   REF    1                22,3704   27463 0                      AVETCMIO
 0272                           22,3705   77414 0               CLEAR  EXIT
 0273   REF    1                22,3706   03671 1                      V37FLAG
 0274   REF   54   LAST   847   22,3707  0 4635 0   AVERTRN     TC     POSTJUMP
 0275   REF    1                22,3710   10116 0               CADR   V37RET

 0276   REF    1                22,3707             OUTGOAVE =         AVERTRN

 0277   REF    5   LAST   855   E7,1570             CVCNTR1  =         MASS1
```

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P0278

 02782  REF    1                 27,2000                          SETLOC  SERV3
 02784                           27,3322                          BANK
 02786  REF    1                                                  COUNT*  $$/SERV

 0279                            27,3322  0 0006 1  SERVIDLE  EXTEND                     DISCONNECT SERVICER FROM ALL GUIDANCE
 0280   REF    1                 27,3323  3 3360 1            DCA     SVEXTADR
 0281   REF    7   LAST   858    27,3324  53 252 1            DXCH    AVEGEXIT

 0282   REF   23   LAST   856    27,3325  4 0103 1            CS      FLAGWRD7           DISCONNECT THE DELTA-V MONITOR
 0283   REF    4   LAST   856    27,3326  7 4745 1            MASK    IDLEFBIT
 0284   REF   24   LAST   860    27,3327  26 103 1            ADS     FLAGWRD7

 0285   REF    6   LAST   825    27,3330  3 4735 1            CAF     LRBYBIT            TERMINATE R12 IF RUNNING.
 0286   REF   11   LAST   825    27,3331  54 107 0            TS      FLGWRD11

 0287                            27,3332  0 0006 1            EXTEND
 0288   REF   15   LAST   809    27,3333  3 4755 1            DCA     NEG0
 0289   REF    4   LAST   730    27,3334  52 752 0            DXCH    -PHASE1

 0290   REF   12   LAST   857    27,3335  3 0102 1            CA      FLAGWRD6           DO NOT TURN OFF PHASE 2 IF MUNFLAG SET.
 0291   REF    4   LAST   853    27,3336  7 4744 0            MASK    MUNFLBIT
 0292   REF  255   LAST   857    27,3337  10 000 0            CCS     A
 0293                            27,3340  1 3344 0            TCF     +4

 0294                            27,3341  0 0006 1            EXTEND
 0295   REF   16   LAST   860    27,3342  3 4755 1            DCA     NEG0
 0296   REF    6   LAST   854    27,3343  52 754 0            DXCH    -PHASE2

 0297                            27,3344  0 0006 1      +4    EXTEND
 0298   REF   17   LAST   860    27,3345  3 4755 1            DCA     NEG0
 0299   REF    4   LAST   809    27,3346  52 756 1            DXCH    -PHASE3

 0300                            27,3347  0 0006 1            EXTEND
 0301   REF   18   LAST   860    27,3350  3 4755 1            DCA     NEG0
 0302   REF    3   LAST   738    27,3351  52 764 0            DXCH    -PHASE6

 0303   REF    2   LAST   226    27,3352  3 4764 0            CAF     DEC33              4.33SPOT FOR GOPOOFIX
 0304   REF  138   LAST   854    27,3353  54 001 1            TS      L
 0305                            27,3354  4 0000 0            COM
 0306   REF    8   LAST   826    27,3355  52 760 1            DXCH    -PHASE4

 0307   REF    1                 27,3356  1 5634 1            TCF     WHIMPER            PERFORM A SOFTWARE RESTART AND PROCEED
A0308                                                                                    TO GOTOPOOH WHILE SERVICER CONTINUES TO
A0309                                                                                    RUN, ALBEIT IN A GROUND STATE WHERE
A0310                                                                                    ONLY STATE-VECTOR DEPENDENT FUNCTIONS
A0311                                                                                    ARE MAINTAINED.

 0312   REF   48   LAST   857    E7,1515                          EBANK=  DVCNTR
```

```
L          SERVICER
                                                                                    USER'S PAGE NO.  10      E? S3
  0313    REF    7   LAST   B26      27,3357    03746 1   SVEXTADR 2CADR   SERVEXIT
  0313                               27,3360    64067 1
  0314                               32,3746
  0315    REF    1                   32,2000                       BANK     32
  0316                               32,3746                       SETLOC  SERV
  0317    REF    1                                                 BANK
                                                                   COUNT*  $$/SERV

  0318    REF   73   LAST   857      32,3746  0 5353 1   SERVEXIT TC       PHASCHNG
  0319                               32,3747    00035 1            OCT      00035

  0320    REF  132   LAST   B43      32,3750  1 5155 1            TCF      ENDOFJOB

  0321                               23,2463                       BANK     23
  0322    REF    1                   23,2000                       SETLOC  NORMLIZ
  0323                               23,2463                       BANK

  0324    REF    1                                                 COUNT*  $$/SERV
```

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P0325    NORMLIZE AND COPYCYCL

 0326    REF 146   LAST  858    23,2463   0 6042 1  NORMLIZE TC       INTPRET
 0327                           23,2464    43175 0           VLOAD    BOFF
 0328    REF   3   LAST  151    23,2465    03545 0                    RN1
 0329    REF   8   LAST  858    23,2466    03347 1                    MUNFLAG
 0330    REF   1                23,2467    66415 1                    NORMLIZ1
 0331                           23,2470    64252 0           VSL6     MXV
 0332    REF  32   LAST  834    23,2471    01734 0                    REFSMMAT
 0333    REF  19   LAST  848    23,2472    37521 0           STCALL   R
 0334    REF   4   LAST  832    23,2473    67067 1                    MUNGRAV
 0335                           23,2474    76575 1           VLOAD    VSL1
 0336    REF   4   LAST  774    23,2475    03553 1                    VN1
 0337                           23,2476    77721 0           MXV
 0338    REF  33   LAST  862    23,2477    01734 0                    REFSMMAT
 0339    REF  11   LAST  838    23,2500    27527 1           STCVL    V
 0340    REF   4   LAST  728    23,2501    01726 0                    V(CSM)
 0341                           23,2502    53435 0           VXV      UNIT
 0342    REF   5   LAST  848    23,2503    01720 0                    R(CSM)
 0343    REF   3   LAST  153    23,2504    03720 1           STORE    UHYP
 0344                           23,2505    77776 1  ASCSPOT  EXIT
 0345                           23,2506   0 0006 1           EXTEND                      MAKE SURE GOUP 2 IS OFF.
 0346    REF  19   LAST  860    23,2507   3 4755 1           DCA      NEG0
 0347    REF   7   LAST  860    23,2510   52 754 0           DXCH     -PHASE2

 0348    REF  55   LAST  859    23,2511   0 4635 0           TC       POSTJUMP
 03482   REF   1                23,2512    66420 1           CADR     NORMLIZ2

 03483                          33,2415                      BANK     33
 03484   REF   5   LAST  854    33,2000                      SETLOC   SERVICES
 03485                          33,2415                      BANK
 03486   REF   5 LAST  854 TO  858:   135   172*             COUNT*   $$/SERV

 0349                           33,2415    77624 1  NORMLIZ1 CALL
 0350    REF   1                33,2416    66667 0                    CALCGRAV
 0351                           33,2417    77776 1           EXIT

 0352    REF   1                33,2420   3 2437 0  NORMLIZ2 CA       EIGHTEEN
 0353    REF   2   LAST  856    33,2421   0 2424 1           TC       COPYCYC +1        DO NOT COPY MASS IN NORMLIZE
 0354    REF 133   LAST  861    33,2422   0 5155 0           TC       ENDOFJOB


 0355    REF   6   LAST  854    33,2423   3 6007 0  COPYCYC  CA       OCT24             DEC 20
 0356                           33,2424   0 0004 0  +1       INHINT
 0357    REF   4   LAST  335    33,2425   7 7752 1  +2       MASK     NEG1              REDUCE BY 1 IF ODD
 0358    REF  31   LAST  746    33,2426   54 061 1           TS       ITEMP1
 0359                           33,2427   0 0006 1           EXTEND
 0360    REF  32   LAST  862    33,2430   5 0061 0           INDEX    ITEMP1
 0361    REF   4   LAST  862    33,2431   3 1545 1           DCA      RN1
 0362    REF  33   LAST  862    33,2432   50 061 0           INDEX    ITEMP1
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L        SERVICER
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 0363   REF  13   LAST  786    33,2433   52'220 1          DXCH    RN
 0364   REF  34   LAST  862    33,2434   10 061 1          CCS     ITEMP1
 0365   REF   3   LAST  862    33,2435   1 2425 1          TCF     COPYCYC +2
 0366   REF 217   LAST  855    33,2436   0 0002 0          TC      Q                  RETURN UNDER INHINT


 0367                          33,2437    00022 1  EIGHTEEN DEC    18
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R0368    ****************** PIPA READER ******************

R0369                      MOD NO. 00  BY D. LICKLY  DEC.9 1966

R0370    FUNCTIONAL DESCRIPTION

R0371       SUBROUTINE TO READ PIPA COUNTERS, TRYING TO BE VERY CAREFUL SO THAT IT WILL BE RESTARTABLE.
R0373       PIPA READINGS ARE STORED IN THE VECTOR DELV. THE HIGH ORDER PART OF EACH COMPONENT CONTAINS THE PIPA READING,
R0375       RESTARTS BEGIN AT REREADAC.


R0376       AT THE END OF THE PIPA READER THE CDUS ARE READ AND STORED AS A
R0377    VECTOR IN CDUTEMP.  THE HIGH ORDER PART OF EACH COMPONENT CONTAINS
R0378    THE CDU READING IN 2S COMP IN THE ORDER CDUX,Y,Z.  THE THRUST
R0379    VECTOR ESTIMATOR IN FINDCDUD REQUIRES THE CDUS BE READ AT PIPTIME.

R0380    CALLING SEQUENCE AND EXIT

R0381       CALL VIA TC, ISWCALL, ETC.

R0382       EXIT IS VIA Q.


R0383

R0384    INPUT

R0385       INPUT IS THROUGH THE COUNTERS PIPAX, PIPAY, PIPAZ, AND TIME2.


R0386    OUTPUT

R0387       HIGH ORDER COMPONENTS OF THE VECTOR DELV CONTAIN THE PIPA READINGS.
R0388       PIPTIME CONTAINS TIME OF PIPA READING.


R0389    DEBRIS (ERASABLE LOCATIONS DESTROYED BY PROGRAM)

R0390              TEMX    TEMY    TEMZ    PIPAGE


 0391                            37,3536                        BANK    37
 0392    REF    2  LAST  852     37,2000                        SETLOC  SERV1
 0393                            37,3536                        BANK

 0394    REF    2 LAST  852 TC  854:     86     86*             COUNT*  $$/SERV

 0395                            37,3536  0 0006 1  PIPASR      EXTEND
 0396    REF  26  LAST  825   37,3537  3 0025 0             DCA    TIME2
 0397    REF   8  LAST  796   37,3540  53'561 0             DXCH   PIPTIME1         CURRENT TIME  POSITIVE VALUE
 0398    REF 158  LAST  851   37,3541  4 4755 0        +3   CS     ZERO             INITIALIZE THESE AT NEG. ZERO.
 0399    REF   5  LAST  812   37,3542  55'253 0             TS     TEMX
 0400    REF   4  LAST  812   37,3543  55'254 1             TS     TEMY
 0401    REF   4  LAST  812   37,3544  55'255 0             TS     TEMZ

 0402    REF 159  LAST  865   37,3545  3 4755 1             CA     ZERO
 0403    REF   4  LAST  386   37,3546  54 330 0             TS     DELVZ
 04031   REF   5  LAST  865   37,3547  54 331 1             TS     DELVZ +1
 0404    REF   5  LAST  386   37,3550  54 326 1             TS     DELVY
 04041   REF   6  LAST  865   37,3551  54 327 0             TS     DELVY +1
 04042   REF   9  LAST  387   37,3552  54 325 1             TS     DELVX +1
 0405    REF   4  LAST  853   37,3553  55'256 0             TS     PIPAGE           SHOW PIPA READING IN PROGRESS

 0406                         37,3554  0 0006 1  REPIP1     EXTEND
 0407    REF   9  LAST  811   37,3555  4 0040 1             DCS    PIPAX            X AND Y PIPS READ
 0408    REF   6  LAST  865   37,3556  53'254 1             DXCH   TEMX
 0409    REF  10  LAST  865   37,3557  52 040 1             DXCH   PIPAX            PIPAS SET TO NEG ZERO AS READ.
 0410    REF  10  LAST  865   37,3560  54 324 0             TS     DELVX
 0411    REF   7  LAST  865   37,3561  22 326 0             LXCH   DELVY

 0412    REF   4  LAST  811   37,3562  4 0041 0  REPIP3     CS     PIPAZ            REPEAT PROCESS FOR Z PIP
 0413    REF   5  LAST  865   37,3563  57'255 1             XCH    TEMZ
 0414    REF   5  LAST  865   37,3564  56 041 1             XCH    PIPAZ
 0415    REF   6  LAST  865   37,3565  54 330 0  DODELVZ    TS     DELVZ

 0416                         37,3566  0 0006 1  REPIP4     EXTEND                  COMPUTE GUIDANCE PERIOD
 0417    REF   9  LAST  865   37,3567  3 1561 1             DCA    PIPTIME1
 0418    REF   2  LAST  105   37,3570  53'247 0             DXCH   PGUIDE
 0419                         37,3571  0 0006 1             EXTEND
 0420    REF  20  LAST  858   37,3572  4 1234 1             DCS    PIPTIME
 0421    REF   3  LAST  865   37,3573  21'247 0             DAS    PGUIDE

 0422    REF  13  LAST  611   37,3574  3 0032 0             CA     CDUX             READ CDUS INTO HIGH ORDER CDUTEMPS
 0423    REF   1              37,3575  55'154 1             TS     CDUTEMPX
 0424    REF   5  LAST  611   37,3576  3 0033 1             CA     CDUY
 0425    REF   1              37,3577  55'155 0             TS     CDUTEMPY
 0426    REF   7  LAST  606   37,3600  3 0034 0             CA     CDUZ
 0427    REF   1              37,3601  55'156 0             TS     CDUTEMPZ
 0428    REF  11  LAST  865   37,3602  3 0324 1             CA     DELVX
 0429    REF   3  LAST  856   37,3603  55'157 1             TS     PIPATMPX
 0430    REF   8  LAST  865   37,3604  3 0326 0             CA     DELVY
 0431    REF   3  LAST  856   37,3605  55'160 0             TS     PIPATMPY
 0432    REF   7  LAST  865   37,3606  3 0330 1             CA     DELVZ
 0433    REF   3  LAST  856   37,3607  55'161 1             TS     PIPATMPZ

 0434    REF 218  LAST  863   37,3610  0 0002 0             TC     Q
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0435   REF   5  LAST  865    37,3611  11'256 0  REREADAC CCS     PIPAGE
0436   REF   1               37,3612  1 3437 0           TCF     READACCS       PIP READING NOT STARTED. GO TO BEGINNING

0437   REF   1               37,3613  3 3651 0           CAF     DONEADR        SET UP RETURN FROM PIPASR
0438   REF 219  LAST  865    37,3614  54 002 1           TS      Q

0439   REF   8  LAST  865    37,3615  10 330 0           CCS     DELVZ
0440   REF   1               37,3616  1 3566 0           TCF     REPIP4         Z DONE, GO DO CDUS
0441                         37,3617  1 3622 0           TCF     +3             Z NOT DONE, CHECK Y.
0442   REF   2  LAST  866    37,3620  1 3566 0           TCF     REPIP4
0443   REF   3  LAST  866    37,3621  1 3566 0           TCF     REPIP4

0444                         37,3622  22 007 0           ZL
0445   REF   9  LAST  865    37,3623  10 326 1           CCS     DELVY
0446                         37,3624  1 3627 0           TCF     +3
0447   REF   1               37,3625  1 3636 0           TCF     CHKTEMX        Y NOT DONE, CHECK X.
0448                         37,3626  1 3627 0           TCF     +1
0449   REF   6  LAST  865    37,3627  22 041 1           LXCH    PIPAZ          Y DONE, ZERO Z PIP.

0450   REF   6  LAST  865    37,3630  11'255 0           CCS     TEMZ
0451   REF   7  LAST  866    37,3631  4 1255 0           CS      TEMZ           TEMZ NOT = -0, CONTAINS -PIPAZ VALUE.
0452   REF   1               37,3632  1 3565 0           TCF     DODELVZ
0453                         37,3633  1 3631 1           TCF     -2
0454   REF   9  LAST  866    37,3634  22 330 1           LXCH    DELVZ          TEMZ = -0, L HAS ZPIP VALUE.
0455   REF   4  LAST  866    37,3635  1 3566 0           TCF     REPIP4

0456   REF   7  LAST  865    37,3636  11'253 0  CHKTEMX  CCS     TEMX           HAS THIS CHANGED
0457   REF   8  LAST  866    37,3637  4 1253 0           CS      TEMX           YES
0458                         37,3640  1 3643 1           TCF     +3             YES
0459                         37,3641  1 3637 1           TCF     -2             YES
0460   REF   1               37,3642  1 3554 1           TCF     REPIP1         NO
0461   REF  12  LAST  865    37,3643  54 324 0           TS      DELVX

0462   REF   5  LAST  865    37,3644  4 1254 1           CS      TEMY
0463   REF  10  LAST  866    37,3645  54 326 1           TS      DELVY

0464   REF 160  LAST  865    37,3646  4 4755 0           CS      ZERO           ZERO X AND Y PIPS
0465   REF  11  LAST  865    37,3647  52 040 1           DXCH    PIPAX          L STILL ZERO FROM ABOVE

0466   REF   1               37,3650  1 3562 1           TCF     REPIP3

0467   REF   1               37,3651   03447 0  DONEADR  GENADR  PIPSDONE
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 0468                          33,2440                         BANK    33
 0469    REF    6  LAST  862   33,2000                         SETLOC  SERVICES
 0470                          33,2440                         BANK

 0471    REF    6 LAST  862 TO  864:     19    191*            COUNT*  $$/SERV

 0472    REF    2  LAST  865   33,2440  3 1155 1  TMPTOSPT CA      CDUTEMPY         THIS SUBROUTINE, CALLED BY AN RTB FROM
 0473    REF    1              33,2441  54 765 1           TS      CDUSPOTY         INTERPRETIVE, LOADS THE CDUS CORRESPON-
 0474    REF    2  LAST  865   33,2442  3 1156 1           CA      CDUTEMPZ         DING TO PIPTIME INTO THE CDUSPOT VECTOR.
 0475    REF    1              33,2443  54 767 0           TS      CDUSPOTZ
 0476    REF    2  LAST  865   33,2444  3 1154 0           CA      CDUTEMPX
 0477    REF    1              33,2445  54 771 1           TS      CDUSPOTX
 0478    REF  220  LAST  866   33,2446  0 0002 0           TC      Q

R0479    LRHTASK IS A WAITLIST TASK SET BY READACCS DURING THE DESCENT BRAKING
R0480    PHASE WHEN THE ALT TO THE LUNAR SURFACE IS LESS THAN 25,000 FT.  THIS
R0481    TASK CLEARS THE ALTITUDE MEASUREMENT MADE DISCRETE AND INITIATES THE
R0482    LANDING RADAR MEASUREMENT JOB (LRHJOB) TO TAKE A ALTITUDE MEASUREMENT
R0483    50 MS PRIOR TO THE NEXT READACCS TASK.

 0484                          21,2125                         BANK    21
 0485    REF    2  LAST   42   21,2000                         SETLOC  R10
 0486                          21,2125                         BANK

 0487    REF    1                                              COUNT*  $$/SERV

 0488    REF   12  LAST  860   21,2125  4 0107 0  LRHTASK  CS      FLGWRD11
 0489    REF    7  LAST  860   21,2126  7 4735 0           MASK    LRBYBIT
 0490                          21,2127  0 0006 1           EXTEND
 0491    REF    1              21,2130  1 2141 0           BZF     GRP2OFF          LR BYPASS SET - BYPASS ALL LR READING.

 0496    REF   13  LAST  867   21,2131  4 0107 0           CS      FLGWRD11
 0497    REF    1              21,2132  7 4742 0           MASK    NOLRRBIT         IS LR READ INHIBITED?
 0498                          21,2133  0 0006 1           EXTEND
 0499    REF    2  LAST  867   21,2134  1 2141 0           BZF     GRP2OFF          YES.  BYPASS LR READ.

 0500    REF    1              21,2135  3 7723 0           CA      PRIO32           LR READ OK   SET JOB TO DO IT
 0501    REF   23  LAST  857   21,2136  0 5072 1           TC      NOVAC            ABOUT 50 MS PRIOR TO PIPA READ
 0502    REF    4  LAST  240   E7,1654                     EBANK=  HMEAS
 0503    REF    1              21,2137   03571 1           2CADR   LRHJOB
 0503    REF    1              21,2140   70067 1
 0504                          21,2141  0 0006 1  GRP2OFF  EXTEND
 0505    REF   20  LAST  862   21,2142  3 4755 1           DCA     NEG0
 0506    REF    8  LAST  862   21,2143  52 754 0           DXCH    -PHASE2
 0507    REF    1              21,2144  1 2021 1           TCF     R10,R11A

 0508                          33,2447                         BANK    33
 0509    REF    7  LAST  867   33,2000                         SETLOC  SERVICES
 0510                          33,2447                         BANK
 0511    REF    7 LAST  867 TO  867:      7   198*           COUNT* $$/SERV

R0512    HIGATASK IS ENTERED APPROXIMATELY 6 SECS PRIOR TO HIGATE DURING THE
R0513    DESCENT PHASE.  HIGATASK SETS THE HIGATE FLAG (BIT11) AND THE LR INHIBIT
R0514    FLAG (BIT10) IN LRSTAT.  THE HIGATJOB IS SET UP TO REPOSITION THE LR
R0515    ANTENNA FROM POSITION 1 TO POSITION 2.  IF THE REPOSITIONING IS
R0516    SUCCESSFUL THE ALT BEAM AND VELOCITY BEAMS ARE TRANSFORMED TO THE NEW
R0517    ORIENTATION IN NB COORDINATES AND STORED IN ERASABLE.

 0518    REF   74   LAST  861    33,2447  0 5353 1  HIGATASK TC      PHASCHNG
 0519                            33,2450   00051 0           OCT     51

 0520    REF    2   LAST  867    33,2451  3 7723 0           CA      PRIO32
 0521    REF   39   LAST  853    33,2452  0 5105 0           TC      FINOVAC
 0522    REF    5   LAST  867    E7,1654                     EBANK=  HMEAS
 0523    REF    1                33,2453   03634 0           2CADR   HIGATJOB
 0523    REF    1                33,2454   66067 0
 0524    REF   14   LAST  867    33,2455  4 0107 0           CS      FLGWRD11
 0525    REF   11   LAST  708    33,2456  7 5015 1           MASK    PRIO3
 0526    REF   15   LAST  868    33,2457  26 107 0           ADS     FLGWRD11
 0527    REF    1                33,2460  1 2546 0           TCF     CONTSERV +1
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P0528       MUNRETRN IS THE RETURN LOC FROM SPECIAL AVE G ROUTINE (MUNRVG)

 0529                             33,2461   77776 1  MUNRETRN EXIT

 0530    REF  16  LAST  868    33,2462  4 0107 0             CS      FLGWRD11
 0531    REF   8  LAST  867    33,2463  7 4735 0             MASK    LRBYBIT
 0532                          33,2464  0 0006 1             EXTEND
 0533    REF   1               33,2465  1 2551 0             BZF     COPYCYC1        BYPASS LR LOGIC IF BIT15 IS SET.

 0534    REF  17  LAST  869    33,2466  4 0107 0             CS      FLGWRD11        CHECK IF AT 30000 FT
 0535    REF   1               33,2467  7 4743 1             MASK    XORFLBIT
 0536                          33,2470  0 0006 1             EXTEND
 0537    REF   1               33,2471  1 2506 1             BZF     R12

 0538                          33,2472  0 0006 1  30KCHK     EXTEND
 0539    REF   1               33,2473  3 3113 1             DCA     ]-30KFT
 0540    REF 348  LAST  856    33,2474  52 155 1             DXCH    MPAC
 0541                          33,2475  0 0006 1             EXTEND
 0542    REF   3  LAST  317    33,2476  3 1535 0             DCA     HCALC
 05425   REF 349  LAST  869    33,2477  20 155 1             DAS     MPAC

 0543    REF 256  LAST  860    33,2500  10 000 0             CCS     A
 05435   REF   2  LAST  869    33,2501  1 2506 1             TCF     R12             ALTITUDE > 30KFT
 0544    REF  56  LAST  858    33,2502  0 5504 0             TC      UPFLAG          ALTITUDE < 30KFT SET X-AXIS OVERRIDE
 05445   REF   7  LAST  845    33,2503   00311 1             ADRES   XOVINFLG
 0545    REF  57  LAST  869    33,2504  0 5504 0             TC      UPFLAG
 05455   REF   1               33,2505   00253 0             ADRES   XORFLG

 0546    REF  18  LAST  869    33,2506  4 0107 0  R12        CS      FLGWRD11
 05463   REF   2  LAST  867    33,2507  7 4742 0             MASK    NOLRRBIT
 05465                         33,2510  0 0006 1             EXTEND
 0547    REF   2  LAST  868    33,2511  1 2545 0             BZF     CONTSERV

 0548    REF  19  LAST  869    33,2512  4 0107 0             CS      FLGWRD11
 0549    REF   1               33,2513  7 4751 1             MASK    NO511BIT
 0550                          33,2514  0 0006 1             EXTEND
 0552    REF   1               33,2515  1 3115 0             BZF     UPDATCHK        IF NO511BIT SET,DO NOT CHECK LR POSITION

 0553    REF  20  LAST  869    33,2516  4 0107 0  HITEST     CS      FLGWRD11
 0554    REF   1               33,2517  7 4741 0             MASK    RSTHIBIT
 0555                          33,2520  0 0006 1             EXTEND
 0556    REF   1               33,2521  1 2540 0             BZF     POS2CHK
 0557    REF  20  LAST  820    33,2522  3 1642 0  HIGATCHK   CA      TTF/8           IS TTF > CRITERION?   (TTF IS NEGATIVE)
 0558    REF   3  LAST  568    33,2523  6 1427 1             AD      RPCRTIME
 0559                          33,2524  0 0006 1             EXTEND
 0560    REF   1               33,2525  6 2536 0             BZMF    POS1CHK         NO

 0561    REF   3  LAST  281    33,2526  3 4741 1             CA      EBANK4          MUST SWITCH EBANKS
 0562    REF  36  LAST  845    33,2527  56 003 1             XCH     EBANK
 0563    REF 139  LAST  860    33,2530  54 001 1             TS      L               SAVE IN L
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L        SERVICER                                                                     USER'S PAGE NO. 19      E7 S3

 05635  REF   8  LAST  858   E4,1545                         EBANK= XNBPIP
 0564   REF   9  LAST  870   33,2531   4 1545 0              CS     XNBPIP          UXBXP IN GSOP CH5
 056405 REF  49  LAST  860   E7,1515                         EBANK= OVCNTR
 05641  REF  37  LAST  869   33,2532  22 003 1               LXCH   EBANK           RESTORE EBANK
 05642  REF   2  LAST  568   33,2533   6 1430 1              AD     RPCRTQSW        QSW - UXBXP
 05643                       33,2534   0 0006 1              EXTEND
 05644  REF   1              33,2535   6 2447 1              BZMF   HIGATASK        IF UXBXP > QSW,THEN REPOSITION

 0565   REF  44  LAST  816   33,2536   3 4746 0  POS1CHK     CAF    BIT6
 0566                        33,2537   1 2541 1              TCF    +2

 0567   REF  27  LAST  817   33,2540   3 4745 0  POS2CHK     CAF    BIT7
 0568   REF   1              33,2541   0 3674 1              TC     POSTST
 0569   REF   2  LAST  869   33,2542   1 3115 0              TCF    UPDATCHK        LR IN RIGHT POSITION - CONTINUE

 0570   REF  34  LAST  821   33,2543   0 5567 0  LRPOSALM    TC     ALARM           LR NOT IN PROPER POS-ALARM-BYPASS UPDATE
 0571                        33,2544    00511 1              OCT    511             AND CONTINUE SERVICER
 0572                        33,2545   0 0004 0  CONTSERV    INHINT
 0573   REF   1              33,2546   4 3111 1              CS     BITS4-7
 0574   REF  21  LAST  869   33,2547   7 0107 0              MASK   FLGWRD11        CLEAR LR MEASUREMENT MADE DISCRETES.
 0575   REF  22  LAST  870   33,2550  54 107 0               TS     FLGWRD11
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P0577
 0578   REF   5  LAST  858   33,2551  0 3512 1  CCFYCYC1 TC      QUIKFAZ5

 0579   REF  14  LAST  610   33,2552  3 0077 1  R29?     CA      FLAGWRD3
 0580   REF   1              33,2553  7 5014 0           MASK    NR29&RDR
 0581   REF 257  LAST  869   33,2554 10 000  0           CCS     A                  IS NOR29FLG OR READRFLG SET?
 0582   REF   1              33,2555  1 2567 0           TCF     R29NODES           YES, SO DON'T DESIGNATE.

 0583   REF 113  LAST  617   33,2556  3 0110 1           CA      RADMODES           NO, SO R29 IS CALLED FOR.
 0584   REF   1              33,2557  7 2250 0           MASK    OCT10002           IS THE RR NOT ZEROING ITS CDUS, AND
 0585   REF 258  LAST  871   33,2560 10 000  0           CCS     A                  IS THE RENDEZVOUS RADAR IN AUTO MODE?
 0586   REF   2  LAST  871   33,2561  1 2567 0           TCF     R29NODES           NO, SO DON'T DESIGNATE.

 0587   REF 114  LAST  871   33,2562  3 0110 1           CA      RADMODES
 0588   REF   6  LAST  852   33,2563  7 7713 1           MASK    PRIO22
 0589   REF 259  LAST  871   33,2564 10 000  0           CCS     A                  IS RR REPOSITIONING OR REMODING?
 0590   REF   6  LAST  603   33,2565  1 2573 0           TCF     NOR29NOW           YES: COME BACK IN 2 SECONDS & TRY AGAIN.

 0591   REF   2  LAST  602   33,2566  1 2045 0           TCF     R29

 0592                        33,2567  0 0004 0  R29NODES INHINT                     R29 NOT ALLOWED THIS CYCLE.
 0593   REF   9  LAST  609   33,2570  4 4742 0           CS      DESIGBIT           SHOW THAT DESIGNATION IS OFF.
 0594   REF 115  LAST  871   33,2571  7 0110 0           MASK    RADMODES
 0595   REF 116  LAST  871   33,2572 54 110  0           TS      RADMODES

 0596   REF 147  LAST  862   33,2573  0 6042 1  NOR29NOW TC      INTPRET            INTPRET DOES A RELINT.
 0597                        33,2574   51575 1           VLOAD   ABVAL              MPAC = ABVAL( NEW SM. POSITION VECTOR)
 0598   REF   2  LAST  149   33,2575   03573 0                   R1S
 0599                        33,2576   45206 1           PUSH    DSU                                                   (2)
 0600   REF  10  LAST  844   33,2577   02333 0                   /LAND/
 0601   REF   4  LAST  869   33,2600   03535 1           STORE   HCALC              NEW HCALC*2(24)M.
 06015  REF   5  LAST  813   33,2601   03775 1           STORE   HCALC1
 0602                        33,2602   47075 0           DMPR    RTB
 0603   REF   1              33,2603   26026 1                   ALTCONV
 0604   REF   2  LAST  378   33,2604   21613 0                   SGNAGREE
 0605   REF   2  LAST  153   33,2605   27742 0           STOVL   ALTBITS            ALTITUDE FOR R10 IN BIT UNITS.
 0606   REF  25  LAST  854   33,2606   03537 0                   UNIT/R/
 0607                        33,2607   53435 0           VXV     UNIT
 0608   REF   4  LAST  862   33,2610   03720 1                   UHYP
 0609   REF   3  LAST  153   33,2611   27726 1           STOVL   UHZP               DOWNRANGE HALF-UNIT VECTOR FOR R10.
 0610   REF   3  LAST  871   33,2612   03573 0                   R1S
 0611                        33,2613   60505 1           VXM     VSR4
 0612   REF  34  LAST  862   33,2614   01734 0                   REFSMMAT
 0613   REF   5  LAST  862   33,2615   27545 0           STOVL   RN1                TEMP. REF. POSITION VECTOR*2(29)M.
 0614   REF   4  LAST  833   33,2616   03601 0                   V1S
 0615                        33,2617   76505 0           VXM     VSL1
 0616   REF  35  LAST  871   33,2620   01734 0                   REFSMMAT
 0617   REF   5  LAST  862   33,2621   27553 1           STOVL   VN1                TEMP. REF. VELOCITY VECTOR*2(7)M/CS.
 0618   REF  26  LAST  871   33,2622   03537 0                   UNIT/R/
 0619                        33,2623   51435 1           VXV     ABVAL
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L         SERVICER                                                                              USER'S PAGE NO.  21      E7 S3

 0620   REF   5  LAST  871    33,2624   03601 0                       V1S
 0621                         33,2625   63552 0            SL1        DSQ
 0622                         33,2626   77671 1            DDV
 0623                         33,2627   47075 0            DMPR       RTB
 0624   REF   1               33,2630   26030 0                       ARCONV1
 0625   REF   3  LAST  871    33,2631   21613 0                       SGNAGREE
 0626                         33,2632   77776 1  COPYCYC2  EXIT                     LEAVE ALTITUDE RATE COMPENSATION IN MPAC
 0627                         33,2633   0 0004 0           INHINT
 0628   REF  27  LAST  871    33,2634   3 1536 0           CA         UNIT/R/       UPDATE RUNIT FOR R10.
 0629   REF   3  LAST  153    33,2635   55'743 1           TS         RUNIT
 0630   REF  28  LAST  872    33,2636   3 1540 1           CA         UNIT/R/ +2
 0631   REF   4  LAST  872    33,2637   55'744 0           TS         RUNIT +1
 0632   REF  29  LAST  872    33,2640   3 1542 0           CA         UNIT/R/ +4
 0633   REF   5  LAST  872    33,2641   55'745 1           TS         RUNIT +2
 0634   REF 350  LAST  869    33,2642   3 0154 1           CA         MPAC          LOAD NEW DALTRATE FOR R10.
 0635   REF   2  LAST  153    33,2643   55'716 1           TS         DALTRATE

 0636                         33,2644   0 0006 1           EXTEND
 0637   REF   4  LAST  871    33,2645   3 1573 1           DCA        R1S
 0638   REF  20  LAST  862    33,2646   53'521 1           DXCH       R
 0639                         33,2647   0 0006 1           EXTEND
 0640   REF   5  LAST  872    33,2650   3 1575 1           DCA        R1S +2
 0641   REF  21  LAST  872    33,2651   53'523 0           DXCH       R +2
 0642                         33,2652   0 0006 1           EXTEND
 0643   REF   6  LAST  872    33,2653   3 1577 0           DCA        R1S +4
 0644   REF  22  LAST  872    33,2654   53'525 0           DXCH       R +4
 0645                         33,2655   0 0006 1           EXTEND
 0646   REF   6  LAST  872    33,2656   3 1601 1           DCA        V1S
 0647   REF  12  LAST  862    33,2657   53'527 1           DXCH       V
 0648                         33,2660   0 0006 1           EXTEND
 0649   REF   7  LAST  872    33,2661   3 1603 0           DCA        V1S +2
 0650   REF  13  LAST  872    33,2662   53'531 0           DXCH       V +2
 0651                         33,2663   0 0006 1           EXTEND
 0652   REF   8  LAST  872    33,2664   3 1605 0           DCA        V1S +4
 0653   REF  14  LAST  872    33,2665   53'533 1           DXCH       V +4

 0654   REF   1               33,2666   1 2275 1           TCF        COPYCYCL      COMPLETE THE COYPCYCL.
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P0702    **************************************************************************************************
R0705

 0706                            33,2667   41456 0  CALCGRAV UNIT   PUSH          SAVE UNIT/R/ IN PUSHLIST             (18)
 0707   REF  30  LAST  872       33,2670   03537 0           STORE  UNIT/R/
 0708                            33,2671   67340 1           LXC,1  SLOAD         RTX2 = 0 IF EARTH ORBIT, =2 IF LUNAR.
 0709   REF  15  LAST  774       33,2672   02777 1                  RTX2
 0710   REF  16  LAST  873       33,2673   03000 1                  RTX2
 0711                            33,2674   50076 0           DCOMP  BMN
 0712   REF   1                  33,2675   66724 0                  CALCGRV1
 0713                            33,2676   50375 0           VLOAD  DOT                                                  (12)
 0714   REF   9  LAST  834       33,2677   06516 0                  UNITZ
 0715   REF  31  LAST  873       33,2700   03537 0                  UNIT/R/
 0716                            33,2701   41552 0           SL1    PUSH                                                 (14)
 0717                            33,2702   44316 0           DSQ    BDSU
 0718   REF   1                  33,2703   26766 1                  DP1/20
 0719                            33,2704   56325 0           PDDL   DDV
 0720   REF   1                  33,2705   26040 1                  RESQ
 0721                            33,2706   00043 0                  34D           (RN)SQ
 0722                            33,2707   00041 1           STORE  32D           TEMP FOR (RE/RN)SQ
 0723                            33,2710   41205 0           DMP    DMP
 0724   REF   1                  33,2711   26042 0                  20J
 0725                            33,2712   65361 0           VXSC   PDDL
 0726   REF  32  LAST  873       33,2713   03537 0                  UNIT/R/
 0727                            33,2714   41205 0           DMP    DMP
 0728   REF   1                  33,2715   26044 0                  2J
 0729                            33,2716   00041 1                  32D
 0730                            33,2717   76561 1           VXSC   VSL1
 0731   REF  10  LAST  873       33,2720   06516 0                  UNITZ
 0732                            33,2721   45455 1           VAD    STADR
 0733   REF   2  LAST  775       33,2722   74256 0           STORE  UNITGOBL
 0734                            33,2723   41455 0           VAD    PUSH          MPAC = UNIT GRAVITY VECTOR.          (18)
 0735                            33,2724   60345 0  CALCGRV1 DLOAD  NORM          PERFORM A NORMALIZATION ON RMAGSQ IN
 0736                            33,2725   00043 0                  34D           ORDER TO BE ABLE TO SCALE THE MU FOR
 0737   REF  14  LAST  772       33,2726   00050 1                  X2            MAXIMUM PRECISION.
 0738                            33,2727   53663 1           BDDV*  SLR*
 0739   REF   1                  33,2730   26032 1                  -MUDT,1
 0740                            33,2731   56623 0                  0 -21D,2
 0741                            33,2732   45561 1           VXSC   STADR
 0742   REF   3  LAST  838       33,2733   74214 0           STORE  GDT1/2        SCALED AT 2(+7) M/CS
 0743                            33,2734   77616 0           RVQ

 0744                            33,2735   61375 1  CALCRVG  VLOAD  VXM
 0745   REF   6  LAST  855       33,2736   00325 0                  DELV
 0746   REF  36  LAST  871       33,2737   01734 0                  REFSMMAT
 0747                            33,2740   76561 1           VXSC   VSL1
 0748   REF   4  LAST  855       33,2741   26022 0                  KPIP1
 0749   REF   5  LAST  766       33,2742   03527 1           STORE  DELVREF
 0750                            33,2743   41562 0           VSR1   PUSH
 0751                            33,2744   41455 0           VAD    PUSH          (DV-OLDGDT)/2 TO PD SCALED AT 2(+7)M/CS
```

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0752   REF   8  LAST  813   33,2745   01236 1                     GDT/2
0753                        33,2746   65255 0             VAC     PDDL                                                       (18)
0754   REF   8  LAST  756   33,2747   01226 0                     VN
0755   REF   4  LAST  865   33,2750   01247 1                     PGUIDE
0756                        33,2751   74261 1             SL      VXSC
0757                        33,2752   20207 0                     6D
0758                        33,2753   44055 1             VAD     STQ
0759   REF  14  LAST  863   33,2754   01220 0                     RN
0760                        33,2755   00037 0                     31D
0761   REF   6  LAST  871   33,2756   37545 1             STCALL  RN1             TEMP STORAGE OF RN SCALED 2(+29)M
0762   REF   2  LAST  862   33,2757   66667 0                     CALCGRAV

0763                        33,2760   53255 0             VAD     VAD
0764                        33,2761   77655 1             VAC
0765   REF   9  LAST  874   33,2762   01226 0                     VN
0766   REF   6  LAST  871   33,2763   37553 0             STCALL  VN1             TEMP STORAGE OF VN SCALED 2(+7)M/CS
0767                        33,2764   00037 0                     31D

0768                        33,2765   01463 1   DP1/20    2DEC    0.05
0768                        33,2766   06315 0
0769                        33,2767   00010 0   SHIFT11   2DEC    1 B-11
0769                        33,2770   00000 1
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P0770    ************************************************************************************************

R0772    MUNRVG IS A SPECIAL AVERAGE G INTEGRATION ROUTINE USED BY THRUSTING
R0773    PROGRAMS WHICH FUNCTION IN THE VICINITY OF AN ASSUMED SPHERICAL MOON.
R0774    THE INPUT AND OUTPUT QUANTITIES ARE REFERENCED TO THE STABLE MEMBER
R0775    COORDINATE SYSTEM.

 0776                          33,2771   41575 0  RVBOTH   VLOAD   PUSH
 0777    REF   3  LAST  728    33,2772   02317 0                   G(CSM)
 0778                          33,2773   65255 0           VAD     PDDL
 0779    REF   5  LAST  862    33,2774   01726 0                   V(CSM)
 0780    REF   5  LAST  874    33,2775   01247 1                   PGUIDE
 0781                          33,2776   74271 0           DDV     VXSC
 0782    REF   1               33,2777   26770 0                   SHIFT11
 0783                          33,3000   77655 1           VAD
 0784    REF   6  LAST  862    33,3001   01720 0                   R(CSM)
 0785    REF   7  LAST  872    33,3002   37573 1           STCALL  R1S
 0786    REF   5  LAST  862    33,3003   67067 1                   MUNGRAV
 0787                          33,3004   53255 0           VAD     VAD
 0788    REF   6  LAST  875    33,3005   01726 0                   V(CSM)
 0789                          33,3006   77626 0           STADR
 0790    REF   9  LAST  872    33,3007   74176 1           STORE   V1S
 0791                          33,3010   77776 1           EXIT
 0792    REF   6  LAST  871    33,3011   0 3512 1          TC      QUIKFAZ5
 0793    REF 148  LAST  871    33,3012   0 6042 1          TC      INTRPRET
 0794                          33,3013   77775 1           VLOAD
 0795    REF   4  LAST  873    33,3014   03563 1                   GDT1/2
 0796    REF   4  LAST  875    33,3015   26317 0           STCVL   G(CSM)
 0797    REF   8  LAST  875    33,3016   03573 0                   R1S
 0798    REF   7  LAST  875    33,3017   25720 0           STOVL   R(CSM)
 0799    REF  10  LAST  875    33,3020   03601 0                   V1S
 0800    REF   7  LAST  875    33,3021   01726 0           STORE   V(CSM)
 0801                          33,3022   77776 1           EXIT
 0802    REF   7  LAST  875    33,3023   0 3512 1          TC      QUIKFAZ5
 0803    REF 149  LAST  875    33,3024   0 6042 1          TC      INTRPRET
 0804                          33,3025   74375 0  MUNRVG   VLOAD   VXSC
 0805    REF   7  LAST  873    33,3026   00325 0                   DELV
 0806    REF   1               33,3027   26024 0                   KPIP2
 0807                          33,3030   53206 0           PUSH    VAD             1ST PUSH: DELV IN UNITS OF 2(8) M/CS
 0808    REF   9  LAST  874    33,3031   01236 1                   GDT/2
 0809                          33,3032   53206 0           PUSH    VAD             2ND PUSH: (DELV + GDT)/2, UNITS OF 2(7)
 0810    REF  15  LAST  872    33,3033   03527 1                   V                                                   (12)
 0811                          33,3034   56325 0           PDDL    DDV
 0812    REF   6  LAST  875    33,3035   01247 1                   PGUIDE
 0813    REF   2  LAST  875    33,3036   26770 0                   SHIFT11
 0814                          33,3037   77761 1           VXSC
 0815                          33,3040   77655 1           VAD
 0816    REF  23  LAST  872    33,3041   03521 1                   R
 0817    REF   9  LAST  875    33,3042   37573 1           STCALL  R1S             STORE R SCALED AT 2(+24)M
 0818    REF   6  LAST  875    33,3043   67067 1                   MUNGRAV
 0819                           33,3044   53255 0            VAC     VAC
 0820                           33,3045   77655 1            VAD                                                     (D)
 0821   REF  16  LAST  875      33,3046   03527 1                    V
 0822   REF  11  LAST  875      33,3047   03601 0            STORE   V1S                STORE V SCALED AT 2(+7)M/CS.
 0823                           33,3050   77646 0            ABVAL
 0824   REF   5  LAST  729      33,3051   27472 0            STOVL   ABVEL              STORE SPEED FOR LR AND DISPLAYS.
 0825   REF  33  LAST  873      33,3052   03537 0                    UNIT/R/
 0826                           33,3053   72441 0            DOT     SL1
 0827   REF  12  LAST  876      33,3054   03601 0                    V1S
 0828   REF  11  LAST  813      33,3055   27474 0            STOVL   HDOTDISP           HDOT = V. UNIT(R)*2(7)M/CS.
 0829   REF  10  LAST  875      33,3056   03573 0                    R1S
 0830                           33,3057   72435 0            VXV     VSL2
 0831   REF   6  LAST  848      33,3060   02325 1                    WM
 0832   REF   2  LAST  153      33,3061   17734 1            STODL   DELVS              LUNAR ROTATION CORRECTION TERM*2(5)M/CS.
 0833                           33,3062   00045 0                    36D
 0834                           33,3063   77625 0            DSU
 0835   REF  11  LAST  871      33,3064   02333 0                    /LAND/
 0836   REF   5  LAST  871      33,3065   37535 0            STCALL  HCALC              FOR NOW, DISPLAY WHETHER POS OR NEG
 0837   REF   1                 33,3066   66461 1                    MUNRETRN
 0838                           33,3067   77656 1  MUNGRAV   UNIT                       AT 36D HAVE ABVAL(R), AT 34D R.R
 0839   REF  34  LAST  876      33,3070   17537 0            STODL   UNIT/R/
 0840                           33,3071   00043 0                    34D
 0841                           33,3072   55261 1            SL      BDDV
 0842                           33,3073   20207 0                    6D
 0843   REF   1                 33,3074   26036 0                    -MUDTMUN
 0844                           33,3075   74205 0            DMP     VXSC
 0845   REF   3  LAST  875      33,3076   26770 0                    SHIFT11
 0846   REF  35  LAST  876      33,3077   03537 0                    UNIT/R/
 0847   REF   5  LAST  875      33,3100   03563 1            STORE   GDT1/2             1/2GDT SCALED AT 2(7)M/CS.
 0848                           33,3101   77616 0            RVQ

 0849                           33,3102   00303 1  1.95SECS  DEC     195
 0851                           33,3103   00014 1  2SEC(18)  2DEC    200 B-18
 0851                           33,3104   20000 0
 0852                           33,3105   00000 1  2SEC(28)  2OCT    00000 00310        2SEC AT 2(28)
 0852                           33,3106   00310 0
 08525                          33,3107   00000 1  4SEC(28)  2DEC    400 B-28
 08525                          33,3110   00620 0
 0853                           33,3111   00110 1  BITS4-7   OCT     110
 08534                          33,3112   37767 0  1-30KFT   2DEC    16768072 B-24      OPPOSMAX-30KFT
 08534                          33,3113   02200 1
 08536                          33,3114   04445 0  6KFT/SEC  DEC     18.288 B-7         6000 FT/SEC AT 2(7)M/CS
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P0854
 0855   REF   3  LAST  869    33,3115  3 4742 1  UPDATCHK CAF    NOLRRBIT        SEE IF LR UPDATE INHIBITED.
 0856   REF  23  LAST  870    33,3116  7 0107 0           MASK   FLGWRD11
 0857   REF 260  LAST  871    33,3117 10 000  0           CCS    A
 0858   REF   3  LAST  869    33,3120  1 2545 0           TCF    CONTSERV        IT IS-NO LR UPDATE
 0859   REF   1               33,3121  3 4750 1           CAF    RNGEDBIT        NO INHIBIT - SEE ALT MEAS. THIS CYCLE.
 0860   REF  24  LAST  877    33,3122  7 0107 0           MASK   FLGWRD11
 0861                         33,3123  0 0006 1           EXTEND
 0862   REF   1               33,3124  1 3250 1           BZF    VMEASCHK        NO ALT MEAS THIS CYCLE-CHECK FOR VEL

 0863   REF  26  LAST  858    33,3125  3 0120 1  POSUPDAT CA     FIXLOC          SET PUSHLIST TO ZERO
 0864   REF   9  LAST  858    33,3126 54 166  1           TS     PUSHLOC

 0865   REF 150  LAST  875    33,3127  0 6042 1           TC     INTPRET
 0866                         33,3130   61375 1           VLOAD  VXM
 0867   REF   1               33,3131   02273 0                  HBEAMNB
 0868   REF  10  LAST  870    33,3132   02146 0                  XNBPIP          HBEAM SM AT 2(2)
 0869                         33,3133   72515 0           PDVL   VSL2            STORE HBEAM IN PD 0-5
 0870   REF  13  LAST  876    33,3134   03601 0                  V1S             SCALE V AT 2(5) M/CS
 0871                         33,3135   50255 0           VAD    DOT
 0872   REF   3  LAST  876    33,3136   03734 1                  DELVS           V RELATIVE TO SURFACE AT 2(5) M/CS
 0873                         33,3137   00001 0                  0D              V ALONG HBEAM AT 2(7) M/CS
 0874                         33,3140   77405 0           DMP    EXIT
 0875   REF   1               33,3141   01352 1                  RADSKAL         SCALE TO RADAR COUNTS X 5

 0876   REF   2  LAST   85    33,3142  4 0110 0           CS     FLGWRD12        TEST LR ALTITUDE SCALE FACTOR
 0877   REF   1               33,3143  7 4743 1           MASK   ALTSCBIT
 0878                         33,3144  0 0006 1           EXTEND
 0879                         33,3145  1 3150 1           BZF    +3              BRANCH IF HIGH SCALE

 0880   REF   1               33,3146  3 1353 0           CA     SKALSKAL        RESCALE IF LOW SCALE
 0881   REF  10  LAST  855    33,3147  0 7312 0           TC     SHORTMP

 0882   REF 151  LAST  877    33,3150  0 6042 1  +3       TC     INTPRET
 0883                         33,3151   54215 0           DAD    SL              CORRECT HMEAS FOR DOPPLER EFFECT
 0884   REF   6  LAST  868    33,3152   03655 1                  HMEAS
 0885                         33,3153   20210 0                  7D
 0886                         33,3154   74205 0           DMP    VXSC            SLANT RANGE AT 2(21),PUSH UP FOR HBEAM
 0887   REF   1               33,3155   26011 0                  HSCAL           SLANT RANGE VECTOR AT 2(23) M
 0888                         33,3156   45241 1           DOT    DSU
 0889   REF  36  LAST  876    33,3157   03537 0                  UNIT/R/         ALTITUDE AT 2(24)M
 0890   REF   6  LAST  876    33,3160   03535 1                  HCALC           DELTA H AT 2(24) M
 0891   REF   5  LAST  781    33,3161   03665 1           STORE  DELTAH
 0892                         33,3162   77776 1           EXIT

 0893   REF  25  LAST  877    33,3163  3 0107 1           CA     FLGWRD11
 0894   REF   2  LAST  869    33,3164  7 4741 0           MASK   PSTHIBIT
 0895                         33,3165  0 0006 1           EXTEND                 DO NOT PERFORM DATA REASONABLENESS TEST
 0896   REF   1               33,3166  1 3203 1           BZF    NOREASON        UNTIL AFTER HIGATE
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0897    REF 152  LAST  877    33,3167  0 6042 1            TC      INTPRET
0898                          33,3170   45246 0            ABS     DSU
0899    REF   2  LAST  122    33,3171   02521 0                    DELQFIX          ABS(DELTAH) - DQFIX   50 FT NOM
0900                          33,3172   45252 0            SL3     DSU              SCALE TO 2(21)
0901    REF   7  LAST  877    33,3173   03535 1                    HCALC            ABS(DELTAH) - (50 + HCALC/8) AT 2(21)
0902                          33,3174   77776 1            EXIT

0903    REF   2  LAST  152    33,3175  25'670 1            INCR    LRLCTR
0904    REF   1               33,3176  0 6726 1            TC      BRANCH
0905    REF   1               33,3177  1 3520 1            TCF     HFAIL            DELTA H TOO LARGE
0906    REF   2  LAST  878    33,3200  1 3520 1            TCF     HFAIL            DELTA H TOO LARGE
0907    REF  90  LAST  847    33,3201  0 5516 0            TC      DOWNFLAG         TURN OFF ALT FAIL LAMP
0908    REF   1               33,3202   00263 0            ADRES   HELSHFLG

0909    REF  26  LAST  877    33,3203  4 0107 0  NOREASON  CS      FLGWRD11
0910    REF   1               33,3204  7 4744 0            MASK    LRINHBIT
0911    REF 261  LAST  877    33,3205  10 000 0            CCS     A
0912    REF   2  LAST  877    33,3206  1 3250 1            TCF     VMEASCHK         UPDATE INHIBITED - TEST VELOCITY ANYWAY

0913    REF 153  LAST  878    33,3207  0 6042 1            TC      INTPRET          DO POSITION UPDATE
0914                          33,3210   40545 1            DLOAD   SR4
0915    REF   8  LAST  878    33,3211   03535 1                    HCALC            RESCALE H TO 2(28)M
0916                          33,3212   77776 1            EXIT
0917                          33,3213  0 0006 1            EXTEND
0918    REF   6  LAST  877    33,3214  3 1665 0            DCA     DELTAH           STORE DELTAH IN MPAC AND
0919    REF 351  LAST  872    33,3215  52 155 1            DXCH    MPAC             BRING HCALC INTO A,L
0920    REF   1               33,3216  0 7547 0            TC      ALSIGNAG
0921                          33,3217  0 0006 1            EXTEND                   IF HIGH PART OF HCALC IS NON ZERO, THEN
0922                          33,3220  1 3222 1            BZF     +2               HCALC > HMAX,
0923    REF   3  LAST  878    33,3221  1 3250 1            TCF     VMEASCHK         SO UPDATE IS BYPASSED
0924    REF 352  LAST  878    33,3222  54 156 1            TS      MPAC +2            FOR LATER SHORTMP

0925    REF 140  LAST  869    33,3223  4 0001 1            CS      L                -H AT 2(14)M
0926    REF   1               33,3224  6 1420 0            AD      LRHMAX           HMAX - H
0927                          33,3225  0 0006 1            EXTEND
0928    REF   4  LAST  878    33,3226  6 3250 0            BZMF    VMEASCHK         IF H >HMAX, BYPASS UPDATE
0929                          33,3227  0 0006 1            EXTEND
0930    REF   1               33,3230  7 1421 0            MP      LRWH             WH(HMAX - H)
0931                          33,3231  0 0006 1            EXTEND
0932    REF   2  LAST  878    33,3232  11'420 1            DV      LRHMAX           WH(1 - H/HMAX)
0933    REF   4  LAST  466    33,3233  54 135 1            TS      MPTEMP
0934    REF   1               33,3234  0 7316 1            TC      SHORTMP2         DELTAH (WH)(1 - H/HMAX) IN MPAC
0935    REF 154  LAST  878    33,3235  0 6042 1            TC      INTPRET          MODE IS DP FROM ABOVE
0936                          33,3236   77752 1            SL1
0937                          33,3237   53361 0            VXSC    VAC
0938    REF  37  LAST  877    33,3240   03537 0                    UNIT/R/          DELTAR = DH(WH)(1 - H/HMAX) UNIT/R/
0939    REF  11  LAST  876    33,3241   03573 0                    R1S
0940    REF   1               33,3242   37657 1            STCALL  GNUR
0941    REF   7  LAST  875    33,3243   67067 1                    MUNGRAV
0942                          33,3244   77776 1            EXIT
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 0943   REF   8  LAST  875   33,3245  0 3512 1            TC      QUIKFAZ5

 0944   REF 161  LAST  866   33,3246  3 4755 1            CA      ZERO
 0945   REF   1              33,3247  0 3474 0  RUPDATED  TC      GNURVST

 0946   REF   9  LAST  879   33,3250  0 3512 1  VMEASCHK  TC      QUIKFAZ5        RESTART AT NEXT LOCATION
 0947   REF  27  LAST  878   33,3251  4 0107 0            CS      FLGWRD11
 0948   REF   1              33,3252  7 4745 1            MASK    VELDABIT        IS V READING AVAILABLE?
 0949   REF 262  LAST  878   33,3253  10 000 0            CCS     A
 0950   REF   1              33,3254  1 3454 0            TCF     VALTCHK         NO   SEE IF V READING TO BE TAKEN

 0951   REF   3  LAST  202   33,3255  4 1651 0  VELUPDAT  CS      VSELECT         PROCESS VELOCITY DATA
 0952   REF 141  LAST  878   33,3256  54 001 1            TS      L
 0953   REF 142  LAST  879   33,3257  26 001 1            ADS     L               -2 VSELECT IN L
 0954   REF 143  LAST  879   33,3260  6 0001 0            AD      L
 0955   REF 144  LAST  879   33,3261  6 0001 0            AD      L               -6 VSELECT IN A
 0956   REF  27  LAST  877   33,3262  50 120 1            INDEX   FIXLOC
 0957   REF  23  LAST  820   33,3263  52 047 0            DXCH    X1              X1 = -6 VSELECT, X2 = -2 VSELECT

 0958   REF   4  LAST  869   33,3264  3 4741 1            CA      EBANK4
 0959   REF  38  LAST  870   33,3265  54 003 0            TS      EBANK
 0960   REF   2  LAST  117   E4,1654                      EBANK=  LRXCDU

 0961   REF   2  LAST  117   33,3266  3 1655 0            CA      LRYCDU          STORE LRCDUS IN CDUSPOTS
 0962   REF  19  LAST  606   33,3267  54 765 1            TS      CDUSPOT
 0963   REF   2  LAST  117   33,3270  3 1656 0            CA      LRZCDU
 0964   REF  20  LAST  879   33,3271  54 767 0            TS      CDUSPOT +2
 0965   REF   3  LAST  879   33,3272  3 1654 1            CA      LRXCDU
 0966   REF  21  LAST  879   33,3273  54 771 1            TS      CDUSPOT +4

 0967   REF 240  LAST  858   33,3274  0 4616 1            TC      BANKCALL
 0968   REF   3  LAST  856   33,3275   47617 1            CADR    QUICTRIG        GET SINES AND COSINES FOR NBSM

 0969   REF  28  LAST  879   33,3276  3 0120 1            CA      FIXLOC
 0970   REF  10  LAST  877   33,3277  54 166 1            TS      PUSHLOC         SET PD TO ZERO

 0971   REF 155  LAST  878   33,3300  0 6042 1            TC      INTPRET
 0972                        33,3301   45173 0            VLOAD*  CALL
 0973   REF   2  LAST  117   33,3302   02231 0                    VZBEAMNB,1      CONVERT VBEAM FROM NB TO SM
 0974   REF   4  LAST  586   33,3303   47675 0                    *NBSM*
 0975                        33,3304   54325 1            PDDL    SL              STORE IN PD 0-5
 0976   REF   3  LAST  203   33,3305   03653 1                    VMEAS           LOAD VELOCITY MEASUREMENT
 0977                        33,3306   20215 0                    12D
 0978                        33,3307   41403 0            DMP*    PUSH            SCALE TO M/CS AT 2(6)
 0979   REF   1              33,3310   51764 0                    VZSCAL,2        AND STORE IN PD 6-7
 0980                        33,3311   77776 1            EXIT
 0981   REF  95  LAST  856   33,3312  4 4753 0            CS      ONE
 0982   REF  14  LAST  820   33,3313  54 163 1            TS      MODE            CHANGE STORE MODE TO VECTOR

 0983   REF   3  LAST  120   33,3314  3 1657 1            CA      PIPTEM          STORE DELV IN MPAC
 0984                            33,3315  22 007 0        ZL
 0985    REF 353  LAST  878      33,3316  52 155 1        DXCH    MPAC

 0986    REF   4  LAST  879      33,3317  3 1660 0        CA      PIPTEM +1
 0987                            33,3320  22 007 0        ZL
 0988    REF 354  LAST  880      33,3321  52 160 1        DXCH    MPAC +3

 0989    REF   5  LAST  880      33,3322  3 1661 1        CA      PIPTEM +2
 0990                            33,3323  22 007 0        ZL
 0991    REF 355  LAST  880      33,3324  52 162 0        DXCH    MPAC +5

 0992    REF  11  LAST  845      33,3325  3 5016 0        CA      EBANK7
 0993    REF  39  LAST  879      33,3326  54 003 0        TS      EBANK           RESTORE EBANK 7
 0994    REF  50  LAST  870      E7,1515                  EBANK=  DVCNTR
 0995    REF 156  LAST  879      33,3327  0 6042 1        TC      INTPRET
 0996                            33,3330   65361 0        VXSC    PODL
 0997    REF   5  LAST  873      33,3331   26022 0                KPIP1           SCALE DELV TO 2(7) M/CS AND PUSH
 0998    REF   2  LAST  117      33,3332   02253 1                LRVTIME         TIME OF DELV AT 2(28)CS
 0999                            33,3333   56225 1        DSU     DDV
 1000    REF  21  LAST  865      33,3334   01234 0                PIPTIME         TU - T(N-1)
 1001    REF   1                 33,3335   27106 0                2SEC(28)
 1002                            33,3336   76561 1        VXSC    VSL1            G(N-1)(TU - T(N-1))
 1003    REF  10  LAST  875      33,3337   01236 1                GDT/2           SCALED AT 2(7) M/CS
 1004                            33,3340   53255 0        VAC     VAC             PUSH UP FOR DELV
 1005    REF  17  LAST  876      33,3341   03527 1                V               VU = V(N-1) + DELVU + G(N-1) DTU
 1006                            33,3342   53352 0        VSL2    VAD             SCALE TO 2(5) M/CS AND SUBTRACT
 1007    REF   4  LAST  877      33,3343   03734 1                DELVS                     MOON ROTATION.
 1008                            33,3344   51406 1        PUSH    ABVAL           STORE IN PD
 1009                            33,3345   43202 0        SR4     DAD             ABS(VM)/8 + VELBIAS AT 2(6)
 1010    REF   1                 33,3346   03372 1                VELBIAS
 1011                            33,3347   24025 0        STDVL   20D             STORE IN 20D AND PICK UP VM
 1012                            33,3350   44241 0        DCT     BDSU            V(EST) AT 2(6)
 1013                            33,3351   00001 0                0               DELTAV = VMEAS - V(EST)
 1014                            33,3352   51406 1        PUSH    ABS
 1015                            33,3353   77425 1        DSU     EXIT            ABS(DV) - (7.5 + ABS(VM)/8))
 1016                            33,3354   00025 0                20D

 1017    REF   2  LAST  152      33,3355  25'672 0        INCR    LRMCTR
 1018    REF   2  LAST  878      33,3356  0 6726 1        TC      BRANCH
 1019    REF   1                 33,3357  1 3535 0        TCF     VFAIL           DELTA V TOO LARGE      ALARM
 1020    REF   2  LAST  880      33,3360  1 3535 0        TCF     VFAIL           DELTA V TOO LARGE      ALARM

 1021    REF  91  LAST  878      33,3361  0 5516 0        TC      DOWNFLAG        TURN OFF VEL FAIL LAMP
 1022    REF   1                 33,3362   00262 1        ADRES   VFLSHFLG

 1023    REF  28  LAST  879      33,3363  3 0107 1        CA      FLGWRD11
 1024    REF   1                 33,3364  7 4740 1        MASK    VXINHBIT
 1025                            33,3365  0 0006 1        EXTEND
 1026    REF   1                 33,3366  1 3375 1        BZF     VUPDAT          IF VX INHIBIT RESET, INCORPORATE DATA.
 1027    REF  92  LAST  880    33,3367  0 5516 0            TC      DOWNFLAG
 1028    REF   1               33,3370   00250 0            ADRES   VXINH            RESET VX INHIBIT

 1029    REF   4  LAST  879    33,3371  3 1651 1            CA      VSELECT
 1030    REF   5  LAST  565    33,3372  6 7751 0            AD      NEG2             IF VSELECT = 2 (X AXIS),
 1031                          33,3373  0 0006 1            EXTEND                   BYPASS UPDATE
 1032    REF   1               33,3374  1 3454 0            BZF     ENDVDAT

 1033    REF  29  LAST  880    33,3375  4 0107 0  VUPDAT    CS      FLGWRD11
 1034    REF   2  LAST  878    33,3376  7 4744 0            MASK    LRINHBIT
 1035    REF 263  LAST  879    33,3377  10 000 0            CCS     A
 1036    REF   2  LAST  879    33,3400  1 3454 0            TCF     VALTCHK          UPDATE INHIBITED

 1037    REF 356  LAST  880    33,3401  54 155 1            TS      MPAC +1

 1038    REF   6  LAST  876    33,3402  3 1471 1            CA      ABVEL            STORE E7 ERASABLES NEEDED IN TEMPS
 1039    REF   1               33,3403  54 130 1            TS      ABVEL*
 1040    REF   5  LAST  881    33,3404  3 1651 1            CA      VSELECT
 1041    REF   1               33,3405  54 131 0            TS      VSELECT*
 1042    REF  10  LAST  820    33,3406  3 5014 1            CA      EBANK5
 1043    REF  40  LAST  880    33,3407  54 003 0            TS      EBANK            CHANGE EBANKS

 1044    REF   2  LAST  123    E5,1527                      EBANK=  LRVF
 1045    REF   3  LAST  881    33,3410  4 1527 1            CS      LRVF
 1046    REF   2  LAST  881    33,3411  6 0130 0            AD      ABVEL*           IF V < VF, USE WVF
 1047                          33,3412  0 0006 1            EXTEND
 1048    REF   1               33,3413  6 3426 1            BZMF    USEVF

 1049    REF   3  LAST  881    33,3414  4 0130 1            CS      ABVEL*
 1050    REF   2  LAST  123    33,3415  6 1526 1            AD      LRVMAX           VMAX - V
 1051                          33,3416  0 0006 1            EXTEND
 1052    REF   1               33,3417  6 3431 1            BZMF    WSTOR -1         IF V > VMAX, W = 0

 1053                          33,3420  0 0006 1            EXTEND
 1054    REF   2  LAST  881    33,3421  5 0131 1            INDEX   VSELECT*
 1055    REF   2  LAST  123    33,3422  7 1530 1            MP      LRWVZ            WV(VMAX - V)

 1056                          33,3423  0 0006 1            EXTEND
 1057    REF   3  LAST  881    33,3424  11 1526 0           DV      LRVMAX           WV( 1 - V/VMAX )
 1058    REF   2  LAST  881    33,3425  1 3432 0            TCF     WSTOR

 1059    REF   3  LAST  881    33,3426  50 131 1  USEVF     INDEX   VSELECT*
 1060    REF   2  LAST  123    33,3427  3 1533 0            CA      LRWVFZ           USE APPROPRIATE CONSTANT WEIGHT
 1061    REF   3  LAST  881    33,3430  1 3432 0            TCF     WSTOR

 1062    REF 162  LAST  879    33,3431  3 4755 1  -1        CA      ZERO
 1063    REF 357  LAST  881    33,3432  54 154 0  WSTOR     TS      MPAC
 1064    REF  28  LAST  870    33,3433  4 4745 1            CS      BIT7             (=64D)
 1065    REF  17  LAST  829    33,3434  6 1010 1            AD      MODREG
 1066                          33,3435  0 0006 1            EXTEND
 1067                           33,3436  6 3441 0               BZMF     +3            IF IN P65,P66,P67, USE ANOTHER CONSTANT

 1068  REF   2  LAST  123       33,3437  3 1536 0               CA       LRWVFF
 1069  REF 358  LAST  881       33,3440  54 154 0               TS       MPAC

 1070  REF  12  LAST  880       33,3441  3 5016 0   +3          CA       EBANK7
 1071  REF  41  LAST  881       33,3442  54 003 0               TS       EBANK         CHANGE EBANKS

 1072  REF   7  LAST  381       E7,1471                         EBANK=   ABVEL
 1073  REF 157  LAST  880       33,3443  0 6042 1               TC       INTPRET
 1074                           33,3444   74205 0               DMP      VXSC          W(DELTA V)(VBEAMSM)  UP 6-7, 0-5
 1075                           33,3445   77655 1               VAD
 1076  REF  14  LAST  877       33,3446   03601 0                        V1S           ADD WEIGHTED DELTA V TO VELOCITY
 1077  REF   1                  33,3447   03657 0               STORE    GNUV
 1078                           33,3450   77776 1               EXIT

 1079  REF  10  LAST  879       33,3451  0 3512 1               TC       QUIKFAZ5      DO NOT RE-UPDATE

 1080  REF  15  LAST  808       33,3452  3 6245 1               CA       SIX
 1081  REF   2  LAST  879       33,3453  0 3474 0   VUPDATED    TC       GNURVST       STORE NEW VELOCITY VECTOR
 1082  REF   3  LAST  881       33,3454             ENDVDAT     =        VALTCHK

 1083  REF  11  LAST  882       33,3454  0 3512 1   VALTCHK     TC       QUIKFAZ5      DO NOT REPEAT ABOVE

 1084  REF   1                  33,3455  3 4747 1               CAF      READVBIT      TEST READVEL TO SEE IF VELOCITY READING
 1085  REF  30  LAST  881       33,3456  7 0107 0               MASK     FLGWRD11      IS DESIRED.
 1086  REF 264  LAST  881       33,3457  10 000 0               CCS      A
 1087  REF   1                  33,3460  1 3467 0               TCF      READV         YES - READ VELOCITY
 1088  REF   8  LAST  882       33,3461  4 1471 0               CS       ABVEL         NO- SEE IF VELOCITY < 6000 FT/SEC
 1089  REF   1                  33,3462  6 3114 0               AD       6KFT/SEC
 1090                           33,3463  0 0006 1               EXTEND
 1091  REF   4  LAST  877       33,3464  6 2545 1               BZMF     CONTSERV      V > 6000 FT/SEC. DO NOT READ VELOCITY.

 1092  REF  58  LAST  869       33,3465  0 5504 0               TC       UPFLAG        V < 6000 FT/SEC. SET READVEL AND READ.
 1093  REF   1                  33,3466   00257 1               ADRES    READVEL

 1094  REF   3  LAST  868       33,3467  3 7723 0   READV       CAF      PRIO32        SET UP JOB TO READ VELOCITY BEAMS.
 1095  REF  24  LAST  867       33,3470  0 5072 1               TC       NOVAC
 1096  REF   7  LAST  877       E7,1654                         EBANK=   HMEAS
 1097  REF   1                  33,3471   03556 1               2CADR    LRVJOB
 1097  REF   1                  33,3472   66067 0
 1098  REF   5  LAST  882       33,3473  1 2545 0               TCF      CONTSERV      CONTINUE WITH SERVICER


 1099  REF  78  LAST  851       33,3474  54 130 1   GNURVST     TS       BUF           STORE GNUR (=GNUV) IN R1S OR V1S
 1100                           33,3475  0 0006 1               EXTEND                 A = 0 FOR R, A = 6 FOR V
 1101  REF   2  LAST  878       33,3476  3 1657 1               DCA      GNUR
 1102  REF  79  LAST  882       33,3477  50 130 0               INDEX    BUF
 1103  REF  12  LAST  878       33,3500  53 573 0               DXCH     R1S
 1104                           33,3501  0 0006 1               EXTEND
 1105   REF   3  LAST  882   33,3502  3 1661 1            DCA      GNUR +2
 1106   REF  80  LAST  882   33,3503  50 130 0            INDEX    BUF
 1107   REF  13  LAST  882   33,3504  53'575 0            DXCH     R1S  +2
 1108                        33,3505  0 0006 1            EXTEND
 1109   REF   4  LAST  883   33,3506  3 1663 0            DCA      GNUR +4
 1110   REF  81  LAST  883   33,3507  50 130 0            INDEX    BUF
 1111   REF  14  LAST  883   33,3510  53'577 1            DXCH     R1S  +4
 1112   REF 221  LAST  867   33,3511  0 0002 0            TC       Q


 1113   REF   3  LAST  821   33,3512  3 5007 0  QUIKFAZ5  CA       EBANK3
 1114   REF  42  LAST  882   33,3513  56 003 1            XCH      EBANK               SET EBANK 3
 1115   REF 145  LAST  879   33,3514  52 002 1            DXCH     L                   Q TO A, A TO L
 1116   REF   1              E3,1446                      EBANK=   PHSNAME5
 1117   REF   2  LAST  883   33,3515  55'446 1            TS       PHSNAME5
 1118   REF  43  LAST  883   33,3516  22 003 1            LXCH     EBANK
 1119   REF  51  LAST  880   E7,1515                      EBANK=   DVCNTR
 1120   REF 265  LAST  882   33,3517  0 0000 1            TC       A


 1121   REF   2  LAST  152   33,3520  4 1671 1  HFAIL     CS       LRRCTR
 1122                        33,3521  0 0006 1            EXTEND
 1123   REF   1              33,3522  1 3532 1            BZF      NORLITE             IF R = 0, DO NOT TURN ON TRK FAIL
 1124   REF   3  LAST  878   33,3523  6 1670 1            AD       LRLCTR
 1125   REF   1              33,3524  7 7750 0            MASK     NEG3
 1126                        33,3525  0 0006 1            EXTEND                       IF L-R LT 4, DO NOT TURN ON TRK FAIL
 1127                        33,3526  1 3530 0            BZF      +2
 1128   REF   2  LAST  883   33,3527  1 3532 1            TCF      NORLITE

 1129   REF  59  LAST  882   33,3530  0 5504 0            TC       UPFLAG              AND SET BIT TO TURN ON TRACKER FAIL LITE
 1130   REF   2  LAST  878   33,3531   00263 0            ADRES    HFLSHFLG

 1131   REF   4  LAST  883   33,3532  3 1670 1  NORLITE   CA       LRLCTR
 1132   REF   3  LAST  883   33,3533  55'671 1            TS       LRRCTR              SET R = L

 1133   REF   5  LAST  878   33,3534  1 3250 1            TCF      VMEASCHK


 1134   REF   2  LAST  152   33,3535  4 1673 0  VFAIL     CS       LRSCTR                 DELTA Q LARGE
 1135                        33,3536  0 0006 1            EXTEND                        IF S = 0, DO NOT TURN ON TRACKER FAIL
 1136   REF   1              33,3537  1 3547 0            BZF      NOLITE
 1137   REF   3  LAST  880   33,3540  6 1672 0            AD       LRMCTR                 M-S
 1138   REF   2  LAST  883   33,3541  7 7750 0            MASK     NEG3                   TEST FOR M-S > 3
 1139                        33,3542  0 0006 1            EXTEND                         IF M-S > 3, THEN TWO OR MORE OF THE
 1140                        33,3543  1 3545 1            BZF      +2                       LAST FOUR V READINGS WERE BAD,
 1141   REF   2  LAST  883   33,3544  1 3547 0            TCF      NOLITE                   SO TURN ON VELOCITY FAIL LIGHT

 1142   REF  60  LAST  883   33,3545  0 5504 0            TC       UPFLAG              AND SET BIT TO TURN ON TRACKER FAIL LITE
 1143   REF   2  LAST  880   33,3546   00262 1            ADRES    VFLSHFLG
 1144   REF   4  LAST  883    33,3547  3 1672 0  NOLITE   CA      LRMCTR           SET S = M
 1145   REF   3  LAST  883    33,3550  55'673 0           TS      LRSCTR

 1146   REF   6  LAST  881    33,3551  11'651 0           CCS     VSELECT          TEST FOR Z COMPONENT
 1147   REF   2  LAST  881    33,3552  1 3454 0           TCF     ENDVDAT          NOT Z, DO NOT SET VX INHIBIT

 1148   REF  61  LAST  883    33,3553  0 5504 0           TC      UPFLAG           Z COMPONENT - SET FLAG TO SKIP X
 1149   REF   2  LAST  881    33,3554   00250 0           ADRES   VXINH            COMPONENT,AS ERROR MAY BE DUE TO CROSS
 1150   REF   3  LAST  884    33,3555  1 3454 0           TCF     ENDVDAT          LOBE LOCK UP NOT DETECTED ON X AXIS.
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P1151   ******************************************************************************************************
R1153      LRVJOB IS SET WHEN THE LEM IS BELOW 15000 FT DURING THE LANDING PHASE
R1154      THIS JOB INITIALIZES THE LANDING RADAR READ ROUTINE FOR 5 VELOCITY
R1155      SAMPLES AND GOES TO SLEEP WHILE THE SAMPLING IS DONE-ABOUT 500 MS.
R1156      WITH A GOODEND RETURN THE DATA IS STORED IN VMEAS AND BIT7 OF LRSTAT
R1157      IS SET.  THE GIMBAL ANGLES ARE READ ABOUT MIDWAY IN THE SAMPLING .

 1158   REF   7  LAST  451       4361            170MS     EQUALS ND1


 1159   REF   1                33,3556  3 4361 1  LRVJOB   CA      170MS             SET TASK TO READ CDUS + PIPAS
 1160   REF  36  LAST  854     33,3557  0 5203 0           TC      WAITLIST
 1161   REF   3  LAST  880     E4,1652                     EBANK=  LRVTIME
 1162   REF   1                33,3560   03632 0           2CADR   RDGIMS
 1162   REF   1                33,3561   70064 1
 1163   REF   7  LAST  884     33,3562  11'651 0           CCS     VSELECT           SEQUENCE LR VEL BEAM SELECTOR
 1164                          33,3563  1 3565 0           TCF     +2
 1165   REF  55  LAST  852     33,3564  3 4752 0           CAF     TWO               IF ZERO-RESET TO TWO
 1166                          33,3565  6 0000 1           DOUBLE                    2XVSELECT USED FOR VBEAM INDEX IN LRVEL
 1167   REF 241  LAST  879     33,3566  0 4616 1           TC      BANKCALL          GO INITIALIZE LR VEL READ ROUTINE
 1168   REF   1                33,3567   53116 1           CADR    LRVEL
 1169   REF 242  LAST  885     33,3570  0 4616 1           TC      BANKCALL          PUT LRVJOB TO SLEEP ABOUT 500 MS
 1170   REF  15  LAST  611     33,3571   17705 0           CADR    RADSTALL
 1171   REF   1                33,3572  1 3625 1           TCF     VBAD
 1172   REF   4  LAST  222     33,3573  11'675 0           CCS     STILBADV          IS DATA GOOD JUST PRESENT?
 1173   REF   1                33,3574  1 3626 1           TCF     VSTILBAD          JUST GOOD - MUST WAIT 4 SECONDS.

 1174                          33,3575  0 0004 0           INHINT
 1175                          33,3576  0 0006 1           EXTEND                    GOOD RETURN-STOW AWAY VMEAS
 1176   REF   8  LAST  576     33,3577  3 1101 0           DCA     SAMPLSUM
 1177   REF   4  LAST  879     33,3600  53'653 1           DXCH    VMEAS
 1178   REF   5  LAST  879     33,3601  3 4741 1           CA      EBANK4            FOR DOWNLINK
 1179   REF  44  LAST  883     33,3602  54 003 0           TS      EBANK
 1180   REF   4  LAST  885     E4,1652                     EBANK=  LRVTIME

 1181                          33,3603  0 0006 1           EXTEND
 1182   REF   5  LAST  885     33,3604  3 1653 0           DCA     LRVTIME
 1183   REF   2  LAST  202     33,3605  53'740 1           DXCH    LRVTIMDL
 1184                          33,3606  0 0006 1           EXTEND
 1185   REF   4  LAST  879     33,3607  3 1655 0           DCA     LRXCDU
 1186   REF   3  LAST  203     33,3610  53'735 0           DXCH    LRXCDUDL
 1187   REF   3  LAST  879     33,3611  3 1656 0           CA      LRZCDU
 1188   REF   3  LAST  202     33,3612  55'736 0           TS      LRZCDUDL
 1189   REF  13  LAST  882     33,3613  3 5016 0           CA      EBANK7
 1190   REF  45  LAST  885     33,3614  54 003 0           TS      EBANK
 1191   REF   8  LAST  885     E7,1651                     EBANK=  VSELECT


 1192   REF  31  LAST  882     33,3615  4 0107 0           CS      FLGWRD11          SET BIT TO INDICATE VELOCITY
 1193   REF   2  LAST  879     33,3616  7 4745 1           MASK    VELDABIT          MEASUREMENT MADE.
 1194    REF  32  LAST  885    33,3617  26 107 0             AOS     FLGWRO1'
 1195    REF   9  LAST  885    33,3620  11'651 0   ENCLRV    CCS     VSELECT        UROATE VSELECT
 1196                          33,3621  1 3623 1             TCF     +2
 1197    REF  56  LAST  885    33,3622  2 4752 C             CA      TWC
 1198    REF  10  LAST  886    33,3623  55'651 0             TS      VSELECT
 1199    REF 134  LAST  862    33,3624  1 5155 1             TCF     ENOCFJCP

 1200    REF  57  LAST  886    33,3625  3 4752 0   V8AD      CAF     TWO            SET STIL8AO TO WAIT 4 SECONOS
 1201    REF   5  LAST  885    33,3626  55'675 0   VSTILBAD  TS      STIL8AOV
 1202    REF   1               33,3627  1 3620 1             TCF     ENOLRV

R1203    LRHJOB IS SET 8Y LRHTASK WHEN LEM IS BELOW 25000 FT.  THIS JOB
R1204    INITIALIZES THE LR REAO ROUTINE FCR AN ALT MEASUREMENT AND GCES TC
R1205    SLEEP WHILE THE SAMPLING IS DCNE-A8OUT 95 MS.  WITH A GOOOENO RETURN
R1206    THE ALT OATA IS STCREO IN HMEAS AND 8IT7 CF LRSTAT IS SET.

 1207                          34,3571                       BANK    34
 1208    REF   1               34,2000                       SETLOC  F12STUFF
 1209                          34,3571                       8ANK

 1210    REF   1                                             COUNT*  $$/SERV

 1211    REF 243  LAST  885    34,3571  0 4616 1   LRHJO8    TC      8ANKCALL       INITIATE LR ALT MEASUREMENT
 1212    REF   2  LAST  495    34,3572   53102 1             CACR    LRALT
 1213    PEF 244  LAST  886    34,3573  0 4616 1             TC      8ANKCALL       LRHJCB TC SLEEP A8CUT 95MS
 1214    REF  16  LAST  885    34,3574   17705 0             CADR    RAOSTALL
 1215    REF   1               34,3575  1 3620 1             TCF     H8AO
 1216    REF   5  LAST  222    34,3576  11'674 1             CCS     STIL8AOH       IS DATA GOOO JUST PRESENT?
 1217    REF   1               34,3577  1 3630 0             TCF     HSTIL8AC       JUST GOOO - MUST WAIT 4 SECONDS.

 1218                          34,3600  0 0004 0             INHINT
 1219                          34,3601  0 0006 1             EXTENO
 1220    REF   9  LAST  885    34,3602  3 1101 0             OCA     SAMRLSUM       GCOC RETURN-STORE AWAY LRH OATA
 1221    REF   8  LAST  882    34,3603  53'655 1             OXCH    HMEAS          LRH OATA 1.079 FT/BIT
 1222                          34,3604  C 0006 1             EXTEND                 FOR OOWNLINK
 1223    REF  10  LAST  865    34,3605  3 1561 1             OCA     PIPTIME1
 1224    REF   8  LAST  611    34,3606  53'755 0             OXCH    MKTIME

 1225                          34,3607  C 0006 1             EXTENO
 1226    REF   3  LAST  867    34,3610  3 1156 1             OCA     CDUTEMPY       COUY,Z = AIG,AMG
 1227    PEF   9  LAST  611    34,3611  53'460 0             CXCH    AIG

 1228    REF   3  LAST  967    34,3612  3 1154 0             CA      COUTEMPX       CDUX = AOG
 1229    REF   7  LAST  611    34,3613  55'461 1             TS      AOG

 1230    REF  33  LAST  886    34,3614  4 0107 0             CS      FLGWRO11       SET 8IT TO INDICATE RANGE
 1231    REF   2  LAST  877    34,3615  7 4750 C             MASK    RNGEO8IT       MEASUREMENT MAOE.
 1232    REF  34  LAST  886    34,3616  26 107 0             AOS     FLGWRO11
 1233    REF 135  LAST  886    34,3617  0 5155 0   ENOLRH    TC      ENDOFJOB       TERMINATE LRHJO8
 1234   REF  27  LAST  825    34,3620  3 0101 1  HBAD      CA      FLAGWRD5
 1235   REF   2  LAST  577    34,3621  7 4742 0            MASK    RNGSCBIT           IS BAD RETURN DUE TO SCALE CHANGE?
 1236                         34,3622  0 0006 1            EXTEND
 1237   REF   2  LAST  886    34,3623  1 3627 0            BZF     HSTILBAD -1        NO    RESET HSTILBAD
 1238   REF  93  LAST  881    34,3624  0 5516 0            TC      DOWNFLAG           YES   RESET SCALE CHANGE BIT AND IGNORE
 1239   REF   4  LAST  611    34,3625   00120 1            ADRES   RNGSCFLG
 1240   REF 136  LAST  886    34,3626  0 5155 0            TC      ENDOFJOB


 1241   REF  58  LAST  886    34,3627  3 4752 0            CAF     TWO                SET STILBAD TO WAIT 4 SECONDS
 1242   REF   6  LAST  886    34,3630  55'674 1  HSTILBAD  TS      STILBADH
 1243   REF 137  LAST  887    34,3631  0 5155 0            TC      ENDOFJOB

 1244                         34,3632                      BANK    34
 1245   REF   1               34,2000                      SETLOC  SERV4
 1246                         34,3632                      BANK

 1247   REF   2 LAST  886 TO  887:     33     33*          COUNT*  $$/SERV

R1248      RDGIMS  IS A TASK SET UP BY LRVJOB TO PICK UP THE IMU CDUS AND TIME
R1249      AT ABOUT THE MIDPOINT OF THE LR VEL READ ROUTINE WHEN 5 VEL SAMPLES
R1250      ARE SPECIFIED.

 1251   REF   6  LAST  885    E4,1652                      EBANK=  LRVTIME
 1252                         34,3632  0 0006 1  RDGIMS    EXTEND
 1253   REF  27  LAST  865    34,3633  3 0025 0            DCA     TIME2              PICK UP TIME2,TIME1
 1254   REF   7  LAST  887    34,3634  53'653 1            DXCH    LRVTIME              AND SAVE IN LRVTIME

 1255                         34,3635  0 0006 1            EXTEND
 1256   REF  14  LAST  865    34,3636  3 0033 1            DCA     CDUX               PICK UP CDUX AND CDUY
 1257   REF   5  LAST  885    34,3637  53'655 1            DXCH    LRXCDU               AND SAVE IN LRXCDU AND LRYCDU

 1258   REF   8  LAST  865    34,3640  3 0034 0            CA      CDUZ
 1259   REF   4  LAST  885    34,3641  55'656 1            TS      LRZCDU             SAVE CDUZ IN LRZCDU

 1260   REF  12  LAST  866    34,3642  3 0037 0            CA      PIPAX
 1261   REF   6  LAST  880    34,3643  55'657 0            TS      PIPTEM             SAVE PIPAX IN PIPTEM

 1262                         34,3644  0 0006 1            EXTEND
 1263   REF   3  LAST  886    34,3645  3 0041 1            DCA     PIPAY              PICK UP PIPAY AND PIPAZ
 1264   REF   7  LAST  887    34,3646  53'661 0            DXCH    PIPTEM +1            AND SAVE IN PIPTEM +1 AND PIPTEM +2
 1265   REF  60  LAST  854    34,3647  0 5261 1            TC      TASKOVER

 1266                         33,3630                      BANK    33
 1267   REF   8  LAST  867    33,2000                      SETLOC  SERVICES
 1268                         33,3630                      BANK

 1269   REF   8 LAST  868 TO  886:    625    823*          COUNT*  $$/SERV

 1270   REF  52  LAST  883    E7,1515                      EBANK=  OVCNTR
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R1271        HIGATJOB IS SET APPROXIMATELY 6 SECONDS PRIOR TO HIGH GATE DURING
R1272        THE DESCENT BURN PHASE OF LUNAR LANDING.  THIS JOB INITIATES THE
R1273        LANDING RADAR REPOSITIONING ROUTINE AND GOES TO SLEEP UNTIL THE
R1274        LR ANTENNA MOVES FROM POSITION 1 TO POSITION 2.  IF THE LR ANTENNA
R1275        ACHIEVES POSITION 2 WITHIN 22 SECONDS THE ALTITUDE AND VELOCITY
R1276        BEAM VECTORS  ARE RECOMPUTED TO REFLECT THE NEW ORIENTATION WITH
R1277        RESPECT TO THE NB.  BIT10 OF LRSTAT IS CLEARED TO ALLOW LR
R1278        MEASUREMENTS AND THE JOB TERMINATES.

 12781                           33,3630  0 0004 0  REREPOS   INHINT
 12783  REF  35  LAST  886       33,3631  4 0107 0            CS       FLGWRD11
 12785  REF  12  LAST  868       33,3632  7 5015 1            MASK     PRIO3
 12787  REF  36  LAST  888       33,3633  26 107 0            ADS      FLGWRD11

 1279   REF 245  LAST  886       33,3634  0 4616 1  HIGATJOB  TC       BANKCALL        START LRPOS2 JOB
 1280   REF   2  LAST  568       33,3635   53454 1            CADR     LRPOS2
 1281   REF 246  LAST  888       33,3636  0 4616 1            TC       BANKCALL        PUT HIGATJOB TO SLEEP UNTIL JOB IS DONE
 1282   REF  17  LAST  886       33,3637   17705 0            CADR     RADSTALL
 1283   REF   1                  33,3640  1 3653 0            TCF      POSALARM        BAD END   ALARM

 1284   REF   2  LAST  256       33,3641  3 7714 1  POSGOOD   CA       PRIO23          REDUCE PRIORITY FOR INTERPRETIVE COMPS.
 1285   REF  16  LAST  828       33,3642  0 5146 1            TC       PRIOCHNG

 1286   REF   1                  33,3643  0 3717 0            TC       SETPOS2         LR IN POS2 - SET UP TRANSFORMATIONS

 12862  REF  62  LAST  884       33,3644  0 5504 0            TC       UPFLAG
 12864  REF   1                  33,3645   00256 0            ADRES    LPOS2FLG
 1287   REF  94  LAST  887       33,3646  0 5516 0  ENDPOS    TC       DOWNFLAG
 1288   REF   1                  33,3647   00252 1            ADRES    NOLRREAD        RESET NOLRREAD FLAG TO ENABLE LR READING
 12882  REF  75  LAST  868       33,3650  0 5353 1  LRRESTRT  TC       PHASCHNG

 12884                           33,3651   00001 0            OCT      1
 1289   REF 138  LAST  887       33,3652  0 5155 0            TC       ENDOFJOB

 1290   REF   1                  33,3653  3 3757 1  POSALARM  CA       OCT523
 1291   REF 247  LAST  868       33,3654  0 4616 1            TC       BANKCALL
 1292   REF   7  LAST  518       33,3655   21563 1            CADR     PRIOLARM        FLASH ALARM CODE
 1293   REF   1                  33,3656  1 3650 0            TCF      LRRESTRT        V34-TERMINATE R12 (NOLRRBIT SET)
 1294   REF   1                  33,3657  1 3662 1            TCF      P1CHK           PROCEED
 1295   REF   1                  33,3660  1 3670 1            TCF      P2CHK           V32E
 1296   REF 139  LAST  888       33,3661  0 5155 0            TC       ENDOFJOB

 12962  REF  63  LAST  888       33,3662  0 5504 0  P1CHK     TC       UPFLAG
 12964  REF   1                  33,3663   00261 1            ADRES    NO511FLG
 1297   REF  45  LAST  870       33,3664  3 4746 0            CA       BIT6
 1298   REF   2  LAST  870       33,3665  0 3674 1            TC       POSTST
 1299   REF   1                  33,3666  0 3646 0            TC       ENDPOS
 1300   REF   1                  33,3667  1 3641 0            TCF      POSGOOD         NOT POS1 - CHANGE TO POS2

 13005  REF  29  LAST  881       33,3670  3 4745 0  P2CHK     CA       BIT7
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13007  REF   3  LAST  888   33,3671  0 3674 1            TC       POSTST
1301   REF   2  LAST  888   33,3672  1 3641 0            TCF      POSGOOD
13015  REF   2  LAST  888   33,3673  1 3653 0            TCF      POSALARM
13017                       33,3674  0 0006 1  POSTST    EXTEND
1302   REF  23  LAST  784   33,3675  02 033 0            RAND     CHAN33
13025                       33,3676  0 0006 1            EXTEND
1303   REF   5  LAST  529   33,3677  1 6745 0            BZF      TCQ
13035  REF   4  LAST  525   33,3700  1 6742 1            TCF      Q+1
1304   REF  11  LAST  742   33,3701  0 4645 1  SETPOS1   TC       MAKECADR        MUST BE CALLED BY BANKCALL
1305   REF   1              33,3702  55'656 1            TS       LRADRET1        SAVE RETURN CADR, SINCE BUF2 CLOBBERED

1306   REF  59  LAST  887   33,3703  3 4752 0            CAF      TWO
1307   REF   7  LAST  887   33,3704  55'674 1            TS       STILBADH        INITIALIZE STILBAD
1308   REF   6  LAST  886   33,3705  55'675 0            TS       STILBADV        INITIALIZE STILBAD

1309   REF 163  LAST  881   33,3706  3 4755 1            CA       ZERO            INDEX FOR LRALPHA,LRBETA IN POS 1.
1310   REF   5  LAST  883   33,3707  55'670 0            TS       LRLCTR          SET L,M,R, AND S TO ZERO
1311   REF   5  LAST  884   33,3710  55'672 1            TS       LRMCTR
1312   REF   4  LAST  883   33,3711  55'671 1            TS       LRRCTR
1313   REF   4  LAST  884   33,3712  55'673 0            TS       LRSCTR
1314   REF  11  LAST  886   33,3713  55'651 0            TS       VSELECT         INITIALIZE VSELECT

1315   REF   1              33,3714  0 3720 1            TC       SETPOS          CONTINUE WITH COMPUTATIONS

1316   REF   2  LAST  889   33,3715  3 1656 0            CA       LRADRET1
1317   REF  14  LAST  743   33,3716  0 4640 1            TC       BANKJUMP        RETURN TO CALLER


1318   REF  60  LAST  889   33,3717  3 4752 0  SETPOS2   CA       TWO             INDEX FOR POS2
1319   REF 222  LAST  883   33,3720  56 002 0  SETPOS    XCH      Q               SAVE INDEX IN Q
1320   REF   2  LAST  151   33,3721  55'650 1            TS       LRADRET         SAVE RETURN

1321   REF  11  LAST  881   33,3722  3 5014 1            CA       EBANK5
1322   REF  46  LAST  885   33,3723  54 003 0            TS       EBANK
1323   REF   2  LAST  123   E5,1522                      EBANK=   LRALPHA

1324                        33,3724  0 0006 1            EXTEND
1325   REF 223  LAST  889   33,3725  5 0002 0            INDEX    Q
1326   REF   3  LAST  889   33,3726  3 1523 1            DCA      LRALPHA         LRALPHA IN A, LRBETA IN L
1327   REF  22  LAST  879   33,3727  54 771 1            TS       CDUSPOT +4      ROTATION ABOUT X
1328   REF  23  LAST  889   33,3730  22 765 0            LXCH     CDUSPOT         ROTATION ABOUT Y
1329   REF 164  LAST  889   33,3731  3 4755 1            CA       ZERO
1330   REF  24  LAST  889   33,3732  54 767 0            TS       CDUSPOT +2      ZERO ROTATION ABOUT Z.

1331   REF  14  LAST  885   33,3733  3 5016 0            CA       EBANK7
1332   REF  47  LAST  889   33,3734  54 003 0            TS       EBANK
1333   REF   3  LAST  889   E7,1650                      EBANK=   LRADRET

1334   REF 158  LAST  882   33,3735  0 6042 1            TC       INTPRET
1335                        33,3736   45175 0            VLDAO    CALL
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 1336   REF   5  LAST  781   33,3737   06520 0                  UNITY          CONVERT UNITY(ANTENNA) TO NB
 1337   REF   2  LAST  577   33,3740   47653 1                  TRG*SMNB
 1338   REF   2  LAST  117   33,3741   26237 0          STOVL   VYBEAMNB
 1339   REF  11  LAST  813   33,3742   06522 1                  UNITX          CONVERT UNITX(ANTENNA) TO NB
 1340                        33,3743   77624 1          CALL
 1341   REF   4  LAST  552   33,3744   47673 0                  *SMNB*
 1342   REF   2  LAST  117   33,3745   02245 0          STORE   VXBEAMNB
 1343                        33,3746   76435 1          VXV     VSL1
 1344   REF   3  LAST  890   33,3747   02237 0                  VYBEAMNB
 1345   REF   3  LAST  879   33,3750   26231 0          STOVL   VZBEAMNB       Z = X * Y
 1346   REF   1              33,3751   26003 0                  HBEAMANT
 1347                        33,3752   77624 1          CALL
 1348   REF   5  LAST  890   33,3753   47673 0                  *SMNB*         CONVERT TO NB
 1349   REF   2  LAST  877   33,3754   02273 0          STORE   HBEAMNB
 1350                        33,3755   77776 1          EXIT

 1351   REF   4  LAST  889   33,3756   01650 0          TC      LRADRET


 1352                        33,3757   00523 0  OCT523  OCT     00523
 0001                        21,2145                          BANK    21
 0002   REF   3  LAST  867   21,2000                          SETLOC  R10
 0003                        21,2145                          BANK
                             .
 0004   REF  38  LAST  878   E7,1536                          EBANK=  UNIT/R/
 0005   REF   2 LAST   42 TC   42:      6      6*             COUNT*  $$/P10

 0006   REF   2  LAST  823   21,2145  23'714 1  LANDISP  LXCH    PIPCTR1      UPDATE TBASE2 AND PIPCTR SIMULTANEOUSLY.
 0007   REF  13  LAST  854   21,2146  4 0025 1           CS      TIME1
 0008   REF   4  LAST  853   21,2147  53'055 1           DXCH    TBASE2

 0009   REF  25  LAST  860   21,2150  4 0103 1           CS      FLAGWRD7     IS LANDING ANALOG DISPLAYS FLAG SET?
 0010   REF   3  LAST  734   21,2151  7 4741 0           MASK    SWANDBIT
 0011   REF 266  LAST  883   21,2152  10 000 0           CCS     A
 0012   REF   1              21,2153  1 3052 1           TCF     DISPRSET     NO.
 0013   REF  26  LAST  528   21,2154  3 1300 0           CA      IMODES33     BIT 7 = 0 (DO ALTRATE), =1 (DO ALT.)
 0014   REF  30  LAST  888   21,2155  7 4745 1           MASK    BIT7
 0015   REF 267  LAST  891   21,2156  10 000 0           CCS     A
 0016   REF   1              21,2157  1 2231 1           TCF     ALTOUT
 0017   REF   1              21,2160  0 2315 1  ALTROUT  TC      DISINDAT     CHECK MODE SELECT SWITCH AND DIDFLG.
 0018   REF  27  LAST  891   21,2161  4 1300 1           CS      IMODES33
 0019   REF  31  LAST  891   21,2162  7 4745 1           MASK    BIT7
 0020   REF  28  LAST  891   21,2163  27'300 1           ADS     IMODES33     ALTERNATE ALTITUDE RATE WITH ALTITUDE.
 0021   REF  39  LAST  816   21,2164  3 4752 0           CAF     BIT2         RATE COMMAND IS EXECUTED BEFORE RANGE.
 0022                        21,2165  0 0006 1           EXTEND
 0023   REF  12  LAST  830   21,2166  05 014 1           WOR     CHAN14       ALTRATE (BIT2 = 1), ALTITUDE (BIT2 = 0).
 0024   REF   6  LAST  872   21,2167  3 1743 0  ARCCMP   CA      RUNIT        COMPUTE ALTRATE=RUNIT.VVECT M/CS *2(-6).
 0025                        21,2170  0 0006 1           EXTEND
 0026   REF   2  LAST  153   21,2171  7 1706 0           MP      VVECT        MULTIPLY X-COMPONENTS.
 0027   REF  24  LAST  812   21,2172  56 070 0           XCH     RUPTREG1     SAVE SINGLE PRECISION RESULT M/CS*2(-6).
 0028   REF   7  LAST  891   21,2173  3 1744 1           CA      RUNIT +1     MULTIPLY Y-COMPONENTS.
 0029                        21,2174  0 0006 1           EXTEND
 0030   REF   3  LAST  891   21,2175  7 1707 1           MP      VVECT +1
 0031   REF  25  LAST  891   21,2176  26 070 1           ADS     RUPTREG1     ACCUMULATE PARTIAL PRODUCTS.
 0032   REF   8  LAST  891   21,2177  3 1745 0           CA      RUNIT +2     MULTIPLY Z-COMPONENTS.
 0033                        21,2200  0 0006 1           EXTEND
 0034   REF   4  LAST  891   21,2201  7 1710 1           MP      VVECT +2
 0035   REF  26  LAST  891   21,2202  26 070 1           ADS     RUPTREG1     ALTITUDE RATE IN M/CS *2(-6).
 0036   REF   1              21,2203  3 2000 0           CA      ARCONV       CONVERT ALTRATE TO BIT UNITS (.5FPS/BIT)
 0037                        21,2204  0 0006 1           EXTEND
 0038   REF  27  LAST  891   21,2205  7 0070 1           MP      RUPTREG1
 0039                        21,2206  20 001 1           DDOUBL
 0040                        21,2207  20 001 1           DDOUBL
 0041   REF  28  LAST  891   21,2210  56 070 0           XCH     RUPTREG1     ALTITUDE RATE IN BIT UNITS*2(-14).
 0042   REF   3  LAST  872   21,2211  3 1716 0           CA      DALTRATE     ALTITUDE RATE COMPENSATION FACTOR.
 0043                        21,2212  0 0006 1           EXTEND
 0044   REF   2  LAST  153   21,2213  7 1715 1           MP      DT
 0045   REF  29  LAST  891   21,2214  6 0070 0           AD      RUPTREG1
 0046   REF   2  LAST  153   21,2215  55'711 0           TS      ALTRATE      ALTITUDE RATE IN BIT UNITS*2(-14).
 0047   REF   3  LAST  891   21,2216  4 1711 0           CS      ALTRATE
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0048                        21,2217  C 0006 1            EXTENO              CHECK POLARITY CF ALTITUDE RATE.
0049                        21,2220  6 2222 1            BZMF    +2
0050   REF   1              21,2221  1 2224 0            TCF     DATAOUT     NEGATIVE - SEND POS. PULSES TO ALTM REG.
0051   REF   4  LAST  891   21,2222  3 1711 1            CA      ALTRATE     POSITIVE OR ZERC - SET SIGN 8IT = 1 AND
0052   REF  34  LAST  536   21,2223  6 4735 1            AD      8IT15       SENO TO ALTM REGISTER  *DO NOT SENO +0*
0053   REF   1              21,2224  54 C6C 0  OATAOUT   TS      ALTM        ACTIVATE THE LANDING ANALOG DISPLAYS - -
0054   REF  31  LAST  618   21,2225  3 4751 0            CAF     8IT3
0055                        21,2226  C 0006 1            EXTENO
0056   REF  13  LAST  891   21,2227  C5 014 1            WOR     CHAN14      8IT3 DRIVES THE ALT/ALTRATE METER.
0057   REF  61  LAST  887   21,2230  1 5261 0            TCF     TASKOVER    EXIT

0058   REF   2  LAST  891   21,2231  0 2315 1  ALTCUT    TC      DISINDAT    CHECK MODE SELECT SWITCH AND DIDFLG.
0059   REF  32  LAST  891   21,2232  4 4745 1            CS      BIT7
0060   REF  29  LAST  891   21,2233  7 1300 1            MASK    IMODES33
0061   REF  30  LAST  892   21,2234  55'300 1            TS      1MODES33    ALTERNATE ALTITUDE RATE WITH ALTITUDE.
0062   REF  40  LAST  891   21,2235  4 4752 1            CS      8IT2
0063                        21,2236  C 0006 1            EXTEND
0064   REF  14  LAST  892   21,2237  C3 014 1            WANO    CHAN14
0065   REF   3  LAST  871   21,2240  11'741 0            CCS     ALT8ITS     =-1 IF OLD ALT. DATA TO8E EXTRAPOLATED.
0066                        21,2241  1 2245 1            TCF     +4
0067                        21,2242  1 2245 1            TCF     +3
0068   REF   1              21,2243  1 2263 0            TCF     OLDDATA
0069   REF   4  LAST  892   21,2244  55'741 0            TS      ALT8ITS     SET ALT8ITS FROM -0 TO +0.
0070   REF  96  LAST  879   21,2245  4 4753 0            CS      ONE
0071   REF   5  LAST  892   21,2246  53'742 0            DXCH    ALT8ITS     SET ALT8ITS=-1 FOR SWITCH USE NEXT PASS.
0072   REF   2  LAST  153   21,2247  53'713 1            DXCH    ALTSAVE
0073   REF  31  LAST  777   21,2250  3 4742 1            CA      BIT10       NEW ALTITUOE EXTRAPOLATICN WITH ALTRATE.
0074   REF 224  LAST  889   21,2251  56 C02 0            XCH     Q
0075                        21,2252  22 007 0            LXCH    7           ZL
0076   REF   3  LAST  891   21,2253  3 1715 0            CA      DT
0077                        21,2254  C 0006 1            EXTEND
0078   REF 225  LAST  892   21,2255  10 002 1            DV      Q           RESCALE DT*2(-14) TO *2(-9) TIME IN CS.
0079                        21,2256  C 0006 1            EXTEND
0080   REF   1              21,2257  7 2002 0            MP      ARTCA2      .0021322 *2(+8)
0081   REF   2  LAST  892   21,2260  1 2264 1            TCF     OLDDATA +1  RATE APPLIES FOR DT CS.

0082   REF   3  LAST  892   21,2261  53'713 1  ZDATA2    DXCH    ALTSAVE
0083   REF   1              21,2262  1 2304 0            TCF     NEWDATA
0084   REF   1              21,2263  3 2001 1  OLCDATA   CA      ARTOA       RATE APPLIES FOR .5 SEC. (4X/SEC. CYCLE)
0085                        21,2264  C 0C06 1            EXTENO
0086   REF   5  LAST  892   21,2265  7 1711 0            MP      ALTRATE     EXTRAPOLATE WITH ALTITUOE RATE.
0087                        21,2266  20 001 1            DDCUBL
0088   REF   4  LAST  892   21,2267  6 1713 0            AO      ALTSAVE +1
0089   REF   5  LAST  892   21,2270  55'713 1            TS      ALTSAVE +1
0090   REF 165  LAST  889   21,2271  3 4755 1            CAF     ZERC
0091   REF   6  LAST  892   21,2272  27'712 0            AOS     ALTSAVE
0092   REF  22  LAST  820   21,2273  3 4733 1            CAF     POSMAX      FORCE SIGN AGREEMENT ASSUMING A
0093   REF  97  LAST  892   21,2274  6 4753 1            AD      ONE         NON-NEGATIVE ALTSAVE.
0094   REF   7  LAST  892   21,2275  6 1713 0            AD      ALTSAVE +1  IF ALTSAVE IS NEGATIVE, ZERC ALTSAVE
0095   REF   8  LAST  892   21,2276  55'713 1            TS      ALTSAVE +1  AND ALTSAVE +1 AT ZERODATA.
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 0096   REF 166  LAST  892   21,2277  3 4755 1             CAF    ZERO
 0097   REF  23  LAST  892   21,2300  6 4733 1             AD     POSMAX
 0098   REF   9  LAST  892   21,2301  6 1712 1             AD     ALTSAVE
 0099   REF  10  LAST  893   21,2302  55'712 0             TS     ALTSAVE          POSSIBLY SKIP TO NEWDATA.
 0100   REF   1              21,2303  1 3047 0             TCF    ZERODATA
 0101   REF  11  LAST  893   21,2304  11'713 1  NEWDATA    CCS    ALTSAVE +1
 0102                        21,2305  1 2311 1             TCF    +4
 0103                        21,2306  1 2311 1             TCF    +3
 0104   REF 167  LAST  893   21,2307  3 4755 1             CAF    ZERO             SET NEGATIVE ALTSAVE +1 TO +0.
 0105   REF  12  LAST  893   21,2310  55'713 1             TS     ALTSAVE +1
 0106   REF  13  LAST  893   21,2311  11'712 0             CCS    ALTSAVE          PROVIDE A 15 BIT UNSIGNED OUTPUT.
 0107   REF  35  LAST  892   21,2312  3 4735 1             CAF    BIT15            THE HI-ORDER PART IS +1 OR +0.
 0108   REF  14  LAST  893   21,2313  6 1713 0             AD     ALTSAVE +1
 0109   REF   2  LAST  892   21,2314  1 2224 0             TCF    DATAOUT          DISPATCH UNSIGNED BITS TO ALTM REG.
 0110                        21,2315  0 0006 1  DISINDAT   EXTEND
 0111   REF   3  LAST  823   21,2316  23'714 1             QXCH   LADQSAVE         SAVE RETURN TO ALTROUT +1 OR ALTOUT +1
 0112   REF  46  LAST  888   21,2317  3 4746 0             CAF    BIT6
 0113                        21,2320  0 0006 1             EXTEND                  WISHETH THE ASTRONAUT THE ANALOG
 0114   REF   6  LAST  824   21,2321  02 030 0             RAND   CHAN30           DISPLAYS?  I.E.,
 0115   REF 268  LAST  891   21,2322  10 000 0             CCS    A                IS THE MODE SELECT SWITCH IN PGNCS?
 0116   REF   2  LAST  891   21,2323  1 3052 1             TCF    DISPRSET         NO.  ASTRONAUT REQUESTS NO INERTIAL DATA
 0117   REF  27  LAST  796   21,2324  4 0075 1             CS     FLAGWRD1         YES. CHECK STATUS OF DIDFLAG.
 0118   REF   2  LAST  219   21,2325  7 4736 0             MASK   DIDFLBIT
 0119                        21,2326  0 0006 1             EXTEND
 0120   REF   1              21,2327  1 2365 1             BZF    SPEEDRUN         SET. PERFORM DATA DISPLAY SEQUENCE.
 0121   REF  28  LAST  893   21,2330  4 0075 1             CS     FLAGWRD1         RESET. PERFORM INITIALIZATION FUNCTIONS.
 0122   REF   3  LAST  893   21,2331  7 4736 0             MASK   DIDFLBIT
 0123   REF  29  LAST  893   21,2332  26 075 1             ADS    FLAGWRD1         SET DIDFLAG.
 0124   REF  33  LAST  892   21,2333  4 4745 1             CS     BIT7
 0125   REF  31  LAST  892   21,2334  7 1300 1             MASK   IMODES33         TO DISPLAY ALTRATE FIRST AND ALT. SECOND
 0126   REF  32  LAST  893   21,2335  55'300 1             TS     IMODES33
 0127   REF  25  LAST  825   21,2336  4 0074 0             CS     FLAGWRD0         ARE WE IN DESCENT TRAJECTORY?
 0128   REF   2  LAST  825   21,2337  7 4752 1             MASK   R10FLBIT
 0129                        21,2340  0 0006 1             EXTEND
 0130   REF  62  LAST  892   21,2341  1 5261 0             BZF    TASKOVER         NO
 0131   REF  29  LAST  892   21,2342  3 4744 1             CAF    BIT8             YES.
 0132                        21,2343  0 0006 1             EXTEND
 0133   REF  51  LAST  780   21,2344  05 012 1             WOR    CHAN12           SET DISPLAY INERTIAL DATA OUTBIT.
 0134   REF 168  LAST  893   21,2345  3 4755 1             CAF    ZERO
 0135   REF   2  LAST  152   21,2346  55'702 1             TS     TRAKLATV         LATERAL VELOCITY MONITOR FLAG
 0136   REF   2  LAST  152   21,2347  55'703 0             TS     TRAKFWDV         FORWARD VELOCITY MONITOR FLAG
 0137   REF   2  LAST  152   21,2350  55'676 0             TS     LATVMETR         LATVEL MONITOR METER
 0138   REF   2  LAST  152   21,2351  55'677 1             TS     FORVMETR         FORVEL MONITOR METER
 0139   REF  37  LAST  830   21,2352  3 4750 1             CAF    BIT4
 0140   REF  25  LAST  846   21,2353  0 5173 1             TC     TWIDDLE
 0141   REF   1              21,2354   02356 0             ADRES  INTLZE
 0142   REF  63  LAST  893   21,2355  1 5261 0             TCF    TASKOVER
 0143   REF  41  LAST  892   21,2356  3 4752 0  INTLZE     CAF    BIT2
 0144                        21,2357  0 0006 1             EXTEND
 0145   REF  52  LAST  893   21,2360  05 012 1             WOR    CHAN12           ENABLE RR ERROR COUNTER.
 0146   REF  33  LAST  893   21,2361   4 1300 1             CS       IMODES33
 0147   REF  30  LAST  893   21,2362   7 4744 0             MASK     BIT8
 0148   REF  34  LAST  894   21,2363  27'300 1             ADS      IMODES33          SET INERTIAL DATA FLAG.
 0149   REF  64  LAST  893   21,2364   1 5261 0             TCF      TASKOVER

 0150   REF  22  LAST  880   21,2365   4 1234 1  SPEEDRUN CS       PIPTIME +1        UPDATE THE VELOCITY VECTOR
 0151   REF  14  LAST  891   21,2366   6 0025 0             AD       TIME1             COMPUTE T - TN
 0152   REF   9  LAST  565   21,2367   6 4736 1             AD       HALF              CORRECT FOR POSSIBLE OVERFLOW OF TIME1.
 0153   REF  10  LAST  894   21,2370   6 4736 1             AD       HALF
 0154   REF   4  LAST  892   21,2371  57'715 0             XCH      DT                SAVE FOR LATER USE
 0155   REF  17  LAST  811   21,2372   3 4777 1             CA       1SEC
 0156   REF   8  LAST  617   21,2373  54 065 0             TS       ITEMP5            INITIALIZE FOR DIVISION LATER
 0157                        21,2374   0 0006 1             EXTEND
 0158   REF  11  LAST  880   21,2375   3 1236 1             DCA      GDT/2             COMPUTE THE X-COMPONENT OF VELOCITY.
 0159                        21,2376  20 001 1              DDOUBL
 0160                        21,2377  20 001 1              DDOUBL
 0161                        21,2400   0 0006 1             EXTEND
 0162   REF   5  LAST  894   21,2401   7 1715 1             MP       DT
 0163                        21,2402   0 0006 1             EXTEND
 0164   REF   9  LAST  894   21,2403  10 065 0              DV       ITEMP5
 0165   REF   5  LAST  891   21,2404  57'706 1             XCH      VVECT             VVECT = G(T-TN) M/CS *2(-5)
 0166                        21,2405   0 0006 1             EXTEND
 0167   REF  18  LAST  880   21,2406   3 1527 0             DCA      V                 M/CS *2(-7)
 0168                        21,2407  20 001 1              DDOUBL                     RESCALE TO 2(-5)
 0169                        21,2410  20 001 1              DDOUBL
 0170   REF   6  LAST  894   21,2411  27'706 0             ADS      VVECT             VVECT = VN + G(T-TN) M/CS *2(-5)
 0171   REF  13  LAST  887   21,2412   3 0037 0             CA       PIPAX             DELV CM/SEC *2(-14)
 0172   REF   4  LAST  865   21,2413   6 1157 0             AD       PIPATMPX          IN CASE PIPAX HAS BEEN ZEROED
 0173                        21,2414   0 0006 1             EXTEND
 0174   REF   1              21,2415   7 2004 0             MP       KPIP1(5)          DELV M/CS *2(-5)
 0175   REF   7  LAST  894   21,2416  27'706 0             ADS      VVECT             VVECT = VN + DELV + GN(T-TN) M/CS *2(-5)
 0176                        21,2417   0 0006 1             EXTEND
 0177   REF  12  LAST  894   21,2420   3 1240 0             DCA      GDT/2 +2          COMPUTE THE Y-COMPONENT OF VELOCITY.
 0178                        21,2421  20 001 1              DDOUBL
 0179                        21,2422  20 001 1              DDOUBL
 0180                        21,2423   0 0006 1             EXTEND
 0181   REF   6  LAST  894   21,2424   7 1715 1             MP       DT
 0182                        21,2425   0 0006 1             EXTEND
 0183   REF  10  LAST  894   21,2426  10 065 0              DV       ITEMP5
 0184   REF   8  LAST  894   21,2427  57'707 0             XCH      VVECT +1
 0185                        21,2430   0 0006 1             EXTEND
 0186   REF  19  LAST  894   21,2431   3 1531 1             DCA      V +2
 0187                        21,2432  20 001 1              DDOUBL
 0188                        21,2433  20 001 1              DDOUBL
 0189   REF   9  LAST  894   21,2434  27'707 1             ADS      VVECT +1
 0190   REF   4  LAST  887   21,2435   3 0040 0             CA       PIPAY
 0191   REF   4  LAST  865   21,2436   6 1160 1             AD       PIPATMPY
 0192                        21,2437   0 0006 1             EXTEND
 0193   REF   2  LAST  894   21,2440   7 2004 0             MP       KPIP1(5)
 0194   REF  10  LAST  894   21,2441  27'707 1             ADS      VVECT +1
 0195                          21,2442  0 0006 1          EXTEND
 0196   REF  13  LAST  894     21,2443  3 1242 1          DCA      GDT/2 +4        COMPUTE THE Z-COMPONENT OF VELOCITY.
 0197                          21,2444  20 001 1          DDOUBL
 0198                          21,2445  20 001 1          DDOUBL
 0199                          21,2446  0 0006 1          EXTEND
 0200   REF   7  LAST  894     21,2447  7 1715 1          MP       DT
 0201                          21,2450  0 0006 1          EXTEND
 0202   REF  11  LAST  894     21,2451  10 065 0          DV       ITEMP5
 0203   REF  11  LAST  894     21,2452  57'710 0          XCH      VVECT +2
 0204                          21,2453  0 0006 1          EXTEND
 0205   REF  20  LAST  894     21,2454  3 1533 0          DCA      V +4
 0206                          21,2455  20 001 1          DDOUBL
 0207                          21,2456  20 001 1          DDOUBL
 0208   REF  12  LAST  895     21,2457  27'710 1          ADS      VVECT +2
 0209   REF   7  LAST  866     21,2460  3 0041 1          CA       PIPAZ
 0210   REF   4  LAST  865     21,2461  6 1161 0          AD       PIPATMPZ
 0211                          21,2462  0 0006 1          EXTEND
 0212   REF   3  LAST  894     21,2463  7 2004 0          MP       KPIP1(5)
 0213   REF  13  LAST  895     21,2464  27'710 1          ADS      VVECT +2

 0214   REF  32  LAST  892     21,2465  3 4751 0          CAF      BIT3            PAUSE 40 MS TO LET OTHER RUPTS IN.
 0215   REF   9  LAST  852     21,2466  0 5224 0          TC       VARDELAY

 0216   REF  26  LAST  893     21,2467  4 0074 0          CS       FLAGWRD0        ARE WE IN DESCENT TRAJECTORY?
 0217   REF   3  LAST  893     21,2470  7 4752 1          MASK     R10FLBIT
 0218   REF 269  LAST  893     21,2471  10 000 0          CCS      A
 0219                          21,2472  1 2474 0          TCF      +2              YES.
 0220   REF   4  LAST  893     21,2473  0 1714 1          TC       LADQSAVE        NO.

 02201  REF  42  LAST  893     21,2474  3 4752 0          CAF      BIT2            CHECK TO SEE IF RR ERROR COUNTERS
 02202                         21,2475  0 0006 1          EXTEND                   ARE ENABLED.
 02203  REF  53  LAST  893     21,2476  02 012 0          RAND     CHAN12
 02204  REF 270  LAST  895     21,2477  10 000 0          CCS      A               IF NOT,
 02205                         21,2500  1 2502 0          TCF      +2
 02206  REF   3  LAST  893     21,2501  1 3052 1          TCF      DISPRSET        RE-INITIALIZE LANDING ANALOG DISPLAYS

 0221   REF   5  LAST  880     21,2502  3 1733 1          CA       DELVS           HI X OF VELOCITY CORRECTION TERM.
 0222   REF  14  LAST  895     21,2503  6 1706 1          AD       VVECT           HI X OF UPDATED VELOCITY VECTOR.
 0223   REF  35  LAST  863     21,2504  54 061 1          TS       ITEMP1          = VX - DVX M/CS*2(-5).
 0224   REF   6  LAST  895     21,2505  3 1735 1          CA       DELVS +2            Y
 0225   REF  15  LAST  895     21,2506  6 1707 0          AD       VVECT +1            Y
 0226   REF  11  LAST  745     21,2507  54 062 1          TS       ITEMP2          = VY - DVY M/CS*2(-5).
 0227   REF   7  LAST  895     21,2510  3 1737 0          CA       DELVS +4            Z
 0228   REF  16  LAST  895     21,2511  6 1710 0          AD       VVECT +2            Z
 0229   REF  19  LAST  746     21,2512  54 063 0          TS       ITEMP3          = VZ - DVZ M/CS*2(-5).
 0230   REF  36  LAST  895     21,2513  3 0061 0          CA       ITEMP1          COMPUTE VHY, VELOCITY DIRECTED ALONG THE
 0231                          21,2514  0 0006 1          EXTEND                   Y-COORDINATE.
 0232   REF   5  LAST  871     21,2515  7 1717 0          MP       UHYP            HI X OF CROSS-RANGE HALF-UNIT VECTOR.
 0233   REF  30  LAST  891     21,2516  56 070 0          XCH      RUPTREG1
 0234   REF  12  LAST  895     21,2517  3 0062 0          CA       ITEMP2
 0235                         21,2520   C 0006 1             EXTEND
 0236   REF   6  LAST  895    21,2521   7 1721 0             MP       UHYP +2              Y
 0237   REF  31  LAST  895    21,2522  26 C70  1             AOS      RUPTREG1      ACCUMULATE PARTIAL PROOUCTS.
 0238   REF  20  LAST  895    21,2523   3 0C63 1             CA       ITEMP3
 0239                         21,2524   C 0006 1             EXTENO
 0240   REF   7  LAST  896    21,2525   7 1723 1             MP       UHYP +4              Z
 0241   REF  32  LAST  896    21,2526  26 070  1             ADS      RUPTREG1
 0242   REF  33  LAST  896    21,2527   3 0070 0             CA       PUPTREG1
 0243                         21,2530   6 C000 1             DDUBLE
 0244   REF   2  LAST  153    21,2531  57'704  0             XCH      VHY           VHY=VMP.UHYP M/CS*2(-5).
 0245   RFF  37  LAST  895    21,2532   3 0C61 C             CA       ITEMP1        NOW COMPUTE VHZ, VFLOCITY DIRECTEO ALONG
 0246                         21,2533   0 0006 1             EXTENO                 THE Z-COORDINATE.
 0247   REF   4  LAST  871    21,2534   7 1725 1             MP       UHZP          HI X OF COWN-RANGE HALF-UNIT VECTOR.
 0248   REF  34  LAST  896    21,2535  56 C70  0             XCH      RUPTREG1
 0249   REF  13  LAST  895    21,2536   3 0062 0             CA       ITEMP2
 0250                         21,2537   0 0006 1             EXTENO
 0251   REF   5  LAST  896    21,2540   7 1727 C             MP       UHZP +2              Y
 0252   REF  35  LAST  896    21,2541  26 070  1             ADS      RUPTREG1      ACCUMULATE PARTIAL PROOUCTS.
 0253   REF  21  LAST  896    21,2542   3 0C63 1             CA       ITEMP3
 0254                         21,2543   C 0006 1             EXTENO
 0255   RFF   6  LAST  896    21,2544   7 1731 1             MP       UHZP +4              Z
 0256   REF  36  LAST  896    21,2545  26 070  1             ADS      RUPTREG1
 0257   REF  37  LAST  896    21,2546   3 0070 0             CA       RUPTREG1
 0258                         21,2547   6 0000 1             DDUBLE
 0259   REF   2  LAST  153    21,2550  57'705  1             XCH      VHZ           VHZ = VMP.UHZP M/CS*2(-5).
 0260   REF   7  LAST  734    21,2551   3 5015 0  GET22/32   CAF      EBANK6        GET SIN(AOG),COS(ADG) FROM GPMATRIX.
 0261   REF  48  LAST  889    21,2552  54 CC3  0             TS       EBANK
 0262   REF   3  LAST  190    E6,1417                        EBANK=   M22
 0263   REF   4  LAST  896    21,2553   3 1417 1             CA       M22
 0264   REF  22  LAST  896    21,2554  54 C63  C             TS       ITEMP3
 0265   REF   2  LAST  191    21,2555   3 1420 0             CA       M32
 0266   REF   8  LAST  746    21,2556  54 064  1             TS       ITEMP4
 0267   REF  15  LAST  889    21,2557   3 5016 0             CAF      FBANK7
 0268   REF  49  LAST  896    21,2560  54 003  0             TS       EBANK
 0269   REF  39  LAST  891    E7,1536                        EBANK=   UNIT/R/
 0270   REF   9  LAST  896    21,2561   3 0064 0  LATFWOV    CA       ITEMP4        COMPUTE LATERAL ANO FORWARO VELOCITIES.
 0271                         21,2562   C 0006 1             EXTENO
 0272   REF   3  LAST  896    21,2563   7 1704 1             MP       VHY
 0273   REF  38  LAST  896    21,2564  56 070  0             XCH      RUPTREG1
 0274   REF  23  LAST  896    21,2565   3 0063 1             CA       ITEMP3
 0275                         21,2566   0 0006 1             EXTEND
 0276   REF   3  LAST  896    21,2567   7 1705 0             MP       VHZ
 0277   REF  39  LAST  896    21,2570  26 C70  1             AOS      RUPTREG1      =VHY(COS)AOG+VHZ(SIN)AOG M/CS *2(-5I
 0278   REF   1                 21,2571   3 2003 0             CA       VELCONV       CONVERT LATERAL VELCCITY TO BIT UNITS.
 0279                         21,2572   C 0006 1             EXTENO
 0280   REF  40  LAST  896    21,2573   7 CC70 1             MP       RUPTREG1
 0281                         21,2574  20 001  1             DDUBL
 0282   REF   2  LAST  152    21,2575  57'700  1             XCH      LATVEL        LATERAL VELOCITY IN BIT UNITS *2(-14).
 0283   REF  10  LAST  896    21,2576   3 0064 0             CA       ITEMP4        COMPUTE FCRWARD VELOCITY.
 0284                         21,2577   C 0006 1             EXTENO
 0285    REF    4   LAST   896    21,2600   7 1705 0             MP      VHZ
 0286    REF   41   LAST   896    21,2601   56 070 0             XCH     RUPTREG1
 0287    REF   24   LAST   896    21,2602   3 0063 1             CA      ITEMP3
 0288                             21,2603   0 0006 1             EXTEND
 0289    REF    4   LAST   896    21,2604   7 1704 1             MP      VHY
 0290    REF  271   LAST   895    21,2605   4 0000 0             CS      A
 0291    REF   42   LAST   897    21,2606   26 070 1             ADS     RUPTREG1        =VHZ(COS)AOG-VHY(SIN)AOG M/CS *2(-5).
 0292    REF    2   LAST   896    21,2607   3 2003 0             CA      VELCONV         CONVERT FORWARD VELOCITY TO BIT UNITS.
 0293                             21,2610   0 0006 1             EXTEND
 0294    REF   43   LAST   897    21,2611   7 0070 1             MP      RUPTREG1
 0295                             21,2612   20 001 1             DDOUBL
 0296    REF    3   LAST   317    21,2613   57'701 0             XCH     FORVEL          FORWARD VELOCITY IN BIT UNITS *2(-14).

 0297    REF    1                 21,2614   4 2005 1             CS      MAXVBITS        ACC.=-199.9989 FT./SEC.
 0298    REF    5   LAST   617    21,2615   54 066 0             TS      ITEMP6          -547 BIT UNITS (OCTAL) AT 0.5571 FPS/BIT

 0299    REF   98   LAST   892    21,2616   3 4753 1             CAF     ONE             LOOP TWICE.
 0300    REF   12   LAST   895    21,2617   54 065 0  VMONITOR   TS      ITEMP5          FORWARD AND LATERAL VELOCITY LANDING
 0301    REF   13   LAST   897    21,2620   50 065 1             INDEX   ITEMP5             ANALOG DISPLAYS MONITOR.
 0302    REF    3   LAST   896    21,2621   11'700 0             CCS     LATVEL
 0303                             21,2622   1 2626 0             TCF     +4
 0304    REF    1                 21,2623   1 2727 0             TCF     LVLIMITS
 0305                             21,2624   1 2634 0             TCF     +8D
 0306    REF    2   LAST   897    21,2625   1 2727 0             TCF     LVLIMITS
 0307    REF   14   LAST   897    21,2626   50 065 1             INDEX   ITEMP5
 0308    REF    4   LAST   897    21,2627   4 1700 0             CS      LATVEL
 0309    REF    2   LAST   897    21,2630   6 2005 0             AD      MAXVBITS        +199.9989 FT./SEC.
 0310                             21,2631   0 0006 1             EXTEND
 0311    REF    1                 21,2632   6 2642 0             BZMF    CHKLASTY
 0312    REF    3   LAST   897    21,2633   1 2727 0             TCF     LVLIMITS
 0313    REF   15   LAST   897    21,2634   50 065 1             INDEX   ITEMP5
 0314    REF    5   LAST   897    21,2635   3 1700 1             CA      LATVEL
 0315    REF    3   LAST   897    21,2636   6 2005 0             AD      MAXVBITS
 0316                             21,2637   0 0006 1             EXTEND
 0317                             21,2640   6 2642 0             BZMF    +2
 0318    REF    4   LAST   897    21,2641   1 2727 0             TCF     LVLIMITS
 0319    REF   16   LAST   897    21,2642   50 065 1  CHKLASTY   INDEX   ITEMP5
 0320    REF    3   LAST   893    21,2643   11'676 0             CCS     LATVMETR
 0321                             21,2644   1 2650 1             TCF     +4
 0322    REF    1                 21,2645   1 2661 0             TCF     LASTCK
 0323                             21,2646   1 2655 1             TCF     +7
 0324    REF    2   LAST   897    21,2647   1 2661 0             TCF     LASTCK
 0325    REF   17   LAST   897    21,2650   50 065 1             INDEX   ITEMP5
 0326    REF    6   LAST   897    21,2651   3 1700 1             CA      LATVEL
 0327                             21,2652   0 0006 1             EXTEND
 0328    REF    1                 21,2653   6 2700 1             BZMF    LASTPOSY +5
 0329                             21,2654   1 2661 0             TCF     +5
 0330    REF   18   LAST   897    21,2655   50 065 1             INDEX   ITEMP5
 0331    REF    7   LAST   897    21,2656   4 1700 0             CS      LATVEL
 0332                             21,2657   0 0006 1             EXTEND
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0333  REF   1              21,2660  6 2715 0            BZMF     LASTNEGY +4
0334  REF  19  LAST  897   21,2661  50 065 1  LASTCK    INDEX    ITEMP5
0335  REF   3  LAST  893   21,2662  11'702 1            CCS      TRAKLATV
0336  REF   2  LAST  897   21,2663  1 2673 0            TCF      LASTPOSY
0337                       21,2664  1 2666 1            TCF      +2
0338  REF   2  LAST  898   21,2665  1 2711 0            TCF      LASTNEGY
0339  REF  20  LAST  898   21,2666  50 065 1            INDEX    ITEMP5
0340  REF   8  LAST  897   21,2667  3 1700 1            CA       LATVEL
0341                       21,2670  0 0006 1            EXTEND
0342  REF   1              21,2671  6 2717 1            BZMF     NEGVMAXY
0343  REF   1              21,2672  1 2702 1            TCF      POSVMAXY
0344  REF  21  LAST  898   21,2673  50 065 1  LASTPOSY  INDEX    ITEMP5
0345  REF   9  LAST  898   21,2674  3 1700 1            CA       LATVEL
0346                       21,2675  0 0006 1            EXTEND
0347                       21,2676  6 2700 1            BZMF     +2
0348  REF   2  LAST  898   21,2677  1 2702 1            TCF      POSVMAXY
0349  REF   4  LAST  897   21,2700  4 2005 1            CS       MAXVBITS
0350  REF   1              21,2701  1 3023 1            TCF      ZEROLSTY
0351  REF  22  LAST  898   21,2702  50 065 1  POSVMAXY  INDEX    ITEMP5
0352  REF   4  LAST  897   21,2703  4 1676 0            CS       LATVMETR
0353  REF   5  LAST  898   21,2704  6 2005 0            AD       MAXVBITS
0354  REF  23  LAST  898   21,2705  50 065 1            INDEX    ITEMP5
0355  REF   4  LAST  812   21,2706  56 072 1            XCH      RUPTREG3
0356  REF  99  LAST  897   21,2707  3 4753 1            CAF      ONE
0357  REF   2  LAST  898   21,2710  1 3026 1            TCF      ZEROLSTY +3
0358  REF  24  LAST  898   21,2711  50 065 1  LASTNEGY  INDEX    ITEMP5
0359  REF  10  LAST  898   21,2712  3 1700 1            CA       LATVEL
0360                       21,2713  0 0006 1            EXTEND
0361  REF   2  LAST  898   21,2714  6 2717 1            BZMF     NEGVMAXY
0362  REF   6  LAST  898   21,2715  3 2005 0            CA       MAXVBITS
0363  REF   3  LAST  898   21,2716  1 3023 1            TCF      ZEROLSTY
0364  REF  25  LAST  898   21,2717  50 065 1  NEGVMAXY  INDEX    ITEMP5
0365  REF   5  LAST  898   21,2720  3 1676 1            CA       LATVMETR
0366  REF   7  LAST  898   21,2721  6 2005 0            AD       MAXVBITS
0367                       21,2722  4 0000 0            COM
0368  REF  26  LAST  898   21,2723  50 065 1            INDEX    ITEMP5
0369  REF   5  LAST  898   21,2724  56 072 1            XCH      RUPTREG3
0370  REF 100  LAST  898   21,2725  4 4753 0            CS       ONE
0371  REF   4  LAST  898   21,2726  1 3026 1            TCF      ZEROLSTY +3
0372  REF  27  LAST  898   21,2727  50 065 1  LVLIMITS  INDEX    ITEMP5
0373  REF   4  LAST  898   21,2730  11'702 1            CCS      TRAKLATV
0374  REF   1              21,2731  1 2760 0            TCF      LATVPOS
0375                       21,2732  1 2734 1            TCF      +2
0376  REF   1              21,2733  1 2765 0            TCF      LATVNEG
0377  REF  28  LAST  898   21,2734  50 065 1            INDEX    ITEMP5
0378  REF   6  LAST  898   21,2735  4 1676 0            CS       LATVMETR
0379                       21,2736  0 0006 1            EXTEND
0380                       21,2737  6 2741 1            BZMF     +2
0381  REF   1              21,2740  1 2774 0            TCF      NEGLMLV
0382  REF  29  LAST  898   21,2741  50 065 1            INDEX    ITEMP5
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 0383   REF  11  LAST  898   21,2742  4 1700 0                CS     LATVEL
 0384                        21,2743  0 0006 1                EXTEND
 0385   REF   1              21,2744  6 3017 1                BZMF   LVMINLM
 0386   REF   6  LAST  897   21,2745  6 0066 1                AD     ITEMP6
 0387   REF  30  LAST  898   21,2746  50 065 1                INDEX  ITEMP5
 0388   REF   7  LAST  898   21,2747  6 1676 1                AD     LATVMETR
 0389                        21,2750  0 0006 1                EXTEND
 0390   REF   2  LAST  899   21,2751  6 3017 1                BZMF   LVMINLM
 0391   REF  31  LAST  899   21,2752  50 065 1                INDEX  ITEMP5
 0392   REF  12  LAST  899   21,2753  6 1700 1                AD     LATVEL
 0393                        21,2754  0 0006 1                EXTEND
 0394   REF  32  LAST  899   21,2755  5 0065 1                INDEX  ITEMP5
 0395   REF   8  LAST  899   21,2756  61'676 1                SU     LATVMETR
 0396   REF   5  LAST  898   21,2757  1 3023 1                TCF    ZEROLSTY
 0397   REF  33  LAST  899   21,2760  50 065 1      LATVPOS   INDEX  ITEMP5
 0398   REF  13  LAST  899   21,2761  4 1700 0                CS     LATVEL
 0399                        21,2762  0 0006 1                EXTEND
 0400   REF   3  LAST  899   21,2763  6 3017 1                BZMF   LVMINLM
 0401                        21,2764  1 2771 0                TCF    +5
 0402   REF  34  LAST  899   21,2765  50 065 1      LATVNEG   INDEX  ITEMP5
 0403   REF  14  LAST  899   21,2766  3 1700 1                CA     LATVEL
 0404                        21,2767  0 0006 1                EXTEND
 0405   REF   4  LAST  899   21,2770  6 3017 1                BZMF   LVMINLM
 0406   REF  35  LAST  899   21,2771  50 065 1                INDEX  ITEMP5
 0407   REF   9  LAST  899   21,2772  4 1676 0                CS     LATVMETR
 0408   REF   6  LAST  899   21,2773  1 3023 1                TCF    ZEROLSTY
 0409   REF  36  LAST  899   21,2774  50 065 1      NEGLMLV   INDEX  ITEMP5
 0410   REF  15  LAST  899   21,2775  3 1700 1                CA     LATVEL
 0411                        21,2776  0 0006 1                EXTEND
 0412   REF   5  LAST  899   21,2777  6 3017 1                BZMF   LVMINLM
 0413   REF   8  LAST  898   21,3000  3 2005 0                CA     MAXVBITS
 0414   REF  37  LAST  899   21,3001  50 065 1                INDEX  ITEMP5
 0415   REF  10  LAST  899   21,3002  6 1676 1                AD     LATVMETR
 0416                        21,3003  4 0000 0                COM
 0417   REF  38  LAST  899   21,3004  50 065 1                INDEX  ITEMP5
 0418   REF  16  LAST  899   21,3005  6 1700 1                AD     LATVEL
 0419                        21,3006  0 0006 1                EXTEND
 0420   REF   6  LAST  899   21,3007  6 3017 1                BZMF   LVMINLM
 0421                        21,3010  0 0006 1                EXTEND
 0422   REF  39  LAST  899   21,3011  5 0065 1                INDEX  ITEMP5
 0423   REF  17  LAST  899   21,3012  61'700 1                SU     LATVEL
 0424   REF  40  LAST  899   21,3013  50 065 1                INDEX  ITEMP5
 0425   REF  11  LAST  899   21,3014  6 1676 1                AD     LATVMETR
 0426                        21,3015  4 0000 0                COM
 0427   REF   7  LAST  899   21,3016  1 3023 1                TCF    ZEROLSTY
 0428   REF  41  LAST  899   21,3017  50 065 1      LVMINLM   INDEX  ITEMP5
 0429   REF  12  LAST  899   21,3020  4 1676 0                CS     LATVMETR
 0430   REF  42  LAST  899   21,3021  50 065 1                INDEX  ITEMP5
 0431   REF  18  LAST  899   21,3022  6 1700 1                AD     LATVEL
 0432   REF  43  LAST  899   21,3023  50 065 1      ZEROLSTY  INDEX  ITEMP5
 0433   REF   6  LAST  898   21,3024  56 072 1             XCH    RUPTREG3
 0434   REF 169  LAST  893   21,3025  3 4755 1             CAF    ZERO
 0435   REF  44  LAST  899   21,3026  50 065 1             INDEX  ITEMP5
 0436   REF   5  LAST  898   21,3027  55'702 1             TS     TRAKLATV
 0437   REF  45  LAST  900   21,3030  50 065 1             INDEX  ITEMP5
 0438   REF   7  LAST  900   21,3031  3 0072 1             CA     RUPTREG3
 0439   REF  21  LAST  867   21,3032  6 4754 0             AD     NEG0           AVOIDS +0 DINC HARDWARE MALFUNCTION
 0440   REF  46  LAST  900   21,3033  50 065 1             INDEX  ITEMP5
 0441   REF   2  LAST  540   21,3034  54 053 0             TS     COUTCMD
 0442   REF  47  LAST  900   21,3035  50 065 1             INDEX  ITEMP5
 0443   REF   8  LAST  900   21,3036  3 0072 1             CA     RUPTREG3
 0444   REF  48  LAST  900   21,3037  50 065 1             INDEX  ITEMP5
 0445   REF  13  LAST  899   21,3040  27'676 0             ADS    LATVMETR
 0446   REF  49  LAST  900   21,3041  10 065 0             CCS    ITEMP5         FIRST MONITOR FORWARD THEN LATERAL VEL.
 0447   REF   1              21,3042  1 2617 1             TCF    VMONITOR

 0448   REF   1              21,3043  3 5020 0             CAF    BITSET         DRIVE THE X-POINTER DISPLAY.
 0449                        21,3044  0 0006 1             EXTEND
 0450   REF  15  LAST  892   21,3045  05 014 1             WOR    CHAN14
 0451   REF   5  LAST  895   21,3046  0 1714 1             TC     LADQSAVE       GO TO ALTROUT +1 OR TO ALTOUT +1
 0452   REF 170  LAST  900   21,3047  3 4755 1   ZERODATA  CAF    ZERO           ZERO ALTSAVE AND ALTSAVE +1 - - -
 0453   REF 146  LAST  883   21,3050  54 001 1             TS     L                     NO NEGATIVE ALTITUDES ALLOWED.
 0454   REF   1              21,3051  1 2261 1             TCF    ZDATA2

R0455   *************************************************************************

 0456   REF  27  LAST  895   21,3052  4 0074 0   DISPRSET  CS     FLAGWRD0       ARE WE IN DESCENT TRAJECTORY?
 0457   REF   4  LAST  895   21,3053  7 4752 1             MASK   R10FLBIT
 0458                        21,3054  0 0006 1             EXTEND
 0459   REF   1              21,3055  1 3066 0             BZF    ABORTON        NO.
 0460   REF  31  LAST  894   21,3056  3 4744 1             CAF    BIT8           YES.
 0461   REF  35  LAST  894   21,3057  7 1300 1             MASK   IMODES33       CHECK IF INERTIAL DATA JUST DISPLAYED.
 0462   REF 272  LAST  897   21,3060  10 000 0             CCS    A
 0463   REF  43  LAST  895   21,3061  3 4752 0             CAF    BIT2           YES. DISABLE RR ERROR COUNTER
 0464   REF  32  LAST  900   21,3062  6 4744 1             AD     BIT8           NO. REMOVE DISPLAY INERTIAL DATA
 0465                        21,3063  4 0000 0             COM
 0466                        21,3064  0 0006 1             EXTEND
 0467   REF  54  LAST  895   21,3065  03 012 1             WAND   CHAN12
 0468   REF   1              21,3066  4 3075 1   ABORTON   CS     BITS8/7        RESET INERTIAL DATA, INTERLEAVE FLAGS.
 0469   REF  36  LAST  900   21,3067  7 1300 1             MASK   IMODES33
 0470   REF  37  LAST  900   21,3070  55'300 1             TS     IMODES33
 0471   REF   4  LAST  893   21,3071  4 4736 0             CS     DIDFLBIT
 0472   REF  30  LAST  893   21,3072  7 0075 1             MASK   FLAGWRD1
 0473   REF  31  LAST  900   21,3073  54 075 1             TS     FLAGWRD1       RESET DIDFLAG.
 0474   REF  65  LAST  894   21,3074  1 5261 0             TCF    TASKOVER
R0475   *************************************************************************
 0476                        21,3075   00300 1   BITS8/7   OCT    00300          INERTIAL DATA AND INTERLEAVE FLAGS.

 0477   REF   2  LAST  540      5020             BITSET    =      PRIO6
R0478   *************************************************************************
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L         FINDCDUW - GUIDAP INTERFACE                                                     USER'S PAGE NO.   1       EO S3

R0001     PROGRAM NAME:    FINDCDUW

R0002     MOD NUMBER:      1          68 07 15

R0003     MOD AUTHOR:      KLUMPP

R0004     OBJECTS OF MOD: 1.          TO SUPPLY COMMANDED GIMBAL ANGLES FOR NOUN 22.
R0005                     2.          TO MAINTAIN CORRECT AND CURRENT THRUST
R0006                                 DIRECTION DATA IN ALL MODES.  THIS IS DONE BY
R0007                                 FETCHING FOR THE THRUST DIRECTION FILTER THE
R0008                                 CDUD'S IN PNGCS-AUTO, THE CDU'S IN ALL OTHER
R0009                                 MODES.
R0010                     3.          TO SUBSTITUTE A STOPRATE FOR THE NORMAL
R0011                                 AUTOPILOT COMMANDS WHENEVER
R0012                                 1) NOT IN PNGCS-AUTO, OR
R0013                                 2) ENGINE IS OFF.

R0014     FUNCTIONAL DESCRIPTION:

R0015     FINDCDUW PROVIDES THE INTERFACES BETWEEN THE VARIOUS POWERED FLITE GUIDANCE PROGRAMS
R0017     AND THE DIGITAL AUTOPILOT.  THE INPUTS TO FINDCDUW ARE THE THRUST COMMAND VECTOR
R0019     AND THE WINDOW COMMAND VECTOR, AND THE OUTPUTS ARE THE GIMBAL ANGLE
R0020     INCREMENTS, THE COMMANDED ATTITUDE ANGLE RATES, AND THE COMMANDED
R0021     ATTITUDE LAG ANGLES (WHICH ACCOUNT FOR THE ANGLES BY WHICH THE BODY WILL
R0022     LAG BEHIND A RAMP COMMAND IN ATTITUDE ANGLE DUE TO THE FINITE ANGULAR
R0023     ACCELERATIONS AVAILABLE).

R0024     FINDCDUW ALINES THE ESTIMATED THRUST VECTOR FROM THE THRUST DIRECTION
R0025     FILTER WITH THE THRUST COMMAND VECTOR, AND, WHEN  XOVINHIB  SET,
R0026     ALINES THE +Z HALF OF THE LM ZX PLANE WITH THE WINDOW COMMAND VECTOR,
R0027   SPECIFICATIONS:

R0028   INITIALIZATION: A SINGLE INTERPRETIVE CALL TO  INITCDUW  IS REQUIRED
R0029                   BEFORE EACH GUIDED MANEUVER USING FINDCDUW.

R0030   CALL:           INTERPRETIVE CALL TO FINDCDUW WITH THE THRUST COMMAND
R0031                   VECTOR IN MPAC.  INTERPRETIVE CALL TO FINDCDUW -2 WITH
R0032                   THE THRUST COMMAND VECTOR IN UNFC/2 AND NOT IN MPAC.

R0033   RETURNS:        NORMAL INTERPRETIVE IN ALL CASES

R0034                   1.      NORMALLY ALL AUTOPILOT CMDS ARE ISSUED.

R0035                   2.      IF NOT PNGCS AUTO, DO STOPRATE AND RETURN
R0036                           WITHOUT ISSUING AUTOPILOT CMDS.

R0037                   3.      IF ENGINE OFF, DO STOPRATE AND RETURN WITHOUT
R0038                           ISSUING AUTOPILOT CMDS.

R0039   ALARMS:         00401 IF INPUTS DETERMINE AN ATTITUDE IN GIMBAL LOCK.
R0040                           FINDCDUW DRIVES CDUXD AND CDUYD TO THE RQD VALUES,
R0042                           BUT DRIVES CDUZD ONLY TO THE GIMBAL LOCK CONE.
R0043                   00402 IF UNFC/2 OR UNWC/2 PRODUCE OVERFLOW WHEN
R0044                           UNITIZED USING NORMUNIT.  FINDCDUW ISSUES
R0045                           STOPRATE AS ONLY INPUT TO AUTOPILOT.

R0046   INPUTS:         UNFC/2   THRUST COMMAND VECTOR, NEED NOT BE SEMI-UNIT.
R0047                   UNWC/2   WINDOW COMMAND VECTOR, NEED NOT BE SEMI-UNIT.
R00471                  OGABIAS  POSSIBLE BIAS FOR OUTER GIMBAL ANGLE (ZEROED IN INITCDUW), UNITS OF PI.
R0048                   XOVINHIB FLAG DENOTING X AXIS OVERRIDE INHIBITED.
R0049                   CSMDOCKD FLAG DENOTING CSM DOCKED.
R0050                   STEERSW  FLAG DENOTING INSUFF THRUST FOR THRUST DIR FLTR.
R0052
R0053   OUTPUTS:        DELCDUX,Y,Z
R0054                   OMEGAPD,+1,+2
R0055                   DELPEROR,+1,+2
R0056                   CPHI,+1,+2 FOR NOUN22
R0057
R0058   DEBRIS:         FINDCDUW DESTROYS SINCDUX,Y,Z AND COSCDUX,Y,Z BY
R0059                   WRITING INTO THESE LOCATIONS THE SINES AND COSINES
R0060                   OF THE CDUD'S IN PNGCS-AUTO, OF THE CDU'S OTHERWISE.
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P0061    INITIALIZATICN FOR FINDCDUW

 0062                          30,3071                       BANK    30
 0063    REF    1              30,2000                       SETLOC  FCDUW
 0064                          30,3071                       BANK

 0065    REF    2  LAST  137   E6,1645                       EBANK=  ECDUW

 0066    REF    1                                            COUNT*  $$/FCDUW

 0067                          30,3071   77331 0  INITCDUW  SSP     VLCAD
 00671   REF    2  LAST  808   30,3072   C2300 1                    DGABIAS
 00672                         30,3073   00000 1                    0
 0068    REF   12  LAST  B90   30,3074   C6522 1                    UNITX
 0069    REF    5  LAST  137   30,3075   03267 1            STORE   UNFV/2
 0070    REF    9  LAST  B45   30,3076   C3261 1            STCRE   UNWC/2
 0071                          30,3077   77616 0            RVQ

RD072    FINDCDUW PRELIMINARIES

 0073                          30,3100   77775 1            VLOAD                 FINDCCUW -2: ENTRY WHEN UNFC/2 PRE-STORO
 0074    REF   19  LAST  B45   30,3101   03253 0                    UNFC/2        INPUT VECTORS NEED NCT BE SEMI-UNIT
 0075                          30,3102   40200 1  FINCCDUW  BCV     SETPD         FINDCDUW: ENTRY WHEN UNFC/2 IN MPAC
 0076    REF    5  LAST  843   30,3103   61102 0                    FINDCDUW      INTERPRETER NOW INITIALIZED
 0077                          30,3104   00023 0                    22            LOCS 0 THRU 21 FOR DIRECTICN COSINE MAT
 0078                          30,3105   77420 1            STQ     EXIT
 0079    REF    2  LAST  137   30,3106   03246 1                    QCDUWUSR      SAVE RETURN ADDRESS

R0080    MCRE HAUSKEEPING

 0081    REF    1              30,3107   3 3752 1           CA      ECDUWL
 0082    REF   50  LAST  896   30,3110   56 003 1           XCH     EBANK         SET EBANK
 0083    REF    2  LAST  137   30,3111   55'645 0           TS      ECDUWUSR      SAVE USER'S EBANK

 0084    REF   29  LAST  858   30,3112   3 0111 0           CA      DAPBOOLS
 0085    REF    6  LAST  74B   30,3113   7 4737 1           MASK    CSMDOCKD      CSMDOCKD MUST NOT BE BIT15
 0086    REF  273  LAST  900   30,3114   1C CCC C           CCS     A
 0087    REF  101  LAST  B98   30,3115   3 4753 1           CA      ONE           INDEX IF CSM DCCKEC
 0088    REF    2  LAST  137   30,3116   55'647 1           TS      NDXCDUW

 0089    REF    1              30,3117   3 4743 0           CA      XOVINHIB      XOVINHIB MUST NOT BE BIT15
 0090    REF    2  LAST  137   30,3120   55'651 0           TS      FLPAUTND      SET TO PCS-NON-ZERC FLAG PNGCS AUTO NOT

 0091    REF   30  LAST  904   30,3121   7 0111 1           MASK    DAPBOOLS
 0092    REF    2  LAST  137   30,3122   55'650 1           TS      FLAGDDDW      FLAGDCDW = ANY PNZ NUMBER IF XOV INHIBTO
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L        FINDCDUW - GUIDAP INTERFACE                                              USER'S PAGE NO.   4       E6 S3

P0093    FETCH BASIC DATA

 0094                              30,3123  0 0004 0           INHINT                      RELINT AT PAUTNO (TC INTPRET)

 0095    REF  15  LAST  887        30,3124  3 0032 0           CA      CDUX                FETCH CDUX,CDUY,CDUZ IN ALL CASES, BUT
 0096    REF   2  LAST  867        30,3125  54 771 1           TS      CDUSPOTX                 REPLACE BELOW IF PNGCS AUTO
 0097    REF   6  LAST  865        30,3126  3 0033 1           CA      CDUY
 0098    REF   2  LAST  867        30,3127  54 765 1           TS      CDUSPOTY
 0099    REF   9  LAST  887        30,3130  3 0034 0           CA      CDUZ
 0100    REF   2  LAST  867        30,3131  54 767 0           TS      CDUSPOTZ

 0101    REF  32  LAST  892        30,3132  3 4742 1           CA      BIT10               PNGCS CONTROL BIT
 0102                              30,3133  0 0006 1           EXTEND
 0103    REF   7  LAST  893        30,3134  02 030 0           RAND    CHAN30
 0104    REF 274  LAST  904        30,3135  10 000 0           CCS     A
 0105    REF   1                   30,3136  1 3153 1           TCF     PAUTNO              NOT PNGCS (BITS INVERTED)

 0106    REF  58  LAST  780        30,3137  3 4736 1           CA      BIT14               AUTO MODE BIT
 0107                              30,3140  0 0006 1           EXTEND
 0108    REF   7  LAST  815        30,3141  02 031 1           RAND    CHAN31
 0109    REF 275  LAST  905        30,3142  10 000 0           CCS     A
 0110    REF   2  LAST  905        30,3143  1 3153 1           TCF     PAUTNO              NOT AUTO (BITS INVERTED)

 0111    REF   3  LAST  904        30,3144  55 651 0           TS      FLPAUTNO            RESET FLAG PNGCS AUTO NOT

 0112    REF  13  LAST  524        30,3145  3 1634 1           CA      CDUXD               PNGCS AUTO: FETCH CDUXD,CDUYD,CDUZD
 0113    REF   3  LAST  905        30,3146  54 771 1           TS      CDUSPOTX
 0114    REF   3  LAST  524        30,3147  3 1635 0           CA      CDUYD
 0115    REF   3  LAST  905        30,3150  54 765 1           TS      CDUSPOTY
 0116    REF   3  LAST  523        30,3151  3 1636 0           CA      CDUZD
 0117    REF   3  LAST  905        30,3152  54 767 0           TS      CDUSPOTZ
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R0118    FETCH INPUTS

 0119    REF 159   LAST  889    30,3153   C 6042 1  PAUTNO     TC       INTPRET             ENTERING THRUST CMD STILL IN MPAC
 0120                           30,3154    77634 0             RTB
 0121    REF   9   LAST  807    30,3155    21727 0                      NORMUNIT
 0122    REF   1                30,3156    24001 0             STOVL    UNX/2               SEMI-UNIT THRUST CMD AS INITIAL UNX/2
 0123    REF  10   LAST  904    30,3157    03261 1                      UNWC/2
 0124                           30,3160    47034 0             RTB      RTB
 0125    REF  10   LAST  906    30,3161    21727 0                      NORMUNIT
 0126    REF   4   LAST  879    30,3162    47617 1                      QUICTRIG            ALWAYS RQD TO OBTAIN TRIGS OF CDUD'S
 0127    REF   1                30,3163    24015 0             STOVL    UNZ/2               SEMI-UNIT WINDOW CMD AS INITIAL UNZ/2
 0128    REF   8   LAST  875    30,3164    00325 0                      DELV
 0129                           30,3165    53404 1             BOVB     UNIT
 0130    REF   1                30,3166    61741 1                      NOATTCNT            AT LEAST ONE ENTERING CMD VCT ZERO
 0131                           30,3167    45000 0             BOV      CALL
 0132    REF   1                30,3170    61204 0                      AFTRFLTR            IF UNIT DELV OVERFLOWS, SKIP FILTER
 0133    REF   6   LAST  890    30,3171    47673 0                      *SMNB*              YIELDS UNIT(DELV) IN VEH COORDS FOR FLTR

R0134    THRUST DIRECTION FILTER

 0135                           30,3172    77776 1             EXIT

 0136    REF   1                30,3173   3 1670 1             CA       UNFVY/2             FOR RESTARTS, UNFV/2 ALWAYS INTACT, MPAC
 0137    REF 359   LAST  882    30,3174   22 157 1             LXCH     MPAC      +3             RENEWED AFTER RETURN FROM CALLER,
 0138    REF   1                30,3175   0 3474 0             TC       FLTRSUB                  TWO FILTER UPDATES MAY BE DONE.
 0139    REF   2   LAST  906    30,3176   55'670 0             TS       UNFVY/2             UNFV/2 NEED NOT BE EXACTLY SEMI-UNIT.

 0140    REF   1                30,3177   3 1672 0             CA       UNFVZ/2
 0141    REF 360   LAST  906    30,3200   22 161 1             LXCH     MPAC      +5
 0142    REF   2   LAST  906    30,3201   0 3474 0             TC       FLTRSUB
 0143    REF   2   LAST  906    30,3202   55'672 1             TS       UNFVZ/2

 0144    REF 160   LAST  906    30,3203   C 6042 1             TC       INTPRET             COMPLETES FILTER
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P0145    FIND A SUITABLE WINDOW POINTING VECTOR

 0146                            30,3204   46135 1  AFTRFLTR SLOAD   BHIZ              IF XOV NOT INHIBITED, GO FETCH ZNB
 0147   REF    3  LAST  904      30,3205   03251 1                   FLAGOODW
 0148   REF    1                 30,3206   61212 1                   FETCHZNB
 0149                            30,3207   45175 0           VLOAD   CALL
 0150   REF    2  LAST  906      30,3210   00015 0                   UNZ/2
 0151   REF    1                 30,3211   61514 0                   UNWCTEST

 0152                            30,3212   77775 1  FETCHZNB VLOAD
 0153   REF    1                 30,3213   02162 0                   ZNBPIP
 0154   REF    3  LAST  907      30,3214   34015 1           STCALL  UNZ/2
 0155   REF    2  LAST  907      30,3215   61514 0                   UNWCTEST

 0156                            30,3216   57575 1           VLOAD   VCOMP             Z AND -X CAN'T BOTH PARALLEL UNFC/2
 0157   REF   11  LAST  877      30,3217   02146 0                   XNBPIP
 0158   REF    4  LAST  907      30,3220   00015 0           STORE   UNZ/2

R0159    COMPUTE THE REQUIRED DIRECTION COSINE MATRIX

 0160                            30,3221   47375 0  DCMCL    VLOAD   VXV
 0161   REF    5  LAST  907      30,3222   00015 0                   UNZ/2
 0162   REF    2  LAST  906      30,3223   00001 0                   UNX/2
 0163                            30,3224   41456 0           UNIT    PUSH              UNY/2 FIRST ITERATION
 0164                            30,3225   76435 1           VXV     VSL1
 0165   REF    3  LAST  907      30,3226   00001 0                   UNX/2
 0166   REF    6  LAST  907      30,3227   00015 0           STORE   UNZ/2             -UNZ/2 FIRST ITERATION
 0167                            30,3230   63361 0           VXSC    POVL              EXCHANGE -UNFVZ/2 UNZ/2 FOR UNY/2
 0168   REF    3  LAST  906      30,3231   03273 1                   UNFVZ/2           MUST BE SMALL
 0169                            30,3232   51361 1           VXSC    BVSU              YIELDS -UNFVY/2 UNY/2-UNFVZ/2 UNZ/2
 0170   REF    3  LAST  906      30,3233   03271 0                   UNFVY/2           MUST BE SMALL
 0171                            30,3234   53372 1           VSL1    VAD
 0172   REF    4  LAST  907      30,3235   00001 0                   UNX/2
 0173                            30,3236   77656 1           UNIT                      TOTALLY ELIMINATES THRUST POINTING ERROR
 0174   REF    5  LAST  907      30,3237   00001 0           STORE   UNX/2             UNX/2
 0175                            30,3240   76435 1           VXV     VSL1
 0176   REF    7  LAST  907      30,3241   00015 0                   UNZ/2             -UNZ/2 WAS STORED HERE REMEMBER
 0177   REF    1                 30,3242   00007 0           STORE   UNY/2             UNY/2
 0178                            30,3243   47276 1           VCOMP   VXV
 0179   REF    6  LAST  907      30,3244   00001 0                   UNX/2
 0180                            30,3245   77772 0           VSL1
 0181   REF    8  LAST  907      30,3246   00015 0           STORE   UNZ/2             UNZ/2
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P0182    COMPUTE THE REQUIRED GIMBAL ANGLES

 0183                          30,3247   77624 1                CALL
 0184    REF   1               30,3250   61524 0                       N82CDUSP           YIELDS THE RQO GIMBAL ANGLES, 2'S, PI
 0185                          30,3251   77776 1                EXIT

R01851   BIAS OUTER GIMBAL ANGLE

 01852   REF   3  LAST  904    30,3252   3 1677 0               CA     OGABIAS
 01853   REF 361  LAST  906    30,3253  26 154 0                ADS    MPAC

R0186    LIMIT THE MIDDLE GIMBAL ANGLE & COMPUTE THE UNLIMITED GIMBAL ANGLE CHGS

 0187    REF 362  LAST  908    30,3254   3 0156 0               CA     MPAC      +2       LIMIT THE MGA
 0188    REF 147  LAST  900    30,3255  54 0001 1               TS     L                  CAN'T LXCH: NEED UNLIMITED MGA FOR ALARM
 0189    REF   1               30,3256   3 3764 1               CA     CDUZOLIM
 0190    REF   1               30,3257   0 3720 1               TC     LIMITSUB           YIELDS LIMITED MGA. 1 BIT ERROR POSSIBLE
 0191    REF 363  LAST  908    30,3260  56 156 0                XCH    MPAC      +2           BECAUSE USING 2'S COMP. WHO CARES?
 0192                          30,3261   0 0006 1               EXTEND
 0193    REF 364  LAST  908    30,3262  20 156 1                MSU    MPAC      +2       THIS BETTER YIELD ZERO
 0194                          30,3263   0 0006 1               EXTEND
 0195                          30,3264   1 3266 1               BZF    +2
 0196    REF   1               30,3265   1 3747 1               TCF    ALARMMGA

 0197                          30,3266   0 0004 0   MGARET      INHINT                    RELINT AT TC INTPRET AFTER TCQCDUW

 0198                          30,3267  22 007 0                ZL
 0199    REF  61  LAST  889    30,3270   3 4752 0               CA     TWO
 0200    REF   4  LAST   98    30,3271  54 142 1    DELGMBLP    TS     TEM2

 0201    REF 148  LAST  908    30,3272   3 0001 0               CA     L                  TO PREVENT FALSE STARTS ABOUT X, ZERO
 0202                          30,3273   0 0006 1               EXTEND                        FLAGOODW IF DELGMBZ OR Y TOO BIG.
 0203                          30,3274   7 0000 0               SQUARE
 0204    REF   5  LAST  418    30,3275   6 4350 0               AD     HI5                WITHIN 1 BIT OF -(45 DEG SQUARED)
 0205                          30,3276   0 0006 1               EXTEND
 0206                          30,3277   6 3302 0               BZMF   +3
 0207    REF 171  LAST  900    30,3300   3 4755 1               CA     ZERO
 0208    REF   4  LAST  907    30,3301  55'650 1                TS     FLAGOODW

 0209    REF   5  LAST  908    30,3302  50 142 0                INDEX  TEM2
 0210    REF 365  LAST  908    30,3303   3 0154 1               CA     MPAC
 0211    REF   6  LAST  908    30,3304  50 142 0                INDEX  TEM2
 0212    REF  10  LAST  523    30,3305  54 321 0                TS     CPHI               OUTPUTS TO NOUN22
 0213                          30,3306   0 0006 1               EXTEND
 0214    REF   7  LAST  908    30,3307   5 0142 0               INDEX  TEM2
 0215    REF  14  LAST  905    30,3310  21'634 0                MSU    CDUXD              NO MATTER THAT THESE SLIGHTLY DIFFERENT
 0216                          30,3311   4 0000 0               COM                           FROM WHEN WE INITIALLY FETCHED THEM
 0217    REF   8  LAST  908    30,3312  50 142 0                INDEX  TEM2
 0218    REF   2  LAST  137    30,3313  55'674 1                TS     -DELGMB            -UNLIMITED GIMBAL ANGLE CHGS, 1'S, PI
 0219    REF 149  LAST  908    30,3314  54 001 1                TS     L                  FOR PRECEDING TEST ON NEXT LOOP PASS
 0220    REF   9  LAST  908    30,3315  10 142 1          CCS     TEM2
 0221    REF   1               30,3316  1 3271 1          TCF     DELGMBLP
```

```
P0222   BRANCHES TO NOATTCNT

 0223   REF   4  LAST  905   30,3317  1 1651 0          CCS     FLPAUTNC
 0224   REF   2  LAST  906   30,3320  1 3743 0          TCF     NOATTCNT +2      NOT PNGCS AUTO

 0225   REF  28  LAST  887   30,3321  3 0101 1          CA      FLAGWRD5
 0226   REF   6  LAST  825   30,3322  7 4745 1          MASK    ENGONBIT
 0227                        30,3323  0 0006 1          EXTEND
 0228   REF   3  LAST  910   30,3324  1 3743 0          BZF     NOATTCNT +2      ENGINE NOT ON
```

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P0229   LIMIT THE ATTITUDE ANGLE CHANGES

R0230   THIS SECTION LIMITS THE ATTITUDE ANGLE CHANGES ABOUT A SET OF ORTHOGONAL VEHICLE AXES X,YPRIME,ZPRIME-
R0232   THESE AXES COINCIDE WITH THE COMMANDED VEHICLE AXES IF AND ONLY IF CDUXD IS ZERO.  THE PRIME SYSTEM IS
R0234   THE COMMANDED VEHICLE SYSTEM ROTATED ABOUT THE X AXIS TO BRING THE Z AXIS INTO ALINEMENT WITH THE MIDDLE GIMBAL
R0236   AXIS.  ATTITUDE ANGLE CHANGES IN THE PRIME SYSTEM ARE RELATED TO SMALL GIMBAL ANGLE CHANGES BY:

R0238   * -DELATTX       *   * 1  SIN(CDUZD)  0 * * -DELGMBX *
R0239   *                *   *                  * *          *
R0240   * -DELATTYPRIME * = * 0  COS(CDUZD)  0 * * -DELGMBY *
R0241   *                *   *                  * *          *
R0242   * -DELATTZPRIME *   * 0  0           1 * * -DELGMBZ *

 0243   REF   3  LAST  908   30,3325  23'676 1           LXCH    -DELGMB  +2     SAME AS -DELATTZPRIME UNLIMITED
 0244   REF   3  LAST  904   30,3326  51'647 0           INDEX   NDXCDUW
 0245   REF   1              30,3327  3 3760 0           CA      DAZMAX
 0246   REF   2  LAST  908   30,3330  0 3720 1           TC      LIMITSUB
 0247   REF   4  LAST  911   30,3331  55'676 0           TS      -DELGMB  +2     -DELGMBZ

 0248   REF   5  LAST  911   30,3332  3 1675 1           CA      -DELGMB  +1
 0249                        30,3333  0 0006 1           EXTEND
 0250   REF   3  LAST  482   30,3334  7 0745 0           MP      COSCDUZ         YIELDS -DELATTYPRIME/2 UNLIMITED
 0251   REF 150  LAST  908   30,3335  54 001 1           TS      L
 0252   REF   4  LAST  911   30,3336  51'647 0           INDEX   NDXCDUW
 0253   REF   1              30,3337  3 3762 1           CA      DAY/2MAX
 0254   REF   3  LAST  911   30,3340  0 3720 1           TC      LIMITSUB
 0255                        30,3341  0 0006 1           EXTEND
 0256   REF   4  LAST  911   30,3342  10 745 0           DV      COSCDUZ
 0257   REF   6  LAST  911   30,3343  57'675 1           XCH     -DELGMB  +1     -DELGMBY, FETCHING UNLIMITED VALUE

 0258                        30,3344  0 0006 1           EXTEND
 0259   REF   3  LAST  482   30,3345  7 0737 0           MP      SINCDUZ
 0260                        30,3346  20 001 1           DDOUBL
 0261                        30,3347  4 0000 0           COM
 0262                        30,3350  0 0006 1           EXTEND                  YIELDS +DELATTX UNLIMITD, MAG < 180 DEG,
 0263   REF   7  LAST  911   30,3351  21'674 1           MSU     -DELGMB              BASED ON UNLIMITED DELGMBY.
 0264   REF 151  LAST  911   30,3352  54 001 1           TS      L                    ONE BIT ERROR IF OPERANDS IN MSU
 0265   REF   5  LAST  911   30,3353  51'647 0           INDEX   NDXCDUW              OF MIXED SIGNS.  WHO CARES?
 0266   REF   1              30,3354  3 3760 0           CA      DAXMAX
 0267   REF   4  LAST  911   30,3355  0 3720 1           TC      LIMITSUB
 0268   REF   8  LAST  911   30,3356  55'674 1           TS      -DELGMB         SAVE LIMITED +DELATTX
 0269   REF   5  LAST  908   30,3357  11'650 1           CCS     FLAGOODW
 0270   REF   9  LAST  911   30,3360  4 1674 1           CS      -DELGMB         FETCH IT BACK CHGING SIGN IF WINDOW GOOD
 0271   REF  10  LAST  911   30,3361  55'674 1           TS      -DELGMB         OTHERWISE USE ZERO FOR -DELATTX
 0272   REF  11  LAST  911   30,3362  4 1675 0           CS      -DELGMB  +1
 0273                        30,3363  0 0006 1           EXTEND
 0274   REF   4  LAST  911   30,3364  7 0737 0           MP      SINCDUZ
 0275                        30,3365  20 001 1           DDOUBL                  YIELDS -CNTRIB TO -DELATTX FROM -DELGMBY
 0276   REF  12  LAST  911   30,3366  27'674 1           ADS     -DELGMB         -DELGMBX.  NO OVERFLOW SINCE LIMITED TO
A0277                                                                            20DEG(1+SIN(70DEG)/COS(70DEG)) < 180DEG
```

```
P0278    COMPUTE COMMANDED ATTITUDE RATES

R0279    * OMEGAPD *    * -2  -4 SINCDUZ             +0             * * -DELGMBX *
R0280    *          *    *                                          * *          *
R0281    * OMEGAQD * = * +0  -3 COSCDUZ COSCDUX  -4 SINCDUX * * -DELGMBY *
R0282    *          *    *                                          * *          *
R0283    * OMEGARD *    * +0  +3 COSCDUZ SINCDUX  -4 COSCDUX * * -DELGMBZ *

R0284    ATTITUDE ANGLE RATES IN UNITS OF PI/4 RAD/SEC = K TRIG FCNS IN UNITS OF 2 X GIMBAL ANGLE RATES IN UNITS OF
R0286    PI/2 RAD/SEC.  THE CONSTANTS ARE BASED ON DELGMB BEING THE GIMBAL ANGLE CHANGES IN UNITS OF PI RADIANS,
R0288    AND 2 SECONDS BEING THE COMPUTATION PERIOD (THE PERIOD BETWEEN SUCCESSIVE PASSES THRU FINDCDUW).

 0290    REF  13  LAST  911    30,3367  4 1674 1              CS      -DELGMB
 0291    REF   6  LAST  371    30,3370  55'642 1              TS      OMEGAPD
 0292    REF  14  LAST  912    30,3371  4 1675 0              CS      -DELGMB   +1
 0293                          30,3372  0 0006 1              EXTEND
 0294    REF   5  LAST  911    30,3373  7 0737 0              MP      SINCDUZ
 0295                          30,3374  20 001 1              DDOUBL
 0296    REF   7  LAST  912    30,3375  27'642 1              ADS     OMEGAPD
 0297    REF   8  LAST  912    30,3376  27'642 1              ADS     OMEGAPD

 0298    REF  15  LAST  912    30,3377  4 1675 0              CS      -DELGMB   +1
 0299                          30,3400  0 0006 1              EXTEND
 0300    REF   4  LAST  482    30,3401  7 0747 1              MP      COSCDUX
 0301                          30,3402  20 001 1              DDOUBL
 0302                          30,3403  0 0006 1              EXTEND
 0303    REF   5  LAST  911    30,3404  7 0745 0              MP      COSCDUZ
 0304    REF   2  LAST  371    30,3405  55'643 0              TS      OMEGAQD
 0305    REF  16  LAST  912    30,3406  4 1676 0              CS      -DELGMB   +2
 0306                          30,3407  0 0006 1              EXTEND
 0307    REF   3  LAST  482    30,3410  7 0741 1              MP      SINCDUX
 0308    REF   3  LAST  912    30,3411  27'643 0              ADS     OMEGAQD
 0309    REF   4  LAST  912    30,3412  27'643 0              ADS     OMEGAQD
 0310    REF   5  LAST  912    30,3413  27'643 0              ADS     OMEGAQD

 0311    REF  17  LAST  912    30,3414  3 1675 1              CA      -DELGMB   +1
 0312                          30,3415  0 0006 1              EXTEND
 0313    REF   4  LAST  912    30,3416  7 0741 1              MP      SINCDUX
 0314                          30,3417  20 001 1              DDOUBL
 0315                          30,3420  0 0006 1              EXTEND
 0316    REF   6  LAST  912    30,3421  7 0745 0              MP      COSCDUZ
 0317    REF   2  LAST  371    30,3422  55'644 1              TS      OMEGARD
 0318    REF  18  LAST  912    30,3423  4 1676 0              CS      -DELGMB   +2
 0319                          30,3424  0 0006 1              EXTEND
 0320    REF   5  LAST  912    30,3425  7 0747 1              MP      COSCDUX
 0321    REF   3  LAST  912    30,3426  27'644 1              ADS     OMEGARD
 0322    REF   4  LAST  912    30,3427  27'644 1              ADS     OMEGARD
 0323    REF   5  LAST  912    30,3430  27'644 1              ADS     OMEGARD
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P0324    FINAL TRANSFER

 0325    REF  62  LAST  908    30,3431   3 4752 0              CA      TWO
 0326    REF  10  LAST  909    30,3432  54  142 1   CDUWXFR    TS      TEM2
 0327    REF  11  LAST  913    30,3433  50  142 0              INDEX   TEM2
 0328    REF  19  LAST  912    30,3434   3 1674 0              CA      -DELGMB
 0329                          30,3435   0 0006 1              EXTEND
 0330    REF   1               30,3436   7 3765 1              MP      DT/DELT          RATIO OF DAP INTERVAL TO CDUW INTERVAL
 0331    REF   1               30,3437   0 3734 1              TC      ONESTO2S
 0332    REF  12  LAST  913    30,3440  50  142 0              INDEX   TEM2
 0333    REF   4  LAST  137    30,3441  55'637 0               TS      DELCDUX          ANGLE INTERFACE

 0334    REF  13  LAST  913    30,3442  50  142 0              INDEX   TEM2
 0335    REF   9  LAST  912    30,3443  11'642 1               CCS     OMEGAPD
 0336    REF 102  LAST  904    30,3444   6 4753 1              AD      ONE
 0337                          30,3445   1 3447 1              TCF     +2
 0338    REF 103  LAST  913    30,3446   6 4753 1              AD      ONE
 0339                          30,3447   0 0006 1              EXTEND                   WE NOW HAVE ABS(OMEGAPD,QD,RD)
 0340    REF  14  LAST  913    30,3450   5 0142 0              INDEX   TEM2
 0341    REF  10  LAST  913    30,3451   7 1642 1              MP      OMEGAPD
 0342                          30,3452   0 0006 1              EXTEND
 0343    REF  22  LAST  746    30,3453   7 4741 0              MP      BIT11            1/16
 0344                          30,3454   0 0006 1              EXTEND
 0345    REF  15  LAST  913    30,3455   5 0142 0              INDEX   TEM2                              2
 0346    REF   5  LAST  369    30,3456  11'530 1               DV      IJACC            UNITS PI/4 RAD/SEC
 0347    REF 152  LAST  911    30,3457  54  001 1              TS      L
 0348    REF   1               30,3460   3 3762 1              CA      DELERLIM
 0349    REF   5  LAST  911    30,3461   0 3720 1              TC      LIMITSUB
 0350    REF  16  LAST  913    30,3462  50  142 0              INDEX   TEM2
 0351    REF   3  LAST  371    30,3463  55'274 0               TS      DELPEROR         LAG ANGLE = OMEGA ABS(OMEGA)/2 ACCEL
 0352    REF  17  LAST  913    30,3464  10  142 1              CCS     TEM2
 0353    REF   1               30,3465   1 3432 0              TCF     CDUWXFR

R0354    HAUSKEEPING AND RETURN

 0355    REF   3  LAST  904    30,3466   3 1645 1   TCQCDUW    CA      ECDUWUSR
 0356    REF  51  LAST  904    30,3467  54  003 0              TS      EBANK            RETURN USER'S EBANK

 0357    REF 161  LAST  906    30,3470   0 6042 1              TC      INTPRET
 0358                          30,3471    52001 1              SETPD   GOTO
 0359                          30,3472    00001 0                      0
 0360    REF   3  LAST  904    30,3473    03246 1                      QCDUWUSR         NORMAL AND ABNORMAL RETURN TO USER
```

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L        FINDCDUW - GUIDAP INTERFACE                                                  USER'S PAGE NO.  13      E6 S3

P0361    THRUST VECTOR FILTER SUBROUTINE

 0362                             30,3474   0 0006 1  FLTRSUB  EXTEND
 0363    REF  18  LAST  913       30,3475  22 142 0            QXCH    TEM2
 0364    REF   3  LAST   98       30,3476  54 143 0            TS      TEM3                   SAVE ORIGINAL OFFSET
 0365                             30,3477   4 0000 0           COM                            ONE MCT, NO WDS, CAN BE SAVED IF NEG OF
 0366    REF 153  LAST  913       30,3500   6 0001 0           AD      L                          ORIG OFFSET ARRIVES IN A, BUT IT'S
 0367                             30,3501   0 0006 1           EXTEND                             NOT WORTH THE INCREASED OBSCURITY.
 0368    REF   6  LAST  911       30,3502   5 1647 0           INDEX   NDXCDUW
 0369    REF   1                  30,3503   7 3753 1           MP      GAINFLTR
 0370    REF 154  LAST  914       30,3504  54 001 1            TS      L                      INCR TO OFFSET, UNLIMITED
 0371    REF   1                  30,3505   3 3755 0           CA      DUNFVLIM               SAME LIMIT FOR Y AND Z
 0372    REF   6  LAST  913       30,3506   0 3720 1           TC      LIMITSUB               YIELDS INCR TO OFFSET, LIMITED
 0373    REF   4  LAST  914       30,3507   6 0143 1           AD      TEM3                   ORIGINAL OFFSET
 0374    REF 155  LAST  914       30,3510  54 001 1            TS      L                      TOTAL OFFSET, UNLIMITED
 0375    REF   1                  30,3511   3 3756 0           CA      UNFVLIM                SAME LIMIT FOR Y AND Z
 0376    REF   7  LAST  914       30,3512   0 3720 1           TC      LIMITSUB               YIELDS TOTAL OFFSET, LIMITED
 0377    REF  19  LAST  914       30,3513   0 0142 0           TC      TEM2

R0378    SUBR TO TEST THE ANGLE BETWEEN THE PROPOSED WINDOW AND THRUST CMD VCTS

 0379                             30,3514   63441 0   UNWCTEST DOT     DSQ
 0380    REF   7  LAST  907       30,3515   00001 0                    UNX/2
 0381                             30,3516   50025 0            DSU     BMN
 0382    REF   1                  30,3517   21760 0                    DOTSWFMX
 0383    REF   1                  30,3520   61221 1                    OCMCL
 0384                             30,3521   43531 1            SSP     RVQ                    RVQ FOR ALT CHOICE IF DOT MAGN TOO LARGE
 0385    REF   6  LAST  911       30,3522   03251 1                    FLAGOOOW                   ZEROING WINDOW GOOD FLAG
 0386                             30,3523   00000 1                    0
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P0387   NB2CDUSP RETURNS THE 2'S COMPLEMENT, PI, SP CDU ANGLES X,Y,Z IN MPAC,+1,+2 GIVEN THE MATRIX WHOSE ROW VECTORS
R0389   ARE THE SEMI-UNIT NAV BASE VECTORS X,Y,Z EXPRESSED IN STABLE MEMBER COORDINATES, LOCATED AT 0 IN THE PUSH LIST.

R0391   NB2CDUSP USES ARCTRGSP WHICH HAS A MAXIMUM ERROR OF +-4 BITS.

 0392                          30,3524   63545 0  NB2CDUSP DLOAD  DSQ
 0393                          30,3525   00003 1                 2
 0394                          30,3526   51021 0           BDSU   8PL
 0395   REF   6  LAST  652     30,3527   06514 1                  DP1/4TH
 0396                          30,3530   61533 0                  +3
 0397                          30,3531   77745 1           DLOAD
 0398   REF  15  LAST  805     30,3532   06524 1                  ZEROVECS         IN CASE SIN WAS SLIGHTLY > 1/2
 0399                          30,3533   77566 1           SQRT   EXIT             YIELDS COS(CDUZ) IN UNITS OF 2

 0400                          30,3534   0 0006 1          EXTEND
 0401   REF 366  LAST  908     30,3535   3 0155 0          DCA    MPAC
 0402                          30,3536   20 001 1          DDOUBL
 0403   REF   3  LAST   98     30,3537   54 145 0          TS     TEM5
 0404                          30,3540   1 3543 1          TCF    +3
 0405   REF  24  LAST  893     30,3541   3 4733 1          CA     POSMAX           OVERFLOW. FETCH POSMAX, MPAC ALWAYS POS
 0406   REF   4  LAST  915     30,3542   54 145 0          TS     TEM5             COS(CDUZ) IN TEM5, UNITS 1

 0407   REF  29  LAST  879     30,3543   50 120 1          INDEX  FIXLOC
 0408                          30,3544   3 0002 0          CA     2
 0409   REF 367  LAST  915     30,3545   22 154 1          LXCH   MPAC
 0410   REF   1                30,3546   0 3613 0          TC     ARCTRGSP
 0411   REF 368  LAST  915     30,3547   54 156 1          TS     MPAC      +2     CDUZ

 0412   REF 172  LAST  908     30,3550   3 4755 1          CA     ZERO
 0413   REF   1                30,3551   0 3571 1          TC     DV8YCOSM
 0414   REF  20  LAST  854     30,3552   3 4751 0          CA     FOUR
 0415   REF   2  LAST  915     30,3553   0 3571 1          TC     DV8YCOSM
 0416   REF   9  LAST  338     30,3554   4 0141 1          CS     TEM1
 0417   REF   2  LAST  915     30,3555   0 3613 0          TC     ARCTRGSP
 0418   REF 369  LAST  915     30,3556   54 155 1          TS     MPAC      +1     CDUY

 0419   REF  38  LAST  893     30,3557   3 4750 1          CA     BIT4
 0420   REF   3  LAST  915     30,3560   0 3571 1          TC     DV8YCOSM
 0421   REF   1                30,3561   3 3570 0          CA     16OCT
 0422   REF   4  LAST  915     30,3562   0 3571 1          TC     DV8YCOSM
 0423   REF  10  LAST  915     30,3563   4 0141 1          CS     TEM1
 0424   REF   3  LAST  915     30,3564   0 3613 0          TC     ARCTRGSP
 0425   REF 370  LAST  915     30,3565   54 154 0          TS     MPAC             CDUX

 0426   REF 162  LAST  913     30,3566   0 6042 1          TC     INTPRET
 0427                          30,3567   77616 0           RVQ

 0428                          30,3570   00016 0  16OCT    OCT    16
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R0429    THE ELEMENTS OF THE NAV BASE MATRIX WHICH WE MUST DIVIDE BY COS(MGA)
R0430    ALREADY CONTAIN COS(MGA)/2 AS A FACTOR.  THEREFORE THE QUOTIENT SHOULD
R0431    ORDINARILY NEVER EXCEED 1/2 IN MAGNITUDE.  BUT IF THE MGA IS NEAR PI/2
R0432    THEN COS(MGA) IS NEAR ZERO, AND THERE MAY BE SOME CHAFF IN THE OTHER
R0433    ELEMENTS OF THE MATRIX WHICH WOULD PRODUCE CHAOS UNDER DIVISION.
R0434    BEFORE DIVIDING WE MAKE SURE COS(MGA) IS AT LEAST ONE BIT LARGER
R0435    THAN THE MAGNITUDE OF THE HIGH ORDER PART OF THE OPERAND.

R0436    IF ONE OR MORE DIVIDES CANNOT BE PERFORMED, THIS MEANS THAT THE
R0437    REQUIRED MGA IS VERY NEARLY +-PI/2 AND THEREFORE THE OTHER GIMBAL
R0438    ANGLES ARE INDETERMINATE.  THE INNER AND OUTER GIMBAL ANGLES RETURNED
R0439    IN THIS CASE WILL BE RANDOM MULTIPLES OF PI/2.

 0440    REF  30  LAST  915    30,3571  6 0120 1  DVBYCOSM AD      FIXLOC
 0441    REF   1               30,3572  54 116 0           TS      ADDRWD          ADRES OF OPERAND

 0442    REF   2  LAST  916    30,3573  50 116 1           INDEX   ADDRWD          FETCH NEG ABS OF OPERAND, AD TEM5, AND
 0443                          30,3574  3 0000 1           CA      0                    SKIP DIVIDE IF RESULT NEG OR ZERO
 0444                          30,3575  0 0006 1           EXTEND
 0445                          30,3576  6 3600 1           BZMF    +2
 0446                          30,3577  4 0000 0           COM
 0447    REF   5  LAST  915    30,3600  6 0145 1           AD      TEM5            C(A) ZERO OR NEG, C(TEM5) ZERO OR POS
 0448                          30,3601  0 0006 1           EXTEND
 0449    REF   1               30,3602  6 3610 0           BZMF    TSL&TCQ         DIFFERENCE ALWAYS SMALL IF BRANCH

 0450                          30,3603  0 0006 1           EXTEND                  TEM5 EXCEEDS ABS HIGH ORDER PART OF
 0451    REF   3  LAST  916    30,3604  5 0116 1           INDEX   ADDRWD               OPERAND BY AT LEAST ONE BIT.
 0452                          30,3605  3 0001 0           DCA     0                    THEREFORE IT EXCEEDS THE DP OPERAND
 0453                          30,3606  0 0006 1           EXTEND                       AND DIVISION WILL ALWAYS SUCCEED.
 0454    REF   6  LAST  916    30,3607  10 145 0           DV      TEM5
 0455    REF 156  LAST  914    30,3610  54 001 1  TSL&TCQ  TS      L
 0456    REF  11  LAST  915    30,3611  22 141 0           LXCH    TEM1
 0457    REF 226  LAST  892    30,3612  0 0002 0           TC      0
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R0458    ARCTRGSP RETURNS THE 2'S COMPLEMENT, PI, SP ANGLE IN THE A REGISTER GIVEN ITS SINE IN A AND ITS COSINE IN L IN
R0460    UNITS OF 2.  THE RESULT IS AN UNAMBIGUOUS ANGLE ANYWHERE IN THE CIRCLE, WITH A MAXIMUM ERROR OF +-4 BITS.
R0462    THE ERROR IS PRODUCED BY THE SUBROUTINE SPARCSIN WHICH IS USED ONLY IN THE REGION +-45 DEGREES.

 0464                           30,3613   0 0006 1  ARCTRGSP EXTEND
 0465    REF   1                30,3614   1 3656 0           BZF      SINZERO           TO AVOID DIVIDING BY ZERO

 0466                           30,3615   0 0006 1           EXTEND
 0467    REF  10  LAST  423     30,3616  22 144 0            QXCH     TEM4
 0468    REF  20  LAST  914     30,3617  54 142 1            TS       TEM2
 0469    REF 157  LAST  916     30,3620   3 0001 0           CA       L
 0470    REF   5  LAST  914     30,3621  54 143 0            TS       TEM3
 0471    REF 173  LAST  915     30,3622   3 4755 1           CA       ZERO
 0472                           30,3623   0 0006 1           EXTEND
 0473    REF  21  LAST  917     30,3624  10 142 1            DV       TEM2
 0474                           30,3625   0 0006 1           EXTEND
 0475    REF   1                30,3626   1 3645 1           BZF      USECOS

 0476    REF   6  LAST  917     30,3627  10 143 0            CCS      TEM3              SIN IS SMALLER OR EQUAL
 0477    REF 174  LAST  917     30,3630   3 4755 1           CA       ZERO
 0478                           30,3631   1 3635 0           TCF      +4
 0479    REF  22  LAST  917     30,3632   4 0142 1           CS       TEM2              IF COS NEG, REVERSE SIGN OF SIN,
 0480    REF  23  LAST  917     30,3633  54 142 1            TS       TEM2                   ANGLE = PI-ARCSIN(SIN)
 0481    REF   4  LAST  820     30,3634   3 4735 1           CA       NEGMAX            PICK UP PI, 2'S COMPLEMENT
 0482    REF   7  LAST  917     30,3635  54 143 0            TS       TEM3              WE NO LONGER NEED COS
 0483    REF  24  LAST  917     30,3636   3 0142 0           CA       TEM2
 0484    REF   2  LAST  802     30,3637   0 3663 1           TC       SPARCSIN -1
 0485    REF   2  LAST  913     30,3640   0 3734 1           TC       ONESTO2S
 0486                           30,3641   0 0006 1           EXTEND
 0487    REF   8  LAST  917     30,3642  20 143 0            MSU      TEM3
 0488    REF   3  LAST  917     30,3643   0 3734 1  1TO2&TCQ TC       ONESTO2S
 0489    REF  11  LAST  917     30,3644   0 0144 0           TC       TEM4

 0490    REF   9  LAST  917     30,3645   4 0143 0  USECOS   CS       TEM3              COS IS SMALLER
 0491    REF   3  LAST  917     30,3646   0 3663 1           TC       SPARCSIN -1       ANGLE = SIGN(SIN)(PI/2-ARCSIN(COS))
 0492    REF  11  LAST  894     30,3647   6 4736 1           AD       HALF
 0493    REF  10  LAST  917     30,3650  54 143 0            TS       TEM3              WE NO LONGER NEED COS
 0494    REF  25  LAST  917     30,3651  10 142 1            CCS      TEM2
 0495    REF  11  LAST  917     30,3652   3 0143 1           CA       TEM3
 0496    REF   1                30,3653   1 3643 1           TCF      1TO2&TCQ
 0497    REF  12  LAST  917     30,3654   4 0143 0           CS       TEM3
 0498    REF   2  LAST  917     30,3655   1 3643 1           TCF      1TO2&TCQ

 0499    REF 158  LAST  917     30,3656  10 001 1   SINZERO  CCS      L
 0500    REF 175  LAST  917     30,3657   3 4755 1           CA       ZERO
 0501    REF 227  LAST  916     30,3660   0 0002 0           TC       Q
 0502    REF   5  LAST  917     30,3661   3 4735 1           CA       NEGMAX            PI, 2'S COMP
 0503    REF 228  LAST  917     30,3662   0 0002 0           TC       Q
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L         FINDCDUW - GUIDAP INTERFACE                                                    USER'S PAGE NO. 17       E6 S3

P0504     SPARCSIN TAKES AN ARGUMENT SCALED UNITY IN A AND RETURNS AN ANGLE SCALED
R0505     180 DEGREES IN A.  IT HAS BEEN UNIT TESTED IN THE REGION +-.94 (+- 70
R0506     DEGREES) AND THE MAXIMUM ERROR IS +-5 BITS WITH AN AVERAGE TIME OF
R0507     450 MICROSECONDS.  SPARCSIN -1 TAKES THE ARGUMENT SCALED TWO.(BOB CRISP)

 0508                               30,3663   6 0000 1             DOUBLE
 0509    REF   8   LAST  448        30,3664  54 0021 0   SPARCSIN  TS        SR
 0510                               30,3665   1 3671 0             TCF       +4
 0511    REF 276   LAST  905        30,3666  50 0000 1             INDEX     A
 0512    REF   1                    30,3667   4 4734 1             CS        LIMITS
 0513    REF   9   LAST  918        30,3670  54 0021 0             TS        SR
 0514                               30,3671   0 0006 1             EXTEND
 0515    REF 277   LAST  918        30,3672   7 0000 0             MP        A
 0516    REF  12   LAST  916        30,3673  54 0141 1             TS        TEM1
 0517                               30,3674   0 0006 1             EXTEND
 0518    REF   1                    30,3675   7 3717 1             MP        DPL9
 0519    REF   1                    30,3676   6 3716 1             AD        DPL7
 0520                               30,3677   0 0006 1             EXTEND
 0521    REF  13   LAST  918        30,3700   7 0141 1             MP        TEM1
 0522    REF   1                    30,3701   6 3715 1             AD        DPL5
 0523                               30,3702   0 0006 1             EXTEND
 0524    REF  14   LAST  918        30,3703   7 0141 1             MP        TEM1
 0525    REF   1                    30,3704   6 3714 0             AD        DPL3
 0526                               30,3705   0 0006 1             EXTEND
 0527    REF  15   LAST  918        30,3706   7 0141 1             MP        TEM1
 0528    REF   1                    30,3707   6 3713 1             AD        DPL1
 0529                               30,3710   0 0006 1             EXTEND
 0530    REF  10   LAST  918        30,3711   7 0021 0             MP        SR
 0531    REF 229   LAST  917        30,3712   0 0002 0             TC        Q
 0532                               30,3713    24406 0   DPL1      DEC       10502
 0533                               30,3714    00660 1   DPL3      DEC       432
 0534                               30,3715    16204 0   DPL5      DEC       7300
 0535                               30,3716    50744 0   DPL7      DEC       -11803
 0536                               30,3717    20315 1   DPL9      DEC       8397
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R0537   LIMITSUB LIMITS THE MAGNITUDE OF THE POSITIVE OR NEGATIVE VARIABLE
R0538   ARRIVING IN L TO THE POSITIVE LIMIT ARRIVING IN A.
R0539   THE SIGNED LIMITED VARIABLE IS RETURNED IN A.

R0540   VERSION COURTESY HUGH BLAIR-SMITH

 0541   REF  16  LAST  918    30,3720  54 141 1  LIMITSUB TS       TEM1
 0542   REF 176  LAST  917    30,3721  3 4755 1           CA       ZERO
 0543                         30,3722  0 0006 1           EXTEND
 0544   REF  17  LAST  919    30,3723  10 141 1           DV       TEM1
 0545   REF 278  LAST  918    30,3724  10 000 0           CCS      A
 0546   REF  18  LAST  919    30,3725  22 141 0           LXCH     TEM1
 0547                         30,3726  1 3730 1           TCF      +2
 0548                         30,3727  1 3732 0           TCF      +3
 0549   REF 159  LAST  917    30,3730  3 0001 0           CA       L
 0550   REF 230  LAST  918    30,3731  0 0002 0           TC       Q
 0551   REF  19  LAST  919    30,3732  4 0141 1           CS       TEM1
 0552   REF 231  LAST  919    30,3733  0 0002 0           TC       Q

R0553   SUBROUTINE TO CONVERT 1'S COMP SP TO 2'S COMP

 0554   REF 279  LAST  919    30,3734  10 000 0  ONESTO2S CCS      A
 0555   REF 104  LAST  913    30,3735  6 4753 1           AD       ONE
 0556   REF 232  LAST  919    30,3736  0 0002 0           TC       Q
 0557   REF 280  LAST  919    30,3737  4 0000 0           CS       A
 0558   REF 233  LAST  919    30,3740  0 0002 0           TC       Q

R0559   NO ATTITUDE CONTROL

 0560   REF  35  LAST  870    30,3741  0 5567 0  NOATTCNT TC       ALARM
 0561                         30,3742   00402 1           OCT      00402                 NO ATTITUDE CONTROL

 0562                         30,3743  0 0004 0  +2       INHINT                         COME HERE FOR NOATTCNT WITHOUT ALARM
 0563   REF  46  LAST  857    30,3744  0 4674 0           TC       IBNKCALL              RELINT AT TC INTPRET AFTER TCQCDUW
 0564   REF   8  LAST  858    30,3745   40166 1           FCADR    STOPRATE
 0565   REF   1               30,3746  1 3466 1           TCF      TCQCDUW               RETURN TO USER SKIPPING AUTOPILOT CMDS

R0566   MIDDLE GIMBAL ANGLE ALARM

 0567   REF  36  LAST  919    30,3747  0 5567 0  ALARMMGA TC       ALARM
 0568                         30,3750   00401 1           OCT      00401
 0569   REF   1               30,3751  1 3266 1           TCF      MGARET
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P0570    ************************************************************************
R0571    CONSTANTS
R0572    ************************************************************************

R0573    ADDRESS CONSTANTS

 0574    REF   3  LAST  904   30,3752   03245 1  ECDUWL     ECADR   ECDUW
R0575
R0576    THRUST DIRECTION FILTER CONSTANTS

 0577                         30,3753   06315 0  GAINFLTR DEC     .2                   GAIN FILTER SANS CSM
 0578                         30,3754   03146 1           DEC     .1                   GAIN FILTER WITH CSM

 0579                         30,3755   00071 1  DUNFVLIM DEC     .007          B-1    7 MR MAX CHG IN F DIR IN VEH IN 2 SECS.
A0580                                                                                 THIS DOES NOT ALLOW FOR S/C ROT RATE.

 0581                         30,3756   02041 0  UNFVLIM  DEC     .129          B-1    129 MR MAX THRUST OFFSET. 105 MR TRAVEL
A0582                                                                                 +10MR DEFL+5MR MECH MOUNT+9MR ABLATION.
R0583
R0584    CONSTANTS RELATED TO GIMBAL ANGLE COMPUTATIONS

 0585                         30,3757   01673 1  DOTSWFMX DEC     .93302        B-4    LIM COLNRTY OF UNWC/2 & UNFC/2 TO 85 DEG
A0586                                                                                 LOWER PART COMES FROM NEXT CONSTANT

 0587                         30,3760   03434 1  DAXMAX   DEC     .1111111111          DELATTX LIM TO 20 DEG IN 2 SECS, 1'S, PI
 0588                         30,3761   00266 0           DEC     .0111111111          2 DEG WHEN CSM DOCKED

 0589                         30,3762   01616 1  DAY/2MAX DEC     .0555555555          LIKEWISE FOR DELATTY
 0590                         30,3763   00133 0           DEC     .0055555555

 0591    REF   2  LAST  911   30,3760            DAZMAX   =       DAXMAX               LIKEWISE FOR DELATTZ

 0592                         30,3764   14344 1  CDUZDLIM DEC     .3888888888          70 DEG LIMIT FOR MGA, 1'S, PI
R0593
R0594    CONSTANTS FOR DATA TRANSFER

 0595                         30,3765   01463 1  DT/DELT  DEC     .05                  .1 SEC/2 SEC WHICH IS THE AUTOPILOT
A0596                                                                                 CONTROL SAMPLE PERIOD/COMPUTATION PERIOD

 0597    REF   2  LAST  911   30,3762            DELERLIM =       DAY/2MAX             10 DEG LIMIT FOR LAG ANGLES, 1'S, PI
R0598

*** END OF FLY     .153 ***
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R0001   PROGRAM NAME- PROG52                                                              DATE- JAN 9, 1967
R0003   MOD NO- 0                                                                         LOG SECTION- P51-P53
R0005   MODIFICATION BY- LONSKE                                                           ASSEMBLY- SUNDANCE REV 46

R0007   FUNCTIONAL DESCRIPTION-

R0008        ALIGNS THE IMU TO ONE OF THREE ORIENTATIONS SELECTED BY THE ASTRONAUT. THE PRESENT IMU ORIENTATION IS KNOWN
R0010   AND IS STORED IN REFSMMAT. THE THREE POSSIBLE ORIENTATIONS MAY BE_

R0011        (A) PREFERRED ORIENTATION

R0012         AN OPTIMUM ORIENTATION FOR A PREVIOUSLY CALCULATED MANUEVER. THIS ORIENTATION MUST BE CALCULATED AND
R0014        STORED BY A PREVIOUSLY SELECTED PROGRAM.

R0015        (B) NOMINAL ORIENTATION

R0016            X    =  UNIT ( R )
R0017            -SM

R0018            Y   =  UNIT (V X R)
R0019             SM

R0020            Z    =  UNIT (X    X   Y   )
R0021             SM              SM      SM

R0022            WHERE_
R0023             R = THE GEOCENTRIC RADIUS VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0025             -

R0026             V = THE INERTIAL VELOCITY VECTOR AT TIME T(ALIGN) SELECTED BY THE ASTRONAUT
R0028             -

R0029        (C) REFSMMAT ORIENTATION

R0030            (D)  LANDING SITE - THIS IS NOT AVAILIBLE IN SUNDANCE

R0031         THIS SELECTION CORRECTS THE PRESENT IMU ORIENTATION. THE PRESENT ORIENTATION DIFFERS FROM THAT TO WHICH IT
R0033        WAS LAST ALIGNED ONLY DUE TO GYRO DRIFT(I.E. NEITHER GIMBAL LOCK NOR IMU POWER INTERRUPTION HAS OCCURED
R0035        SINCE THE LAST ALIGNMENT).

R0036        AFTER A IMU ORIENTATION HAS BEEN SELECTED ROUTINE S52.2 IS OPERATED TO COMPUTE THE GIMBAL ANGLES USING THE
R0038   NEW ORIENTATION AND THE PRESENT VEHICLE ATTITUDE. CAL52A THEN USES THESE ANGLES, STORED IN THETAD,+1,+2, TO
R0040   COARSE ALIGN THE IMU. THE STAR SELECTION ROUTINE, R56, IS THEN OPERATED. IF 2 STARS ARE NOT AVAILABLE AN ALARM
R0042   IS FLASHED TO NOTIFY THE ASTRONAUT. AT THIS POINT THE ASTRONAUT WILL MANUEVER THE VEHICLE AND SELECT 2 STARS
R0044   EITHER MANUALLY OR AUTOMATICALLY. AFTER 2 STARS HAVE BEEN SELECTED THE IMU IS FINE ALIGNED USING ROUTINE R51. IF
R0046   THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING(INDICATED BY RNDVZFLG) P20 IS DISPLAYED. OTHERWISE P00 IS
R0048   REQUESTED.

R0049   CALLING SEQUENCE-
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R0050        THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

R0051    SUBROUTINES CALLED-

R0052        1. FLAGDOWN      7. S52.2          13. NEWMODEX
R0053        2. R02BOTH       8. CAL53A         14. PRIOLARM
R0054        3. GOPERF4       9. FLAGUP
R0055        4. MATMOVE      10. R56
R0056        5. GOFLASH      11. R51
R0057        6. S52.3        12. GOPERF3

R0058    NORMAL EXIT MODES-

R0059        EXITS TO ENDOFJOB

R0060    ALARM OR ABORT EXIT MODES-

R0061        NONE

R0062    OUTPUT-

R0063        THE FOLLOWING MAY BE FLASHED ON THE DSKY
R0064           1. IMU ORIENTATION CODE
R0065           2. ALARM CODE 215 -PREFERRED IMU ORIENTATION NOT SPECIFIED
R0066           3. TIME OF NEXT IGNITION
R0067           4. GIMBAL ANGLES
R0068           5. ALARM CODE 405 -TWO STARS NOT AVAILABLE
R0069           6. PLEASE PERFORM P00
R0070        THE MODE DISPLAY MAY BE CHANGED TO 20

R0071    ERASABLE INITIALIZATION REQUIRED-

R0072        PFRATFLG SHOULD BE SET IF A PREFERRED ORIENTATION HAS BEEN COMPUTED.IF IT HAS BEEN COMPUTED IT IS STORED IN
R0074        XSMD,YSMD,ZSMD.
R0075        RNDVZFLG INDICATES WHETHER THE RENDEZVOUS NAVIGATION PROCESS IS OPERATING.

R0077    DEBRIS-

R0078        WORK AREA
 0079                            33,3760                          BANK    33
 0080    REF   2  LAST  251      15,2000                          SETLOC  P50S
 0081                            15,2050                          BANK

 0082    REF   3  LAST  198      E5,1755                          EBANK=  BESTI
 0083    REF   1                                                  COUNT*  $$/P52
 0084    REF 248  LAST  888      15,2050  0 4616 1  PROG52        TC      BANKCALL
 0085    REF  10  LAST  831      15,2051   11233 0                CADR    R02BOTH          IMU STATUS CHECK
 0086    REF   1                 15,2052  3 4750 1                CAF     PFRATBIT
 0087    REF  27  LAST  856      15,2053  7 0076 1                MASK    FLAGWRD2         IS PFRATFLG SET?
 0088    REF 281  LAST  919      15,2054  10 000 0                CCS     A
 0089   REF    1                15,2055   0 2060 0              TC      P52A            YES
 0090   REF   25   LAST   826   15,2056   3 6250 0              CAF     THREE           DISPLAY REFSMMAT OPTION 3
 0091   REF    2   LAST   923   15,2057   0 2061 1              TC      P52A +1
 0092   REF   41   LAST   846   15,2060   3 4753 1   P52A       CAF     BIT1
 0093   REF    6   LAST   658   15,2061   55'144 0              TS      OPTION2
 0094   REF   42   LAST   923   15,2062   3 4753 1   P52B       CAF     BIT1
 0095   REF  249   LAST   922   15,2063   0 4616 1              TC      BANKCALL        FLASH OPTION CODE  AND ORIENTATION CODE
 0096   REF    1                15,2064    20714 1              CADR    GOPERF4R        FLASH V04N06
 0097   REF   34   LAST   847   15,2065   0 6001 0              TC      GOTOPOOH
 0098                           15,2066   1 2073 0              TCF     +5              V33-PROCEED
 0099   REF    1                15,2067   0 2062 1              TC      P52B            NEW CODE - NEW ORIENTATION CODE INPUT
 0100   REF   76   LAST   888   15,2070   0 5353 1              TC      PHASCHNG        DISPLAY RETURN
 0101                           15,2071    00014 1              OCT     00014
 0102   REF  140   LAST   888   15,2072   0 5155 0              TC      ENDOFJOB

 0103   REF    7   LAST   923   15,2073   3 1144 1              CA      OPTION2
 0104   REF   26   LAST   923   15,2074   7 6250 1              MASK    THREE
 0105   REF  282   LAST   922   15,2075   50 000 1              INDEX   A
 0106                           15,2076   0 2077 0              TC      +1
 0107   REF    1                15,2077   1 2105 0              TCF     OPT4            OPTION 4 LANDING SITE
 0108   REF    1                15,2100   1 2153 0              TCF     P52H            OPTION 1 PREFERRED
 0109   REF    1                15,2101   1 2110 1              TCF     P52T            OPTION 2 NOMINAL
 0110   REF  163   LAST   915   15,2102   0 6042 1   P52E       TC      INTPRET         OPTION 3 REFSMMAT
 0111                           15,2103    77650 1              GOTO
 0112   REF    1                15,2104    32164 0                      P52F            GO DO P51

 0113                           15,2105   0 0006 1   OPT4       EXTEND
 0114   REF    5   LAST   781   15,2106   3 1401 0              DCA     TLAND           IF OPTION 4 DISPLAY TLAND
 0115   REF    2   LAST   923   15,2107   1 2112 0              TCF     P52T +2

 0116                           15,2110   0 0006 1   P52T       EXTEND
 0117   REF   22   LAST   900   15,2111   3 4755 1              DCA     NEG0
 0118   REF   27   LAST   659   15,2112   53'045 0              DXCH    DSPTEM1
 0119   REF    1                15,2113   3 2170 0              CAF     V06N34*
 0120   REF  250   LAST   923   15,2114   0 4616 1              TC      BANKCALL
 0121   REF   26   LAST   847   15,2115    20477 1              CADR    GOFLASH
 0122   REF   35   LAST   923   15,2116   0 6001 0              TC      GOTOPOOH
 0123                           15,2117   0 2121 1              TC      +2
 0124                           15,2120   0 2113 0              TC      -5
 0125   REF   28   LAST   923   15,2121   53'045 0              DXCH    DSPTEM1
 0126                           15,2122   0 0006 1              EXTEND
 0127                           15,2123   6 2125 0              BZMF    +2              IF TIME ZERO OR NEG USE TIME2
 0128                           15,2124   1 2127 0              TCF     +3
 0129                           15,2125   0 0006 1              EXTEND
 0130   REF   28   LAST   887   15,2126   3 0025 0              DCA     TIME2
 0131   REF    4   LAST   204   15,2127   53'775 1              DXCH    TALIGN
 0132   REF    8   LAST   923   15,2130   3 1144 1   P52V       CA      OPTION2
 0133   REF   44   LAST   900   15,2131   7 4752 1              MASK    BIT2
 0134   REF  283   LAST   923   15,2132   10 000 0              CCS     A
 0135   REF    1                15,2133   0 2137 0              TC      P52W
 0136    REF 164  LAST  923   15,2134  0 6042 1          TC       INTPRET          OPTION 4 - GET LS ORIENTATION
 0137                         15,2135   77650 1          GOTO
 0138    REF   1              15,2136   32220 0                   P52LS
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P0139    START ALIGNMENT

 0140    REF 165  LAST  924    15,2137  0 6042 1  P52W      TC      INTPRET
 0141                          15,2140   45145 0            DLOAD   CALL                   PICK UP ALIGN TIME
 0142    REF   5  LAST  923    15,2141   02775 0                    TALIGN                 COMPUTE NOMINAL IMU
 0143    REF   1               15,2142   31651 1                    S52.3                   ORIENTATION
 0144                          15,2143   77624 1  P52D      CALL                           READ VEHICLE ATTITUDE AND
 0145    REF   1               15,2144   31620 1                    S52.2                   COMPUTE GIMBAL ANGLES
 0146                          15,2145   77776 1            EXIT
 0147    REF   2  LAST  489    15,2146  3 5010 0            CAF     V06N22
 0148    REF 251  LAST  923    15,2147  0 4616 1            TC      BANKCALL               DISPLAY GIMBAL ANGLES
 0149    REF  27  LAST  923    15,2150   20477 1            CADR    GOFLASH
 0150    REF  36  LAST  923    15,2151  0 6001 0            TC      GOTOPOOH
 0151    REF   1               15,2152  1 2171 0            TCF     COARSTYP               V33-PROCEED, SEE IF GYRO TORQUE COARSE
 0152    REF 166  LAST  925    15,2153  0 6042 1  P52H      TC      INTPRET
 0153                          15,2154   77650 1            GOTO
 0154    REF   1               15,2155   32143 0                    P52D
 0155    REF 167  LAST  925    15,2156  0 6042 1  REGCOARS  TC      INTPRET
 0156                          15,2157   77624 1            CALL                           DO COARSE ALIGN
 0157    REF   1               15,2160   31321 0                    CAL53A                  ROUTINE
 0158                          15,2161   43014 0  COARSRET  SET     CLEAR
 0159    REF   2  LAST  682    15,2162   01462 0                    REFSMFLG
 0160    REF   2  LAST  764    15,2163   01273 0                    PFRATFLG
 0161                          15,2164   77624 1  P52F      CALL
 0162    REF   1               15,2165   31007 1                    R51
 0163                          15,2166   77776 1  P52OUT    EXIT
 0164    REF  37  LAST  925    15,2167  0 6001 0            TC      GOTOPOOH
 0165    REF   5  LAST  742       5306            VB05N09   =       V05N09
 0166                          15,2170   01442 1  V06N34*   VN      634
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R0167  CHECK FOR GYRO TORQUE COARSE ALIGNMENT
 0168  REF   1                 15,2171  3 2217 1  COARSTYP CAF     OCT13
 0169  REF 252  LAST  925      15,2172  0 4616 1           TC      BANKCALL         DISPLAY V 50N25 WITH COARSE ALIGN OPTION
 0170  REF   5  LAST  784      15,2173   20624 0           CADR    GOPERF1
 0171  REF  38  LAST  925      15,2174  1 6001 1           TCF     GOTOPOOH         V34-TERMINATE
 0172  REF   1                 15,2175  1 2156 0           TCF     REGCOARS         V33-NORMAL COARSE
 0173  REF 168  LAST  925      15,2176  0 6042 1           TC      INTPRET          V32-GYRO TORQUE COARSE
 0174                          15,2177   64375 1           VLOAD   MXV
 0175  REF   4  LAST  151      15,2200   03607 0                   XSMD             GET SM(DESIRED) WRT SM(PRESENT)
 0176  REF  37  LAST  873      15,2201   01734 0                   REFSMMAT
 0177                          15,2202   77656 1           UNIT
 0178  REF   3  LAST  124      15,2203   26665 0           STOVL   XDC
 0179  REF   3  LAST  149      15,2204   03615 0                   YSMD
 0180                          15,2205   53521 1           MXV     UNIT
 0181  REF  38  LAST  926      15,2206   01734 0                   REFSMMAT
 0182  REF   3  LAST  124      15,2207   26673 1           STOVL   YDC
 0183  REF   3  LAST  150      15,2210   03623 0                   ZSMD
 0184                          15,2211   53521 1           MXV     UNIT
 0185  REF  39  LAST  926      15,2212   01734 0                   REFSMMAT
 0186  REF   3  LAST  124      15,2213   36701 1           STCALL  ZDC
 0187  REF   1                 15,2214   21156 1                   GYCOARS
 0188                          15,2215   77650 1           GOTO
 0189  REF   1                 15,2216   32166 1                   P52OUT
 0190                          15,2217   00013 0  OCT13    OCT     13
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P0191     COMPUTE LANDING ORIENTATION FOR OPTION 4
 0192                                15,2220    43014 0  P52LS      SET     CLEAR                GET LANDING SITE ORIENTATION
 0193     REF    4  LAST   786       15,2221    01463 1                     LUNAFLAG
 0194     REF    2  LAST   659       15,2222    00662 0                     ERADFLAG             TO PICK UP RLS
 0195                                15,2223    77201 1             SETPD   VLOAD                -
 0196                                15,2224    00001 0                     0
 0197     REF    9  LAST   834       15,2225    02023 1                     RLS                  PICK UP LANDING SITE VEC IN MF
 0198                                15,2226    41525 0             PDDL    PUSH                 RLS PD 0-5
 0199     REF    6  LAST   925       15,2227    02775 0                     TALIGN
 0200     REF    6  LAST   923       15,2230    36401 1             STCALL  TLAND                JAM ALIGN TIME IN TLAND FOR OPTION 4

 0201     REF    3  LAST   834       15,2231    55716 1                     PP-TC-R              TRANS RLS TO REF
 0202                                15,2232    77742 0             VSR2
 0203     REF    4  LAST   786       15,2233    16032 1             STODL   ALPHAV               INPUT TO LAT-LONG
 0204     REF    7  LAST   927       15,2234    02775 0                     TALIGN
 0205                                15,2235    77624 1             CALL
 0206     REF    1                   15,2236    30440 1                     N89DISP
 0207                                15,2237    53575 0             VLOAD   UNIT                 COMPUTE LANDING SITE ORIENT (XSMD)
 0208     REF    5  LAST   927       15,2240    02032 1                     ALPHAV
 0209     REF    5  LAST   926       15,2241    37607 1             STCALL  XSMD
 0210     REF    1                   15,2242    10757 0                     LSORIENT
 0211                                15,2243    77650 1             GOTO
 0212     REF    2  LAST   925       15,2244    32143 0                     P52D                 NOW GO COMPUTE GIMBAL ANGLES
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P0213    SUBROUTINE TO CALCULATE AND DISPLAY THE LUNAR LANDING SITE

 0214    REF   2  LAST   45    14,2000                        SETLOC P50S1
 0215                          14,2440                        BANK
 0216    REF  16  LAST  390    E5,1642                        EBANK= XSM

 0217                          14,2440  -77620 0  N89DISP     STO
 0218    REF   3  LAST  783    14,2441   02746 0                     QMAJ
 0219    REF  14  LAST  895    14,2442   35242 0              STCALL GDT/2 +4        TEMP STORE TIME
 0220    REF   3  LAST  786    14,2443   26347 0                     LAT-LONG
 0221                          14,2444   70545 1              DLCAD  SR1
 0222    REF   3  LAST  316    14,2445   01122 1                     LONG
 0223    REF   3  LAST  319    14,2446   16711 1              STODL  LANDLONG
 0224    REF   3  LAST  316    14,2447   01124 1                     ALT
 0225    REF   2  LAST  319    14,2450   16713 0              STODL  LANDALT
 0226    REF   3  LAST  316    14,2451   01120 0                     LAT
 0227    REF   3  LAST  319    14,2452   02707 0              STORE  LANDLAT
 0228                          14,2453   77776 1              EXIT

 0229    REF   1               14,2454  3 2477 1  LSDISP      CAF    V06N89*         DISPLAY LAT,LONG/2,ALT
 0230    REF 253  LAST  926    14,2455  0 4616 1              TC     BANKCALL
 0231    REF  28  LAST  925    14,2456   20477 1              CADR   GOFLASH
 0232    REF  39  LAST  926    14,2457  1 6001 1              TCF    GOTOPOOH        V34-TERMINATE-EXIT P57
 0233                          14,2460  1 2462 1              TCF    +2              V33-PROCEED- ACCEPT LS DATA
 0234    REF   1               14,2461  1 2454 1              TCF    LSDISP          V32 OR E- LOOK AGAIN AND/OR LOAD NEW LS

 0235    REF 169  LAST  926    14,2462  0 6042 1              TC     INTPRET
 0236                          14,2463   72545 0              DLCAD  SL1
 0237    REF   4  LAST  928    14,2464   02711 1                     LANDLONG
 0238    REF   4  LAST  928    14,2465   15122 1              STODL  LONG
 0239    REF   3  LAST  928    14,2466   02713 0                     LANDALT
 0240    REF   4  LAST  928    14,2467   15124 1              STODL  ALT
 0241    REF   4  LAST  928    14,2470   02707 0                     LANDLAT
 0242    REF   4  LAST  928    14,2471   15120 0              STODL  LAT
 0243    REF  15  LAST  928    14,2472   01242 1                     GDT/2 +4        PICK UP TIME
 0244                          14,2473   77624 1              CALL                   GET RLS BACK FROM LAT,LONG, ALT
 0245    REF   1               14,2474   26420 0                     LALOTORV        RLS B-29 IN MPAC AND ALPHAV
 0246                          14,2475   77650 1              GOTO
 0247    REF   4  LAST  928    14,2476   02746 0                     QMAJ
 0248                          14,2477   01531 1  V06N89*     VN     689
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```
R0249    NAME -S50 ALIAS  LOCSAM
R0250    BY
R0251    VINCENT
R0252    FUNCTION - COMPUTE INPUTS FOR PICAPAR  AND PLANET

R0253                 DEFINE

R0254
R0255                 U     = UNIT( SUN WRT EARTH)
R0256                  ES

R0257                 U     =UNIT( MOON WRT EARTH)
R0258                  EM

R0259                 R     =POSITION VECTOR OF LEM
R0260                  L

R0261                 R     =MEAN DISTANCE (384402KM) BETWEEN EARTH AND MOON
R0262                  EM

R0263                 P     =RATIO   R   /(DISTANCE SUN TO EARTH)    >.00257125
R0264                              EM

R0265                 R     =EQUATORIAL RADIUSS (6378.166KM) OF EARTH
R0266                  E

R0267                 LOCSAM  COMPUTES IN EARTH INFLUENCE
R0268

R0269            VSUN    =     U
R0270                           ES

R0271            VEARTH  =    -UNIT( R    )
R0272                                 L

R0273            VMOON   =     UNIT(R   .U    - R    )
R0274                                EM   EM      L

R0275            CSUN    =    COS 90

R0276            CEARTH  =     COS(5 +ARCSIN(R  /MAG(R  )))
R0277                                         E       L

R0278            CMOON   =     COS 5

R0279
R0280   INPUT -  TIME IN MPAC
R0281   OUTPUT - LISTED ABOVE
R0282   SUBROUTINES -LSPOS,LEMPREC
R0283   DEBRIS - VAC AREA ,TSIGHT
```

```
 0284    REF   2 LAST   45 TO   45:       8       8*            COUNT* $$/LOSAM

 0285    REF   1                 14,2500                 S50      =       LOCSAM
 0286                            14,2500   77620 0  LOCSAM   STQ
 0287    REF   2  LAST  125      14,2501   02745 0                    QMIN
 0288    REF   2  LAST  259      14,2502   37562 1                    STCALL  TSIGHT
 0289    REF   1                 14,2503   33647 1                    LSPOS
 0290                            14,2504   77745 1           DLOAD
 0291    REF   3  LAST  930      14,2505   03562 0                    TSIGHT
 0292    REF  47  LAST  832      14,2506   34041 0           STCALL  TOEC1
 0293    REF  10  LAST  832      14,2507   27056 1                    LEMPREC
 0294                            14,2510   61131 0           SSP     TIX,2
 0295    REF   9  LAST  723      14,2511   00052 0                    S2
 0296                            14,2512   00000 1                    0
 0297    REF   1                 14,2513   30535 1                    MOONCNTR
 0298                            14,2514   74375 0  EARTCNTR VLOAD   VXSC
 0299    REF   3  LAST  491      14,2515   02723 0                    VMOON
 0300    REF   1                 14,2516   30001 0                    RSUBEM
 0301                            14,2517   52372 0           VSL1    VSU
 0302    REF  26  LAST  832      14,2520   00001 0                    RATT
 0303                            14,2521   77656 1           UNIT
 0304    REF   4  LAST  930      14,2522   26723 0           STCVL   VMOON
 0305    REF  27  LAST  930      14,2523   00001 0                    RATT
 0306                            14,2524   57456 1           UNIT    VCOMP
 0307    REF   3  LAST  125      14,2525   16707 0           STODL   VEARTH
 0308    REF   1                 14,2526   30005 1                    RSUBE
 0309                            14,2527   77624 1           CALL
 0310    REF   1                 14,2530   30567 0                    OCCOS
 0311    REF   1                 14,2531   14017 1           STODL   CEARTH
 0312    REF   1                 14,2532   30576 0                    CSS5
 0313    REF   1                 14,2533   34023 1           STCALL  CMOON
 0314    REF   1                 14,2534   30562 0                    ENDSAM
 0315                            14,2535   74375 0  MOONCNTR VLOAD   VXSC
 0316    REF   5  LAST  930      14,2536   02723 0                    VMOON
 0317    REF   1                 14,2537   30007 0                    ROE
 0318                            14,2540   53445 1           BVSU    UNIT
 0319    REF   2  LAST  124      14,2541   02715 0                    VSUN
 0320    REF   3  LAST  930      14,2542   26715 0           STCVL   VSUN
 0321    REF   6  LAST  930      14,2543   02723 0                    VMOON
 0322                            14,2544   53361 0           VXSC    VAD
 0323    REF   2  LAST  930      14,2545   30001 0                    RSUBEM
 0324    REF  28  LAST  930      14,2546   00001 0                    RATT
 0325                            14,2547   57456 1           UNIT    VCOMP
 0326    REF   4  LAST  930      14,2550   26707 0           STCVL   VEARTH
 0327    REF  29  LAST  930      14,2551   00001 0                    RATT
 0328                            14,2552   57456 1           UNIT    VCOMP
 0329    REF   7  LAST  930      14,2553   16723 0           STODL   VMOON
 0330    REF   1                 14,2554   30003 1                    RSUBM
 0331                            14,2555   77624 1           CALL
 0332    REF   2  LAST  930      14,2556   30567 0                    OCCOS
 0333    REF   2  LAST  930    14,2557    14023 0             STODL   CMOON
 0334    REF   2  LAST  930    14,2560    30576 0                     CSS5
 0335    REF   2  LAST  930    14,2561    00017 1             STORE   CEARTH
 0336                          14,2562    77745 1  ENDSAM     DLOAD
 0337    REF   1               14,2563    30600 1                     CSSUN
 0338    REF   1               14,2564    00021 1             STORE   CSUN
 0339                          14,2565    77650 1             GOTO
 0340    REF   3  LAST  930    14,2566    02745 0                     QMIN
 0341                          14,2567    70471 1  OCCOS      DDV     SR1
 0342                          14,2570    00045 0                     360
 0343                          14,2571    43336 0             ASIN    DAD
 0344    REF   1               14,2572    30602 0                     5DEGREES
 0345                          14,2573    70546 1             COS     SR1
 0346                          14,2574    77616 0             RVQ
 0347                             0016             CEARTH     =       14D
 0348                             0020             CSUN       =       16D
 0349                             0022             CMOON      =       18D
 0350                          14,2575    07760 1  CSS5       2DEC    .2490475          (COS 5)/4
 0350                          14,2576    14473 1
 0351                          14,2577    04000 0  CSSUN      2DEC    .125              (COS60)/4
 0351                          14,2600    00000 1
 0352                          14,2601    00343 0  5DEGREES 2DEC      .013888889          SCALED IN REVS
 0352                          14,2602    21616 0
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R0353    PROGRAM NAME - R56                          DATE  DEC 20 66
R0354    MOD 1                                       LOG SECTION P51-P53
R0355                                                ASSEMBLY  SUNDISK  REV40
R0356    BY KEN VINCENT
R0357
R0358    FUNCTION
R0359      THIS PROGRAM READ THE IMU-CDUS AND COMPUTES THE VEHICLE ORIENTATION
R0360    WITH RESPECT TO INERTIAL SPACE. IT THEN COMPUTES THE SHAFT AXIS (SAX)
R0361    WITH RESPECT TO REFERENCE INERTIAL. EACH STAR IN THE CATALOG IS TESTED
R0362    TO DETERMINE IF IT IS OCCULTED BY EITHER THE EARTH,SUN OR MOON. IF A
R0363    STAR IS NOT OCCULTED  THEN IT IS PAIRED WITH ALL STAR OF LOWER INDEX.
R0364    THE PAIRED STAR  IS TESTED FOR OCCULTATION. PAIRS OF STARS THAT PASS
R0365    THE OCCULTATION TESTS ARE TESTED FOR GOOD SEPARATION.A PAIR OF STARS
R0366    HAVE GOOD SEPERATION IF THE ANGLE BETWEEN THEM IS LESS THAN 100 DEGREES
R0367    AND MORE THAN 50 DEGREES. THOSE PAIRS WITH GOOD SEPARATION
R0368    ARE THEN TESTED TO SEE IF THEY LIE IN CURRENT FIELD OF VIEW.(WITHIN
R0369    50 DEGREESOF SAX).THE PAIR WITH MAX SEPARATION IS CHOSEN FROM
R0370    THOSE WITH GOOD SEPARATION,AND      IN FIELD OF VIEW.
R0371
R0372    CALLING SEQUENCE
R0373    L          TC      BANKCALL
R0374    L+1        CADR    R56
R0375    L+2        ERROR RETURN - NO STARS IN FIELD OF VIEW
R0376    L+3        NORMAL RETURN
R0377
R0378    OUTPUT
R0379    BESTI,BESTJ -SINGLE PREC,INTEGERS,STAR NUMBERS TIMES 6
R0380    VFLAG - FLAG BIT  SET IMPLIES NO STARS IN FIELD OF VIEW
R0381
R0382    INITIALIZATION
R0383    1)A CALL TO LOCSAM MUST BE MADE
R0384
R0385    DEBRIS
R0386    WORK AREA
R0387    X,Y,ZNB
R0388    SINCDU,COSCDU
R0389    STARAD - STAR +5
 0390    REF   1                  14,2603               R56        =       PICAPAR
 0391    REF   1                                                  COUNT*  $$/R56
 0392    REF  12  LAST  889       14,2603   0 4645 1   PICAPAR    TC      MAKECADR
 0393    REF   4  LAST  931       14,2604   55745 1               TS      QMIN
 0394    REF 170  LAST  928       14,2605   0 6042 1              TC      INTPRET
 0395                             14,2606   77624 1               CALL
 0396    REF   4  LAST  552       14,2607   47541 1                       CDUTRIG
 0397                             14,2610   77624 1               CALL
 0398    REF   1                  14,2611   20030 0                       CALCSMSC
 0399                             14,2612   77601 0               SETPD
 0400                             14,2613   00001 0                       0
 0401                             14,2614   71214 0               SET     DLOAD           VFLAG = 1
 0402    REF   1                  14,2615   01465 1                       VFLAG
 0403   REF    1              14,2616    24007 0                      OPZERO
 0404   REF    4   LAST  922  14,2617    26756 1              STOVL   BESTI
 0405   REF    3   LAST  383  14,2620    02665 0                      XNB
 0406                         14,2621    63361 0              VXSC    POVL
 0407   REF    1              14,2622    24005 1                      HALFDP
 0408   REF    3   LAST  376  14,2623    02701 0                      ZNB
 0409                         14,2624    74370 0              AXT,1   VXSC
 0410                         14,2625    00344 1                      2280                 X1 = 37 X 6 +6
 0411   REF    2   LAST  933  14,2626    24005 1                      HALFDP
 0412                         14,2627    77655 1              VAC
 0413                         14,2630    53505 1              VXM     UNIT
 0414   REF   40   LAST  926  14,2631    01734 0                      REFSMMAT
 0415   REF    1              14,2632    02731 0              STORE   SAX                  SAX = SHAFT AXIS
 0416                         14,2633    66331 0              SSP     SSP                  S1=S2=6
 0417   REF    7   LAST  614  14,2634    00051 0                      S1
 0418                         14,2635    00006 1                      6
 0419   REF   10   LAST  930  14,2636    00052 0                      S2
 0420                         14,2637    00006 1                      6
 0421                         14,2640    52100 1   PIC1       TIX,1   GOTO                 MAJOR STAR
 0422   REF    1              14,2641    30643 0                      PIC2
 0423   REF    1              14,2642    30760 0                      PICEND
 0424                         14,2643    50373 0   PIC2       VLOAD*  DOT
 0425   REF    1              14,2644    30347 1                      CATLOG,1
 0426   REF    2   LAST  933  14,2645    02731 0                      SAX
 0427                         14,2646    50025 0              DSU     BMN
 0428   REF    1              14,2647    30757 1                      CSS33
 0429   REF    1              14,2650    30640 0                      PIC1
 0430                         14,2651    77754 1              LXA,2
 0431   REF   24   LAST  979  14,2652    00046 0                      X1
 0432                         14,2653    52104 0   PIC3       TIX,2   GOTO
 0433   REF    1              14,2654    30656 1                      PIC4
 0434   REF    2   LAST  933  14,2655    30640 0                      PIC1
 0435                         14,2656    50373 0   PIC4       VLOAD*  DOT
 0436   REF    2   LAST  933  14,2657    47430 0                      CATLOG,2
 0437   REF    3   LAST  933  14,2660    02731 0                      SAX
 0438                         14,2661    50025 0              DSU     BMN
 0439   REF    2   LAST  933  14,2662    30757 1                      CSS33
 0440   REF    1              14,2663    30653 1                      PIC3
 0441                         14,2664    47773 1              VLOAD*  DOT*
 0442   REF    3   LAST  933  14,2665    30347 1                      CATLOG,1
 0443   REF    4   LAST  933  14,2666    47430 0                      CATLOG,2
 0444                         14,2667    51025 1              DSU     BPL
 0445   REF    1              14,2670    30755 0                      CSS40
 0446   REF    2   LAST  933  14,2671    30653 1                      PIC3
 0447                         14,2672    45173 0              VLOAD*  CALL
 0448   REF    5   LAST  933  14,2673    30347 1                      CATLOG,1
 0449   REF    1              14,2674    30732 1                      OCCULT
 0450                         14,2675    77614 1              BON
 0451   REF    1              14,2676    01710 0                      CULTFLAG
 0452   REF    3   LAST  933  14,2677    30640 0                      PIC1
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L          P51-P53                                                                                    USER'S PAGE NO. 14       E5 S3

 0453                            14,2700    45173 0              VLOAD* CALL
 0454    REF   6  LAST  933      14,2701    47430 0                     CATLOG,2
 0455    REF   2  LAST  933      14,2702    30732 1                     OCCULT
 0456                            14,2703    77614 1              BON
 0457    REF   2  LAST  933      14,2704    01710 0                     CULTFLAG
 0458    REF   3  LAST  933      14,2705    30653 1                     PIC3
 0459                            14,2706    77614 1   STRATGY    BONCLR
 0460    REF   2  LAST  932      14,2707    01605 0                     VFLAG
 0461    REF   1                 14,2710    30725 1                     NEWPAR
 0462                            14,2711    65120 1              XCHX,1 XCHX,2
 0463    REF   5  LAST  933      14,2712    02755 1                     BESTI
 0464    REF   2  LAST  125      14,2713    02756 1                     BESTJ
 0465                            14,2714    47773 1   STRAT      VLOAD* DOT*
 0466    REF   7  LAST  934      14,2715    30347 1                     CATLOG,1
 0467    REF   8  LAST  934      14,2716    47430 0                     CATLOG,2
 0468                            14,2717    43006 0              PUSH   6OFINV
 0469    REF   3  LAST  934      14,2720    01545 1                     VFLAG
 0470    REF   1                 14,2721    30711 0                     STRAT -3
 0471                            14,2722    45345 1              DLOAD  OSU
 0472                            14,2723    77644 1              BPL
 0473    REF   4  LAST  934      14,2724    30653 1                     PIC3
 0474                            14,2725    67130 1   NEWPAR     SXA,1  SXA,2
 0475    REF   6  LAST  934      14,2726    02755 1                     BESTI
 0476    REF   3  LAST  934      14,2727    02756 1                     BESTJ
 0477                            14,2730    77650 1              GOTO
 0478    REF   5  LAST  934      14,2731    30653 1                     PIC3
 0479                            14,2732    51321 0   OCCULT     MXV    BVSU
 0480    REF   1                 14,2733    02707 0                     CULTRIX
 0481    REF   1                 14,2734    00017 1                     CSS
 0482                            14,2735    77654 0              BZE
 0483    REF   1                 14,2736    30751 1                     CULTED
 0484                            14,2737    75240 0              BMN    SIGN
 0485    REF   2  LAST  934      14,2740    30751 1                     CULTED
 0486    REF 371  LAST  915      14,2741    00160 0                     MPAC +3
 0487                            14,2742    75240 0              BMN    SIGN
 0488    REF   3  LAST  934      14,2743    30751 1                     CULTED
 0489    REF 372  LAST  934      14,2744    00162 1                     MPAC +5
 0490                            14,2745    43040 1              BMN    CLRGO
 0491    REF   4  LAST  934      14,2746    30751 1                     CULTED
 0492    REF   3  LAST  934      14,2747    01630 0                     CULTFLAG
 0493    REF   6  LAST  766      14,2750    00052 0                     QPRET
 0494                    .       14,2751    77614 1   CULTED     SETGO
 0495    REF   4  LAST  934      14,2752    01430 1                     CULTFLAG
 0496    REF   7  LAST  934      14,2753    00052 0                     QPRET
 0497    REF   3  LAST  931         0016              CSS        =      CEARTH
 0498                            14,2754    05110 1   CSS40      2DEC   .16070              COS 50 /4
 0498                            14,2755    35052 0
 0499                            14,2756    05110 1   CSS33      2DEC   .16070               COS 50 /4
 0499                            14,2757    35052 0
 0500                            14,2760    77414 0   PICEND     BOFF   EXIT
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0501  REF   4  LAST  934  14,2761   01745 0                     VFLAG
0502  REF   1             14,2762   30764 1                     PICGXT
0503  REF   1             14,2763  0 3005 1            TC       PICBXT
0504                      14,2764   73150 1  PICGXT    LXA,1    LXA,2
0505  REF   7  LAST  934  14,2765   02755 1                     BESTI
0506  REF   4  LAST  934  14,2766   02756 1                     BESTJ
0507                      14,2767   47775 1            VLOAD    DOT*
0508  REF   4  LAST  933  14,2770   02731 0                     SAX
0509  REF   9  LAST  934  14,2771   30347 1                     CATLOG,1
0510                      14,2772   47715 1            PDVL     DOT*
0511  REF   5  LAST  935  14,2773   02731 0                     SAX
0512  REF  10  LAST  935  14,2774   47430 0                     CATLOG,2
0513                      14,2775   77625 0            DSU
0514                      14,2776   66044 1            BPL      SXA,1
0515  REF   1             14,2777   31003 0                     PICNSWP
0516  REF   5  LAST  935  14,3000   02756 1                     BESTJ
0517                      14,3001   77734 1            SXA,2
0518  REF   8  LAST  935  14,3002   02755 1                     BESTI
0519                      14,3003   77776 1  PICNSWP   EXIT
0520  REF   5  LAST  932  14,3004   25745 0            INCR     QMIN
0521  REF   6  LAST  935  14,3005  3 1745 0  PICBXT    CA       QMIN
0522  REF   4  LAST  495  14,3006  0 4622 0            TC       SWCALL
0523                          0000           VPD       =        00
0524                          0006           V0        =        60
0525                          0014           V1        =        120
0526                          0022           V2        =        180
0527                          0030           V3        =        240
0528                          0036           DP0       =        300
0529                          0040           DP1       =        320
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R0530   NAME-R51  FINE ALIGN
R0531   FUNCTION-TO ALIGN THE STABLE MEMBER TO REFSMMAT
R0532   CALLING SEQ- CALL  R51
R0533   INPUT -  REFSMMAT
R0534   OUTPUT- GYRO TORQUE PULSES
R0535   SUBROUTINES -LOCSAM,PICAPAR,R52,R53,R54,R55
 0536   REF    1                                                  COUNT* $$/R51
 0537                            14,3007   77620 0  R51         STQ
 0538   REF    5  LAST  928      14,3010   02746 0                      QMAJ
 0539                            14,3011   77776 1  R51.1       EXIT
 0540   REF   77  LAST  923      14,3012  0 5353 1              TC      PHASCHNG
 0541                            14,3013   04024 0              OCT     04024

 0542   REF    2  LAST  181      14,3014  3 4761 0  R51C        CAF     OCT15
 0543   REF  254  LAST  928      14,3015  0 4616 1              TC      BANKCALL
 0544   REF    6  LAST  926      14,3016   20624 0              CADR    GOPERF1
 0545   REF   40  LAST  928      14,3017  0 6001 0              TC      GOTOPOOH
 0546                            14,3020  0 3022 1              TC      +2              V33E
 0547   REF    1                 14,3021  0 3045 0              TC      R51E            ENTER
 0548   REF  171  LAST  932      14,3022  0 6042 1              TC      INTPRET
 0549                            14,3023   43234 0              RTB     DAD
 0550   REF   25  LAST  845      14,3024   21574 1                      LOADTIME
 0551   REF    1                 14,3025   31155 1                      TSIGHT1
 0552                            14,3026   77624 1              CALL
 0553   REF    2  LAST  930      14,3027   20500 1                      LOCSAM
 0554                            14,3030   77776 1              EXIT
 0555   REF  255  LAST  936      14,3031  0 4616 1              TC      BANKCALL
 0556   REF    1                 14,3032   30603 1              CADR    R56
 0557   REF    1                 14,3033  0 3035 1              TC      R51I
 0558   REF    2  LAST  936      14,3034  0 3045 0  R51F        TC      R51E
 0559   REF   37  LAST  919      14,3035  0 5567 0  R51I        TC      ALARM
 0560                            14,3036   00405 0              OCT     405
 0561   REF    1                 14,3037  3 5006 1              CAF     VB05N09
 0562   REF  256  LAST  936      14,3040  0 4616 1              TC      BANKCALL
 0563   REF   29  LAST  928      14,3041   20477 1              CADR    GOFLASH
 0564   REF   41  LAST  936      14,3042  0 6001 0              TC      GOTOPOOH
 0565   REF    3  LAST  936      14,3043  0 3045 0              TC      R51E
 0566   REF    1                 14,3044  0 3014 1              TC      R51C
 0567   REF  177  LAST  919      14,3045  3 4755 1  R51E        CAF     ZERO
 0568   REF    3  LAST  740      14,3046  55'757 1              TS      STARIND
 0569   REF  172  LAST  936      14,3047  0 6042 1  R51.2       TC      INTPRET
 0570                            14,3050   77776 1  R51.3       EXIT
 0571   REF   78  LAST  936      14,3051  0 5353 1              TC      PHASCHNG
 0572                            14,3052   04024 0              OCT     04024

 0573   REF  173  LAST  936      14,3053  0 6042 1              TC      INTPRET
 0574                            14,3054   77624 1              CALL
 0575   REF    1                 14,3055   31671 0                      R52             AOP WILL MAKE CALLS TO SIGHTING
 0576                            14,3056   77776 1              EXIT
 0577   REF  257  LAST  936      14,3057  0 4616 1              TC      BANKCALL
 0578    REF   1                 14,3060   16000 0                CADR    AOTMARK
 0579    REF 258   LAST   936    14,3061  0 4616 1                TC      BANKCALL
 0580    REF   1                 14,3062   17703 0                CADR    OPTSTALL
 0581    REF   1                 14,3063  0 5701 1                TC      CURTAINS
 0582    REF   4   LAST   936    14,3064   10757 1                CCS     STARIND
 0583                            14,3065  1 3067 1                TCF     +2
 0584    REF   1                 14,3066  0 3137 1                TC      R51.4
 0585    REF 174   LAST   936    14,3067  0 6042 1                TC      INTPRET
 0586                            14,3070   77775 1                VLCAD
 0587    REF  13   LAST   319    14,3071   02715 0                        STARAD +6
 0588    REF   5   LAST   254    14,3072   02767 0                STORE    STARSAV2
 0589                            14,3073   77776 1                EXIT
 0590    REF  79   LAST   936    14,3074  0 5353 1                TC      PHASCHNG
 0591                            14,3075   04024 0                OCT     04024

 0592    REF 175   LAST   937    14,3076  0 6042 1                TC      INTPRET
 0593                            14,3077   45145 0                DLOAD   CALL
 0594    REF   4   LAST   930    14,3100   03562 0                        TSIGHT
 0595    REF   1                 14,3101   32472 1                        PLANET
 0596                            14,3102   53521 1                MXV     UNIT
 0597    REF  41   LAST   933    14,3103   01734 0                        REFSMMAT
 0598    REF  14   LAST   937    14,3104   26715 0                STOVL   STARAD +6
 0599    REF   2   LAST   147    14,3105   03554 0                        PLANVEC
 0600                            14,3106   53521 1                MXV     UNIT
 0601    REF  42   LAST   937    14,3107   01734 0                        REFSMMAT
 0602    REF  15   LAST   937    14,3110   26707 0                STOVL   STARAD
 0603    REF   3   LAST   198    14,3111   02761 0                        STARSAV1
 0604                            14,3112   24007 0                STOVL   6D
 0605    REF   6   LAST   937    14,3113   02767 0                        STARSAV2
 0606                            14,3114   34015 1                STCALL  12D
 0607    REF   1                 14,3115   31250 1                        R54                STAR DATA TEST
 0608                            14,3116   45014 0                BOFF    CALL
 0609    REF   1                 14,3117   00354 0                        FREEFLAG
 0610    REF   1                 14,3120   31126 0                        R51K
 0611    REF   1                 14,3121   47443 1                        AXISGEN
 0612                            14,3122   77624 1                CALL
 0613    REF   1                 14,3123   31216 0                        R55                GYRO TORQUE
 0614                            14,3124   77614 1                CLEAR
 0615    REF   3   LAST   925    14,3125   01273 0                        PFRATFLG
 0616                            14,3126   77776 1  R51K          EXIT
 0617    REF   2   LAST   183    14,3127  3 5741 0  P51P63        CAF     OCT14
 0618    REF 259   LAST   937    14,3130  0 4616 1                TC      BANKCALL
 0619    REF   7   LAST   936    14,3131   20624 0                CADR    GOPERF1
 0620    REF  42   LAST   936    14,3132  0 6001 0                TC      GOTOPOOH
 0621    REF   2   LAST   936    14,3133  0 3014 1                TC      R51C
 0622    REF 176   LAST   937    14,3134  0 6042 1                TC      INTPRET
 0623                            14,3135   77650 1                GOTO
 0624    REF   6   LAST   936    14,3136   02746 0                        QMAJ
 0625    REF 177   LAST   937    14,3137  0 6042 1  R51.4         TC      INTPRET
 0626                            14,3140   77775 1                VLCAD
 0627   REF  16  LAST  937   14,3141   02715 0                  STARAD +6
 0628   REF   4  LAST  937   14,3142   02761 0          STORE   STARSAV1
 0629                        14,3143   45145 0          DLOAD   CALL
 0630   REF   5  LAST  937   14,3144   03562 0                  TSIGHT
 0631   REF   2  LAST  937   14,3145   32472 1                  PLANET
 0632   REF   3  LAST  937   14,3146   03554 0          STORE   PLANVEC
 0633                        14,3147   77731 1          SSP
 0634   REF   5  LAST  937   14,3150   02760 1                  STARIND
 0635                        14,3151   00001 0                  1
 0636                        14,3152   77650 1          GOTO
 0637   REF   1              14,3153   31050 0                  R51.3
 0638                        14,3154   00002 0  TSIGHT1 2DEC    36000          6 MIN  TO  MARKING
 0638                        14,3155   06240 1
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P0639    GYRO TORQUE COARSE ALIGNMENT
 0640                                14,3156   45020 1  GYCOARS   STQ      CALL
 0641    REF    7  LAST  937        14,3157   02746 0                     QMAJ
 0642    REF    1                    14,3160   47251 1                     CALCGTA
 0643                                14,3161   43014 0            CLEAR    CLEAR
 0644    REF    2  LAST  858        14,3162   01260 1                     DRIFTFLG
 0645    REF    3  LAST  925        14,3163   01662 1                     REFSMFLG
 0646                                14,3164   77776 1            EXIT
 0647    REF    1                    14,3165  3 3215 1            CAF      V16N20            MONITOR GIMBALS
 0648    REF  260  LAST  937        14,3166  0 4616 1            TC       BANKCALL
 0649    REF    2  LAST  478        14,3167   20452 0            CADR     GODSPR
 0650    REF    1                    14,3170  3 3247 0            CA       R55CDR
 0651    REF  261  LAST  939        14,3171  0 4616 1            TC       BANKCALL
 0652    REF    4  LAST  390        14,3172   17314 1            CADR     IMUPULSE
 0653    REF  262  LAST  939        14,3173  0 4616 1            TC       BANKCALL
 0654    REF    8  LAST  380        14,3174   17707 1            CADR     IMUSTALL
 0655    REF    2  LAST  937        14,3175  0 5701 1            TC       CURTAINS
 0656    REF   80  LAST  937        14,3176  0 5353 1            TC       PHASCHNG
 0657                                14,3177   04024 0            OCT      04024

 0658    REF  178  LAST  937        14,3200  0 6042 1            TC       INTPRET
 0659                                14,3201   75160 1            AXC,1    AXC,2
 0660    REF    6  LAST  927        14,3202   03606 1                     XSMD
 0661    REF   43  LAST  937        14,3203   01733 1                     REFSMMAT
 0662                                14,3204   77624 1            CALL                       STORE DESIRED REFSMMAT
 0663    REF    1                    14,3205   31371 0                     MATMOVE
 0664                                14,3206   43014 0            CLEAR    SET
 0665    REF    4  LAST  937        14,3207   01273 0                     PFRATFLG
 0666    REF    4  LAST  939        14,3210   01462 0                     REFSMFLG
 0667                                14,3211   77624 1            CALL
 0668    REF    1                    14,3212   31603 0                     NCOARSE           SET DRIFT AND INITIALIZE 1/PIPADT
 0669                                14,3213   77650 1            GOTO
 0670    REF    2  LAST  937        14,3214   31126 0                     R51K
 0671                                14,3215   04024 0  V16N20    VN       1620
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R0672    R55  GYRO  TORQUE
R0673    FUNCTION-COMPUTE AND SEND GYRO PULSES
R0674    CALLING SEQ- CALL R55
R0675    INPUT- X,Y,ZDC- REFSMMAT WRT PRESENT STABLE MEMBER
R0676    OUTPUT- GYRO PULSES
R0677    SUBROUTINES- CALCGTA,GOFLASH,GODSPR,IMUFINE,IMUPULSE,GOPERF1
 0678    REF   1                                                    COUNT* $$/R55
 0679                              14,3216   77620 0  R55           STQ
 0680    REF   7  LAST  935        14,3217   02745 0                       QMIN
 0681                              14,3220   77624 1                CALL
 0682    REF   2  LAST  939        14,3221   47251 1                       CALCGTA
 0683                              14,3222   77776 1  PULSEM        EXIT
 0684    REF   1                   14,3223  3 3246 1  R55.1         CAF    V06N93
 0685    REF 263  LAST  939        14,3224  0 4616 1                TC     BANKCALL
 0686    REF  30  LAST  936        14,3225   20477 1                CADR   GOFLASH
 0687    REF  43  LAST  937        14,3226  0 6001 0                TC     GOTOPOOH
 0688    REF   1                   14,3227  0 3231 1                TC     R55.2
 0689    REF   1                   14,3230  0 3243 1                TC     R55RET
 0690    REF  81  LAST  939        14,3231  0 5353 1  R55.2         TC     PHASCHNG
 0691                              14,3232   00214 0                OCT    00214
 0692    REF   2  LAST  939        14,3233  3 3247 0                CA     R55COR
 0693    REF 264  LAST  940        14,3234  0 4616 1                TC     BANKCALL
 0694    REF   5  LAST  939        14,3235   17314 1                CADR   IMUPULSE
 0695    REF 265  LAST  940        14,3236  0 4616 1                TC     BANKCALL
 0696    REF   9  LAST  939        14,3237   17707 1                CADR   IMUSTALL
 0697    REF   3  LAST  939        14,3240  0 5701 1                TC     CURTAINS
 0698    REF  82  LAST  940        14,3241  0 5353 1                TC     PHASCHNG
 0699                              14,3242   04024 0                OCT    04024

 0700    REF 179  LAST  939        14,3243  0 6042 1  R55RET        TC     INTPRET
 0701                              14,3244   77650 1                GOTO
 0702    REF   8  LAST  940        14,3245   02745 0                       QMIN
 0703                              14,3246   01535 0  V06N93        VN     0693
 0704    REF  11  LAST  390        14,3247   02737 0  R55COR        ECADR  OGC
 0705    REF   1                   14,3250            R54           =      CHKSDATA
R0706    ROUTINE NAME- CHKSDATA                                                                          DATE- JAN 9, 1967
R0708    MOD NO- 0                                                                                       LOG SECTION- P51-P53
R0710    MODIFICATION BY- LONSKE                                                                         ASSEMBLY-

R0712    FUNCTIONAL DESCRIPTION - CHECKS THE VALIDITY OF A PAIR OF STAR SIGHTINGS. WHEN A PAIR OF STAR SIGHTINGS ARE MADE
R0714    BY THE ASTRONAUT THIS ROUTINE OPERATES AND CHECKS THE OBSERVED SIGHTINGS AGAINST STORED STAR VECTORS IN THE
R0716    COMPUTER TO INSURE A PROPER SIGHTING WAS MADE. THE FOLLOWING COMPUTATIONS ARE PERFORMED_

R0718                      OS1 = OBSERVED STAR 1 VECTOR
R0719                      OS2 = OBSERVED STAR 2 VECTOR
R0720                      SS1 = STORED STAR 1 VECTOR
R0721                      SS2 = STORED STAR 2 VECTOR
R0722                       A1 = ARCCOS(OS1 - OS2)
R0723                       A2 = ARCCOS(SS1 - SS2)
R0724                        A = ABS(2(A1 - A2))
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R0725   THE ANGULAR DIFFERENCE IS DISPLAYED FOR ASTRONAUT ACCEPTENCE
R0726   EXIT MODE 1. FREEFLAG SET  IMPLIES  ASTRONAUT WANTS TO PROCEED
R0727             2. FREEFLAG RESET IMPLIES ASTRONAUT WANTS TO RECYCLE        ERANCE)
R0729   OUTPUT - 1.VERB 6,NOUN 3- DISPLAYS ANGULAR DIFFERENCE BETWEEN 2 SETS OF STARS.
R0731            2.STAR VECTORS FROM STAR CATALOG ARE LEFT IN 6D AND 12D.

R0732   ERASABLE INITIALIZATION REQUIRED -
R0733            1.MARK VECTORS ARE STORED IN STARAD AND STARAD +6.
R0734            2.CATALOG VECTORS ARE STORED IN 6D AND 12D.
R0735   DEBRIS -
 0736   REF   1                                        COUNT*  $$/R54
 0737                        14,3250   43020 1  CHKSCATA STQ    SET
 0738   REF   9  LAST  940   14,3251   02745 0                  QMIN
 0739   REF   2  LAST  937   14,3252   00074 1                  FREEFLAG
 0740                        14,3253   77760 0  CHKSAB   AXC,1                    SET X1 TO STORE  EPHEMERIS DATA
 0741   REF  17  LAST  938   14,3254   02706 1                  STARAD
R0742
 0743                        14,3255   47773 1  CHKSB    VLOAD*  DOT*             CAL. ANGLE THETA
 0744                        14,3256   00001 0                  0,1
 0745                        14,3257   00007 0                  6,1
 0746                        14,3260   65552 0           SL1     ACOS
 0747   REF   1              14,3261   00025 0           STORE   THETA
 0748                        14,3262   43014 0           BOFF    INVERT           BRANCH TO CHKSD IF THIS IS 2ND PASS
 0749   REF   3  LAST  941   14,3263   00354 0                   FREEFLAG
 0750   REF   1              14,3264   31274 1                   CHKSD
 0751   REF   4  LAST  941   14,3265   00174 0                   FREEFLAG         CLEAR FREEFLAG
 0752                        14,3266   71360 1           AXC,1   DLOAD            SET X1 TO MARK ANGLES
 0753                        14,3267   00006 1                   6D
 0754   REF   2  LAST  941   14,3270   00025 0                   THETA
 0755                        14,3271   00023 0           STORE   18D
 0756                        14,3272   77650 1           GOTO
 0757   REF   1              14,3273   31255 1                   CHKSB            RETURN TO CAL. 2ND ANGLE
 0758                        14,3274   45345 1  CHKSD    DLOAD   DSU
 0759   REF   3  LAST  941   14,3275   00025 0                   THETA
 0760                        14,3276   00023 0                   18D              COMPUTE POS DIFF
 0761   *                    14,3277   77634 0           RTB
 0762   REF   4  LAST  872   14,3300   21613 0                   SGNAGREE
 0763   REF   1              14,3301   01045 1           STORE   NORMTEM1
 0764                        14,3302   77414 0           SET     EXIT
 0765   REF   5  LAST  941   14,3303   00074 1                   FREEFLAG
 0766   REF   1              14,3304   3 3320 0          CAF     V06N05
 0767   REF 266  LAST  940   14,3305   0 4616 1          TC      BANKCALL
 0768   REF  31  LAST  940   14,3306   20477 1           CADR    GOFLASH
 0769   REF  44  LAST  940   14,3307   1 6001 1          TCF     GOTOPOOH
 0770   REF   1              14,3310   0 3315 0          TC      CHKSDA           PROCEED
 0771   REF 180  LAST  940   14,3311   0 6042 1          TC      INTPRET
 0772                        14,3312   52014 0           CLEAR   GOTO
 0773   REF   6  LAST  941   14,3313   00274 0                   FREEFLAG
 0774   REF  10  LAST  941   14,3314   02745 0                   QMIN
 0775   REF 181  LAST  941   14,3315   0 6042 1  CHKSDA   TC      INTPRET
 0776                            14,3316   77650 1            GOTO
 0777   REF  11  LAST  941       14,3317   02745 0                    QMIN
 0778                            14,3320   01405 1  V06N5     VN      605
R0779   NAME - CAL53A
R0780   FUNCTION -COMPUTE DESIRED GIMBAL ANGLES AND COARSE ALIGN IF NECESSARY
R0781   CALLING SEQUENCE - CALL CAL53A
R0782   INPUT - X,Y,ZSMD ,COLX,Y,Z
R0783           DESIRED GIMBAL ANGLES - THETAD,+1,+2
R0784   OUTPUT - THE IMU COORDINATES ARE STORED IN REFSMMAT
R0785   SUBROUTINES - S52.2, IMUCOARSE , IMUFINE
 0786   REF   1                                               COUNT* $$/R50
 0787                            14,3321   77624 1  CAL53A    CALL
 0788   REF   2  LAST  925       14,3322   31620 1                    S52.2          MAKE ONE FINAL COMP OF GIMBALE ANGLES
 0789                            14,3323   66234 1            RTB     SSP
 0790   REF   1                  14,3324   31405 1                    RDCDUS         READ CDUS
 0791   REF   8  LAST  933       14,3325   00051 0                    S1
 0792                            14,3326   00001 0                    1
 0793                            14,3327   40370 1            AXT,1   SETPD
 0794                            14,3330   00003 1                    3
 0795                            14,3331   00005 1                    4
 0796                            14,3332   70543 1  CALOOP    DLOAD*  SR1
 0797   REF  10  LAST  380       14,3333   00325 0                    THETAD +3D,1
 0798                            14,3334   70523 1            PDDL*   SR1
 0799                            14,3335   00005 1                    4,1
 0800                            14,3336   51425 0            DSU     ABS
 0801                            14,3337   45206 1            PUSH    DSU
 0802   REF   1                  14,3340   31404 0                    DEGREE1
 0803                            14,3341   71240 1            BMN     DLOAD
 0804   REF   1                  14,3342   31360 0                    CALOOP1
 0805                            14,3343   51025 1            DSU     BPL
 0806   REF   1                  14,3344   31405 1                    DEG359
 0807   REF   2  LAST  942       14,3345   31360 0                    CALOOP1
 0808                            14,3346   77776 1            EXIT
 0809   REF  83  LAST  940       14,3347   0 5353 1           TC      PHASCHNG
 0810                            14,3350   04024 0            OCT     04024

 0811   REF 182  LAST  941       14,3351   0 6042 1           TC      INTPRET
 0812                            14,3352   77624 1  COARFINE  CALL
 0813   REF   1                  14,3353   31557 1                    COARSE
 0814                            14,3354   77624 1            CALL
 0815   REF   2  LAST  939       14,3355   31603 0                    NCOARSE
 0816                            14,3356   77650 1            GOTO
 0817   REF   1                  14,3357   31362 1                    FINEONLY
 0818                            14,3360   77700 0  CALOOP1   TIX,1
 0819   REF   1                  14,3361   31332 1                    CALOOP
 0820                            14,3362   75160 1  FINEONLY  AXC,1   AXC,2
 0821   REF  17  LAST  928       14,3363   02642 0                    XSM
 0822   REF  44  LAST  939       14,3364   01733 1                    REFSMMAT
 0823                            14,3365   77624 1            CALL
 0824   REF   2  LAST  939       14,3366   31371 0                    MATMOVE
 0825                          14,3367   77650 1            GOTO
 0826   REF   1                14,3370   32161 0                     COARSRET
 0827                          14,3371   77773 1  MATMOVE   VLOAD*                          TRANSFER MATRIX
 0828                          14,3372   00001 0                     0,1
 0829                          14,3373   10001 1            STORE    0,2
 0830                          14,3374   77773 1            VLOAD*
 0831                          14,3375   00007 0                     6D,1
 0832                          14,3376   10007 1            STORE    6D,2
 0833                          14,3377   77773 1            VLOAD*
 0834                          14,3400   00015 0                     12D,1
 0835                          14,3401   10015 1            STORE    12D,2
 0836                          14,3402   77616 0            RVQ
 0837                          14,3403   00056 1  DEGREE1   DEC      46                     1 DEG SCALED CDU/2
 0838                          14,3404   37722 1  DEG359    DEC      16338                  359 DEG SCALED CDU/2
 0839                          14,3405  0 0004 0  RDCDUS    INHINT                          READ CDUS
 0840   REF  16  LAST  905     14,3406  3 0032 0            CA       CDUX
 0841   REF  31  LAST  916     14,3407  50 120 1            INDEX    FIXLOC
 0842                          14,3410  54 001 1            TS       1
 0843   REF   7  LAST  905     14,3411  3 0033 1            CA       CDUY
 0844   REF  32  LAST  943     14,3412  50 120 1            INDEX    FIXLOC
 0845                          14,3413  54 002 1            TS       2
 0846   REF  10  LAST  905     14,3414  3 0034 0            CA       CDUZ
 0847   REF  33  LAST  943     14,3415  50 120 1            INDEX    FIXLOC
 0848                          14,3416  54 003 0            TS       3
 0849                          14,3417  0 0003 1            RELINT
 0850   REF   1                14,3420  0 6064 0            TC       DANZIG                                                  +
 0851   REF   1                                             COUNT*   $$/INFLT
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P0852   NAME - P51 - IMU ORIENTATION DETERMINATION
R0853            MOD.NO.1  23 JAN 67                                                                         LOG SECTION - P51-P53
R0855   MOD BY STURLAUGSON                                                                                  ASSEMBLY SUNDANCE REV56

R0857   FUNCTIONAL DESCRIPTION

R0858        DETERMINES THE INERTIAL ORIENTATION OF THE IMU. THE PROGRAM IS SELECTED BY DSKY ENTRY. THE SIGHTING
R0860   (AOTMARK)ROUTINE IS CALLED TO COLLECT AND PROCESS MARKED-STAR DATA. AOTMARK(R53) RETURNS THE STAR NUMBER AND THE
R0862   STAR LOS VECTOR IN STARAD+6, TWO STARS ARE THUS SIGHTED. THE ANGLE BETWEEN THE TWO STARS IS THEN CHECKED AT
R0864   CHKSDATA(R54). REFSMMAT IS THEN COMPUTED AT AXISGEN.

R0865   CALLING SEQUENCE

R0866     THE PROGRAM IS CALLED BY THE ASTRONAUT BY DSKY ENTRY.

R0867   SUBROUTINES CALLED.

R0868        GOPERF3
R0869        GOPERF1
R0870        GODSPR
R0871        IMUCOARS
R0872        IMUFIN20
R0873        AOTMARK(R53)
R0874        CHKSDATA(R54)
R0875        MKRELEAS
R0876        AXISGEN
R0877        MATMOVE

R0878   ALARMS

R0879        NONE.

R0880   ERASABLE INITIALIZATION

R0881        IMU ZERO FLAG SHOULD BE SET.

R0882   OUTPUT

R0883        REFSMMAT
R0884        REFSMFLG

R0885   DEBRIS

R0886        WORK AREA
R0887        STARAD
R0888        STARIND
R0889        BESTI
R0890        BESTJ

 0891   REF   1                                          COUNT* $$/P51
 0892   REF 267  LAST  941   14,3421  0 4616 1  P51        TC     BANKCALL          IS ISS ON - IF NOT, IMUCHK WILL SEND
 0893   REF   1              14,3422   33635 1             CADR   IMUCHK            ALARM CODE 210 AND EXIT VIA GOTOPOOH.

 0894   REF   3  LAST  936   14,3423  3 4761 0             CAF    OCT15
 0895   REF 268  LAST  945   14,3424  0 4616 1             TC     BANKCALL
 0896   REF   8  LAST  937   14,3425   20624 0             CADR   GOPERF1
 0897   REF  45  LAST  941   14,3426  0 6001 0             TC     GOTOPOOH          TERM.
 0898   REF   1              14,3427  1 3453 1             TCF    P51B              V33
 0899   REF  84  LAST  942   14,3430  0 5353 1             TC     PHASCHNG
 0900                        14,3431   04024 0             OCT    04024

 0901   REF 178  LAST  936   14,3432  3 4755 1             CAF    ZERO
 0902   REF  11  LAST  942   14,3433  54 321 0             TS     THETAD            ZERO THE GIMBALS
 0903   REF  12  LAST  945   14,3434  54 322 0             TS     THETAD +1
 0904   REF  13  LAST  945   14,3435  54 323 1             TS     THETAD +2
 0905   REF   3  LAST  925   14,3436  3 5010 0             CAF    V06N22
 0906   REF 269  LAST  945   14,3437  0 4616 1             TC     BANKCALL
 0907   REF   3  LAST  752   14,3440   20447 1             CADR   GODSPRET
 0908   REF   1              14,3441  3 3556 1             CAF    V41K              NOW DISPLAY COARSE ALIGN VERB 41
 0909   REF 270  LAST  945   14,3442  0 4616 1             TC     BANKCALL
 0910   REF   4  LAST  945   14,3443   20447 1             CADR   GODSPRET
 0911   REF 183  LAST  942   14,3444  0 6042 1             TC     INTPRET
 0912                        14,3445   77624 1             CALL
 0913   REF   2  LAST  942   14,3446   31557 1                    COARSE
 0914                        14,3447   77776 1             EXIT
 0915   REF  85  LAST  945   14,3450  0 5353 1             TC     PHASCHNG
 0916                        14,3451   04024 0             OCT    04024
 0917   REF   2  LAST  235   14,3452  1 3423 0             TCF    P51 +2

 0918   REF  86  LAST  945   14,3453  0 5353 1  P51B       TC     PHASCHNG
 0919                        14,3454   00014 1             OCT    00014
 0920   REF 184  LAST  945   14,3455  0 6042 1             TC     INTPRET
 0921                        14,3456   77624 1             CALL
 0922   REF   3  LAST  942   14,3457   31603 0                    NCOARSE
 0923                        14,3460   40331 1             SSP    SETPD
 0924   REF   6  LAST  938   14,3461   02760 1                    STARIND           INDEX-STAR 1 OR 2
 0925                        14,3462   00000 1                    0
 0926                        14,3463   00001 0                    0
 0927                        14,3464   77776 1  P51C       EXIT
 0928   REF  87  LAST  945   14,3465  0 5353 1             TC     PHASCHNG
 0929                        14,3466   04024 0             OCT    04024

 0930   REF 271  LAST  945   14,3467  0 4616 1             TC     BANKCALL
 0931   REF   2  LAST  937   14,3470   16000 0             CADR   AOTMARK           P53
 0932   REF 272  LAST  945   14,3471  0 4616 1             TC     BANKCALL
 0933   REF   1              14,3472   17703 0             CADR   AOTSTALL
 0934   REF   4  LAST  940   14,3473  0 5701 1             TC     CURTAINS
 0935   REF   7  LAST  945   14,3474  11757 1              CCS    STARIND
 0936   REF   1              14,3475  1 3503 0             TCF    P51D +1
 0937   REF 185  LAST  945   14,3476  0 6042 1             TC     INTPRET
 0938                          14,3477   77775 1              VLOAD
 0939   REF  18  LAST  941     14,3500   02715 0                       STARAD +6
 0940   REF   5  LAST  938     14,3501   02761 0              STORE    STARSAV1
 0941                          14,3502   77776 1   P51D       EXIT
 0942   REF  88  LAST  945     14,3503  0 5353 1              TC       PHASCHNG
 0943                          14,3504   04024 0              OCT      04024

 0944   REF   8  LAST  945     14,3505  11'757 1              CCS      STARIND
 0945   REF   1                14,3506  1 3522 0              TCF      P51E
 0946   REF  89  LAST  946     14,3507  0 5353 1              TC       PHASCHNG
 0947                          14,3510   04024 0              OCT      04024

 0948   REF 186  LAST  945     14,3511  0 6042 1              TC       INTPRET
 0949                          14,3512   45145 0              DLOAD    CALL
 0950   REF   6  LAST  938     14,3513   03562 0                       TSIGHT
 0951   REF   3  LAST  938     14,3514   32472 1                       PLANET
 0952   REF   4  LAST  938     14,3515   03554 0              STORE    PLANVEC
 0953                          14,3516   77776 1              EXIT
 0954   REF  43  LAST  923     14,3517  3 4753 1              CAF      BIT1
 0955   REF   9  LAST  946     14,3520  55'757 1              TS       STARIND
 0956   REF   1                14,3521  1 3465 1              TCF      P51C +1           DO SECOND STAR
 0957   REF  90  LAST  946     14,3522  0 5353 1   P51E       TC       PHASCHNG
 0958                          14,3523   04024 0              OCT      04024

 0959   REF 187  LAST  946     14,3524  0 6042 1              TC       INTPRET
 0960                          14,3525   45145 0              DLOAD    CALL
 0961   REF   7  LAST  946     14,3526   03562 0                       TSIGHT
 0962   REF   4  LAST  946     14,3527   32472 1                       PLANET
 0963                          14,3530   24015 0              STOVL    12D
 0964   REF   5  LAST  946     14,3531   03554 0                       PLANVEC
 0965                          14,3532   24007 0              STOVL    6D
 0966   REF   6  LAST  946     14,3533   02761 0                       STARSAV1
 0967   REF  19  LAST  946     14,3534   26707 0              STOVL    STARAD
 0968   REF   7  LAST  937     14,3535   02767 0                       STARSAV2
 0969   REF  20  LAST  946     14,3536   36715 1              STCALL   STARAD +6
 0970   REF   2  LAST  940     14,3537   31250 1                       CHKSDATA          CHECK STAR ANGLES IN STARAD AND
 0971                          14,3540   77414 0              BON      EXIT
 0972   REF   7  LAST  941     14,3541   00314 1                       FREEFLAG
 0973   REF   1                14,3542   31544 0                       P51G
 0974   REF   3  LAST  945     14,3543  0 3423 1              TC       P51 +2
 0975                          14,3544   77624 1   P51G       CALL
 0976   REF   2  LAST  937     14,3545   47443 1                       AXISGEN           COME BACK WITH REFSMMAT IN XDC
 0977                          14,3546   75160 1              AXC,1    AXC,2
 0978   REF   4  LAST  926     14,3547   02664 1                       XDC
 0979   REF  45  LAST  942     14,3550   01733 1                       REFSMMAT
 0980                          14,3551   77624 1              CALL
 0981   REF   3  LAST  942     14,3552   31371 0                       MATMOVE
 0982                          14,3553   77414 0              SET      EXIT
 0983   REF   5  LAST  939     14,3554   01462 0                       REFSMFLG
 0984   REF  46  LAST  945     14,3555  0 6001 0              TC       GOTOPOOH          FINIS
 0985                          14,3556   12200 0  V41K     VN      4100
 0986                          14,3557   77776 1  COARSE   EXIT
 0987   REF   5  LAST  276     14,3560  3 1301 1     +1    CA      MODECADR        SEE IF IMU DEVICE IS IN USE.
 0988                          14,3561  0 0006 1           EXTEND
 0989   REF   1                14,3562  1 3567 1           BZF     DOCCRS          NOT IN USE, DO COARSE ALIGN
 0990   REF  18  LAST  894     14,3563  3 4777 1           CAF     1SEC            IN USE, DELAY ONE SEC
 0991   REF 273  LAST  945     14,3564  0 4616 1           TC      BANKCALL
 0992   REF  14  LAST  752     14,3565   01736 1           CADR    DELAYJOB
 0993   REF   3  LAST  945     14,3566  1 3560 0           TCF     COARSE +1
 0994   REF 274  LAST  947     14,3567  0 4616 1  DOCCRS   TC      BANKCALL
 0995   REF   4  LAST  380     14,3570   16771 1           CADR    IMUCOARS
 0996   REF 275  LAST  947     14,3571  0 4616 1           TC      BANKCALL
 0997   REF  10  LAST  940     14,3572   17707 1           CADR    IMUSTALL
 0998   REF   5  LAST  945     14,3573  0 5701 1           TC      CURTAINS
 0999   REF 276  LAST  947     14,3574  0 4616 1           TC      BANKCALL
 1000   REF   3  LAST  380     14,3575   17201 1           CADR    IMUFINE
 1001   REF 277  LAST  947     14,3576  0 4616 1           TC      BANKCALL
 1002   REF  11  LAST  947     14,3577   17707 1           CADR    IMUSTALL
 1003   REF   6  LAST  947     14,3600  0 5701 1           TC      CURTAINS
 1004   REF 188  LAST  946     14,3601  0 6042 1           TC      INTPRET
 1005                          14,3602   77616 0           RVQ
 1006                          14,3603   77776 1  NCOARSE  EXIT
 1007   REF  15  LAST  894     14,3604  3 0025 0           CA      TIME1
 1008   REF   9  LAST  858     14,3605  55 074 1           TS      1/PIPADT
 1009   REF 179  LAST  945     14,3606  4 4755 0           CS      ZERO
 1010   REF  14  LAST  894     14,3607  54 037 1           TS      PIPAX
 1011   REF   5  LAST  894     14,3610  54 040 1           TS      PIPAY
 1012   REF   8  LAST  895     14,3611  54 041 0           TS      PIPAZ
 1013   REF 189  LAST  947     14,3612  0 6042 1           TC      INTPRET
 1014                          14,3613   77775 1           VLOAD
 1015   REF   3  LAST  689     14,3614   24007 0                   ZEROVEC
 1016   REF  24  LAST  385     14,3615   01472 1           STORE   GCOMP
 1017                          14,3616   43414 1           SET     RVO
 1018   REF   3  LAST  939     14,3617   01060 0                   DRIFTFLG
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P1019   NAME-S52.2
R1020   FUNCTION-COMPUTE GIMBAL ANGLES FOR DESIRED SM AND PRESENT VEHICLE
R1021   CALL-  CALL  S52.2
R1022   INPUT- X,Y,ZSMD
R1023   OUTPUT- OGC,IGC,MGC,THETAD,+1,+2
R1024   SUBROUTINES-CDUTRIG,CALCSMSC,MATMOVE,CALCGA
 1025   REF   1                                        COUNT* $$/S52.1
 1026                       14,3620   45020 1  S52.2    STQ    CALL
 1027   REF   8  LAST  939  14,3621   02746 0                  QMAJ
 1028   REF   5  LAST  932  14,3622   47541 1                  CDUTRIG
 1029                       14,3623   77624 1           CALL
 1030   REF   2  LAST  932  14,3624   20030 0                  CALCSMSC
 1031                       14,3625   66370 0           AXT,1  SSP
 1032                       14,3626   00022 1                  18D
 1033   REF   9  LAST  942  14,3627   00051 0                  S1
 1034                       14,3630   00006 1                  6D
 1035                       14,3631   61373 1  S52.2A   VLOAD* VXM
 1036   REF   4  LAST  933  14,3632   02707 0                  XNB +18D,1
 1037   REF  46  LAST  946  14,3633   01734 0                  REFSMMAT
 1038                       14,3634   77656 1           UNIT
 1039   REF   5  LAST  948  14,3635   06707 1           STORE  XNB +18D,1
 1040                       14,3636   77700 0           TIX,1
 1041   REF   1             14,3637   31631 1                  S52.2A
 1042                       14,3640   75160 1  S52.2.1  AXC,1  AXC,2
 1043   REF   7  LAST  939  14,3641   03606 1                  XSMD
 1044   REF  18  LAST  942  14,3642   02642 0                  XSM
 1045                       14,3643   77624 1           CALL
 1046   REF   4  LAST  946  14,3644   31371 0                  MATMOVE
 1047                       14,3645   77624 1           CALL
 1048   REF   2  LAST  376  14,3646   47355 1                  CALCGA
 1049                       14,3647   77650 1           GOTO
 1050   REF   9  LAST  948  14,3650   02746 0                  QMAJ
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P1051    NAME-S52.3
R1052    FUNCTION   XSMD= UNIT  R
R1053               YSMD= UNIT(V X R)
R1054               ZSMD= UNIT(XSMD X YSMD)
R1055    CALL     DLOAD  CALL
R1056                    TALIGN
R1057                    S52.3
R1058    INPUT-   TIME OF ALIGNMENT IN MPAC
R1059    OUTPUT-  X,Y,ZSMD
R1060    SUBROUTINES- CSMCONIC
 1061    REF   1                                                COUNT* $$/S52.3
 1062                           14,3651   77620 0  S52.3        STQ
 1063    REF  10  LAST  948     14,3652   02746 0                      QMAJ
 1064    REF  48  LAST  930     14,3653   34041 0               STCALL TDEC1
 1065    REF   5  LAST  594     14,3654   27077 1                      LEMCONIC
 1066                           14,3655   53575 0               VLCAD  UNIT
 1067    REF  30  LAST  930     14,3656   00001 0                      RATT
 1068    REF   8  LAST  948     14,3657   27607 0               STOVL  XSMD
 1069    REF  22  LAST  832     14,3660   00007 0                      VATT
 1070                           14,3661   53435 0               VXV    UNIT
 1071    REF  31  LAST  949     14,3662   00001 0                      RATT
 1072    REF   4  LAST  926     14,3663   27615 0               STOVL  YSMD
 1073    REF   9  LAST  949     14,3664   03607 0                      XSMD
 1074                           14,3665   53435 0               VXV    UNIT
 1075    REF   5  LAST  949     14,3666   03615 0                      YSMD
 1076    REF   4  LAST  926     14,3667   37623 1               STCALL ZSMD
 1077    REF  11  LAST  949     14,3670   02746 0                      QMAJ
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L        P51-P53                                                                                    USER'S PAGE NO.  30       E5 S3

P1078    NAME     -R52 (AUTOMATIC OPTICS POSITIONING ROUTINE)

R1079    FUNCTION-POINT THE AOT OPTIC AXIS BY MANEUVERING THE LEM TO A NAVIGATION
R1080               STAR SELECTED BY ALIGNMENT PROGRAMS OR DSKY INPUT

R1081    CALLING -CALL R52

R1082    INPUT   -BESTI AND BESTJ (STAR CODES TIMES 6)
R1083    OUTPUT  -STAR CODE IN BITS1-6, DETENT CODE IN BITS 7-9
R1084               (NO CHECK IS MADE TO INSURE THE DETENT  CODE TO BE VALID)
R1085               POINTVSM-1/2 UNIT NAV STAR VEC IN SM
R1086               SCAXIS-AOT OPTIC AXIS VEC IN NB X-Z PLANE

R1087    SUBROUT -R60LEM

 1088    REF    1                                                 COUNT*  $$/R52
 1089                           14,3671    77420 1  R52           STQ     EXIT
 1090    REF    1               14,3672    03665 1                        SAVQR52
 1091    REF   10  LAST  946    14,3673   51 757 0                INDEX   STARIND
 1092    REF    9  LAST  935    14,3674   3 1755 1                CA      BESTI              PICK UP STARCODE DETERMINED BY R56
 1093                           14,3675   0 0006 1                EXTEND
 1094    REF    1               14,3676   7 3772 1                MP      1/6TH
 1095    REF   33  LAST  900    14,3677   6 4744 1                AD      BIT8               SET DETENT POSITION 2
 1096    REF    2  LAST  100    14,3700   54 734 0                TS      STARCODE           SCALE AND STORE IN STARCODE

 1097    REF    1               14,3701   3 3773 1  R52A          CAF     V01N70
 1098    REF  278  LAST  947    14,3702   0 4616 1                TC      BANKCALL
 1099    REF   32  LAST  941    14,3703    20477 1                CADR    GOFLASH            DISPLAY STARCODE AND WAIT FOR RESPONSE
 1100    REF   47  LAST  946    14,3704   0 6001 0                TC      GOTOPOOH           V34-TERMINATE
 1101    REF    1               14,3705   1 3707 0                TCF     R52B               V33-PROCEED TO ORIENT LEM
 1102    REF    1               14,3706   1 3701 0                TCF     R52A               ENTER-SELECT NEW STARCODE-RECYCLE

 1103    REF   95  LAST  888    14,3707   0 5516 0  R52B          TC      DOWNFLAG
 1104    REF    7  LAST  749    14,3710    00124 0                ADRES   3AXISFLG           BIT6 OF FLAGWRD5 ZERO TO ALLOW VECPOINT
 1105    REF    3  LAST  950    14,3711   3 0734 1                CA      STARCODE           GRAB DETENT CODE
 1106    REF    3  LAST  685    14,3712   7 7747 0                MASK    HIGH9
 1107                           14,3713   0 0006 1                EXTEND
 1108    REF   23  LAST  858    14,3714   7 4743 1                MP      BIT9
 1109    REF  160  LAST  919    14,3715   54 001 1                TS      L                  TEMP STORE DETENT

 1110                           14,3716   0 0006 1                EXTEND
 1111    REF    1               14,3717   6 3735 0                BZMF    GETAZEL            CODE 0, COAS CALIBRATION

 1112    REF    2  LAST  247    14,3720   6 5650 1                AD      NEG7
 1113                           14,3721   0 0006 1                EXTEND
 1114    REF    2  LAST  950    14,3722   1 3735 1                BZF     GETAZEL            CODE 7, COAS SIGHTING

 1115    REF   17  LAST  261    E7,1551                           EBANK=  XYMARK
 1116    REF   16  LAST  896    14,3723   3 5016 0                CA      EBANK7
 1117    REF   52  LAST  913    14,3724   54 003 0                TS      EBANK
 1118    REF 161  LAST  950   14,3725  50 001 0            INDEX   L
 1119    REF   4  LAST  248   14,3726  3 1403 1            CA      AOTAZ -1         PICK UP AZ CORRESPONDING TO DETENT
 1120    REF 162  LAST  951   14,3727  54 001 1            TS      L
 1121    REF  19  LAST  948   E5,1642                      EBANK=  XSM
 1122    REF  12  LAST  889   14,3730  3 5014 1            CA      EBANK5           CHANGE TO EBANK5 BUT DONT DISTURB L
 1123    REF  53  LAST  950   14,3731  54 003 0            TS      EBANK
 1124    REF  36  LAST  830   14,3732  3 4737 0            CA      BIT13            SET ELV TO 45 DEG
 1125    REF 163  LAST  951   14,3733  56 001 0            XCH     L                SET C(A)=AZ, C(L)=45 DEG
 1126    REF   1              14,3734  1 3745 0            TCF     AZEL             GO COMP OPTIC AXIS

 1127    REF   1              14,3735  3 3774 0  GETAZEL   CAF     V06N87           CODE 0 OR 7, GET AZ AND EL KEY IN
 1128    REF 279  LAST  950   14,3736  0 4616 1            TC      BANKCALL
 1129    REF  33  LAST  950   14,3737   20477 1            CADR    GOFLASH
 1130    REF  48  LAST  950   14,3740  0 6001 0            TC      GOTOPOOH         V34-TERMINATE
 1131                         14,3741  1 3743 0            TCF     +2               PROCEED-CALC OPTIC AXIS
 1132    REF   3  LAST  950   14,3742  1 3735 1            TCF     GETAZEL          ENTER-RECYCLE

 1133                         14,3743  0 0006 1            EXTEND
 1134    REF   4  LAST  319   14,3744  3 1345 1            DCA     AZ               PICK UP AZ AND EL IN SP 2S COMP
 1135    REF  34  LAST  943   14,3745  50 120 1  AZEL      INDEX   FIXLOC           JAM AZ AND EL IN 8 AND 9 OF VAC
 1136                         14,3746  52 011 0            DXCH    8D
 1137    REF 190  LAST  947   14,3747  0 6042 1            TC      INTPRET
 1138                         14,3750   77624 1            CALL                     GO COMPUTE OPTIC AXIS AND STORE IN
 1139    REF   2  LAST  249   14,3751   10522 0                    OANB             SCAXIS IN NB COORDS
 1140                         14,3752   45034 1            RTB     CALL
 1141    REF  26  LAST  936   14,3753   21574 1                    LOADTIME
 1142    REF   5  LAST  946   14,3754   32472 1                    PLANET
 1143                         14,3755   53521 1            MXV     UNIT
 1144    REF  47  LAST  948   14,3756   01734 0                    REFSMMAT
 1145    REF   7  LAST  783   14,3757   03773 1            STORE   POINTVSM         STORE FOR VECPOINT

 1146                         14,3760   77776 1            EXIT
 1147    REF 280  LAST  951   14,3761  0 4616 1            TC      BANKCALL
 1148    REF   6  LAST  784   14,3762   54123 0            CADR    R60LEM           GO TORQUE LEM OPTIC AXIS TO STAR LOS

 1149    REF   4  LAST  950   14,3763  3 7747 1            CAF     HIGH9            IF COAS CALIBRATION CODE 0, RECYCLE
 1150    REF   4  LAST  950   14,3764  7 0734 0            MASK    STARCODE
 1151                         14,3765  0 0006 1            EXTEND
 1152    REF   2  LAST  950   14,3766  1 3701 0            BZF     R52A

 1153    REF 191  LAST  951   14,3767  0 6042 1            TC      INTPRET          RETURN FROM KALCMANU
 1154                         14,3770   77650 1            GOTO
 1155    REF   2  LAST  950   14,3771   03665 1                    SAVQR52          RETURN TO CALLER

 1156                         14,3772   05253 0  1/6TH     DEC     .1666667
 1157                         14,3773   00306 1  V01N70    VN      0170
 1158                         14,3774   01527 0  V06N87    VN      687
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R1159   LUNAR SURFACE STAR AQUISITION

 1160                          15,2245                          BANK    15
 1161   REF   3  LAST  922     15,2000                          SETLOC  P50S
 1162                          15,2245                          BANK
 1163   REF   2 LAST  251  TO  252:     40     40*              COUNT*  $$/R59

 1164   REF  15  LAST  871     15,2245  4 0077 0  R59           CS      FLAGWRD3
 1165   REF   3  LAST  215     15,2246  7 4737 1                MASK    REFSMBIT       IF REFSMMAT FLAG CLEAR BYPASS STAR AQUIR
 1166   REF 284  LAST  923     15,2247  10 000 0                CCS     A
 1167   REF   1                15,2250  1 2455 0                TCF     R59OUT         NO REFSMMAT GO TO ACTMARK

 1168   REF   1                15,2251  3 2463 1                CAF     V01N70*        SELECT STAR CODE FOR ACQUISITION
 1169   REF 281  LAST  951     15,2252  0 4616 1                TC      BANKCALL
 1170   REF  34  LAST  951     15,2253   20477 1                CADR    GOFLASH
 1171   REF  49  LAST  951     15,2254  0 6001 0                TC      GOTOPOOH       V34-TERMINATE
 1172   REF   1                15,2255  1 2257 1                TCF     R59A           V33-PROCEED
 1173   REF   1                15,2256  1 2245 1                TCF     R59            V32-RECYCLE

 1174   REF   5  LAST  951     15,2257  4 7747 0  R59A          CS      HIGH9          GRAB STARCODE FOR INDEX
 1175   REF   9  LAST  318     15,2260  7 0734 0                MASK    AOTCODE
 1176                          15,2261  0 0006 1                EXTEND
 1177   REF   2  LAST  255     15,2262  7 6245 0                MP      REVCNT         JUST 6
 1178   REF 164  LAST  951     15,2263  56 001 0                XCH     L
 1179   REF  11  LAST  950     15,2264  51'757 0                INDEX   STARIND
 1180   REF  10  LAST  950     15,2265  55'755 0                TS      BESTI
 1181   REF  35  LAST  951     15,2266  50 120 1                INDEX   FIXLOC
 1182   REF  25  LAST  933     15,2267  54 046 1                TS      X1             CODE X 6 FOR CATLOG STAR INDEX
 1183                          15,2270  0 0006 1                EXTEND
 1184   REF   2  LAST  952     15,2271  1 2455 0                BZF     R59OUT         BYPASS AQUISITION IF NOT CATLOG STAR
 1185                          15,2272  4 0000 0                COM
 1186   REF   1                15,2273  6 2557 1                AD      DEC227
 1187                          15,2274  0 0006 1                EXTEND
 1188   REF   3  LAST  952     15,2275  6 2455 1                BZMF    R59OUT

 1189   REF 192  LAST  951     15,2276  0 6042 1                TC      INTPRET
 1190                          15,2277   64373 1                VLOAD*  MXV
 1191   REF  11  LAST  935     15,2300   30347 1                        CATLOG,1       GRAB STAR VECTOR
 1192   REF  48  LAST  951     15,2301   01734 0                        REFSMMAT       TRANSFORM TO SM
 1193                          15,2302   45056 0                UNIT    CALL
 1194   REF   3  LAST  779     15,2303   47650 1                        CDU*SMNB
 1195   REF   3  LAST  242     15,2304   02731 0                STORE   STAR           TEMP STORE STAR VEC(NB)
 1196                          15,2305   77776 1                EXIT

 1197   REF  44  LAST  946     15,2306  3 4753 1                CAF     BIT1           INITIALIZE AZ POSITION CODE TO 1 (-60)
 1198   REF   2  LAST  318     15,2307  55'241 0                TS      POSCODE

 1199   REF  18  LAST  950     E7,1651                          EBANK=  XYMARK
 1200   REF  17  LAST  950     15,2310  3 5016 0  INCAZ         CA      EBANK7
 1201   REF  54  LAST  951     15,2311  54 003 0                TS      EBANK
 1202   REF   3  LAST  952   15,2312  51'241 1          INDEX  PDSCODE
 1203   REF   5  LAST  951   15,2313  3 1403 1          CA     AOTAZ -1        PICK UP AZ CORRESPONDING TO POSCODE
 1204   REF 165  LAST  952   15,2314  54 001 1          TS     L

 1205   REF  20  LAST  951   E5,1642                    EBANK= XSM
 1206   REF  13  LAST  951   15,2315  3 5014 1          CA     EBANK5
 1207   REF  55  LAST  952   15,2316  54 003 0          TS     EBANK

 1208   REF  37  LAST  951   15,2317  3 4737 0          CA     BIT13           SET ELV TO 45 DEG
 1209   REF 166  LAST  953   15,2320  56 001 0          XCH    L               SET C(A)=AZ, C(L)=45 DEG
 1210   REF  12  LAST  942   15,2321  55'745 1          TS     QMIN            STORE QMIN=AZ FOR LATER
 1211   REF  36  LAST  952   15,2322  50 120 1          INDEX  FIXLOC
 1212                        15,2323  52 011 0          DXCH   8D              JAM AZ IN 8D, 45 DEG IN 90 FOR OANB

 1213   REF 193  LAST  952   15,2324  0 6042 1          TC     INTPRET
 1214                        15,2325   77624 1          CALL
 1215   REF   3  LAST  951   15,2326   10522 0                 OANB            GO CALC OPTIC AXIS WRT NB
 1216                        15,2327   50375 0          VLOAD  DOT
 1217   REF   4  LAST  952   15,2330   02731 0                 STAR            DOT STAR WITH OA
 1218   REF  24  LAST  763   15,2331   03765 0                 SCAXIS
 1219                        15,2332   65552 0          SL1    ARCCOS
 1220                        15,2333   00031 0          STORE  24D             TEMP STORE ARCCOS(STAR.OPTAXIS)

 1221                        15,2334   51025 1          DSU    8PL
 1222   REF   2  LAST  252   15,2335   32466 1                 DEG30           SEE IF STAR IN AOT FIELD-OF-VIEW
 1223   REF   1              15,2336   32420 0                 NXAX            NOT IN FIELD - TRY NEXT POSITION
 1224                        15,2337   45345 1          DLOAD  DSU             SEE IF STAR AT FIELD CENTER
 1225                        15,2340   00031 0                 24D
 1226   REF   1              15,2341   32470 0                 DEG.5
 1227                        15,2342   71240 1          BMN    DLOAD           CALC SPIRAL AND CURSOR
 1228   REF   1              15,2343   32413 0                 ZSPCR           GO ZERO CURSOR AND SPIRAL
 1229                        15,2344   00031 0                 24D             GET SPIRAL
 1230                        15,2345   42405 0          DMP    SL4
 1231   REF   1              15,2346   11220 1                 3/4             12 SCALED AT 16
 1232                        15,2347   24031 0          STOVL  24D             12(ARCCOS(OA.STAR)) SCALED IN REVS

 1233   REF  25  LAST  953   15,2350   03765 0                 SCAXIS          OA
 1234                        15,2351   53435 0          VXV    UNIT
 1235   REF   3  LAST   37   15,2352   24005 1                 XUNIT
 1236                        15,2353   47206 0          PUSH   VXV              OA X UNITX    PD 0-5
 1237   REF  26  LAST  953   15,2354   03765 0                 SCAXIS
 1238                        15,2355   77676 0          VCOMP
 1239                        15,2356   63256 0          UNIT   PDVL            UNIT(OA X(OA X UNITX))  PD 6-11
 1240   REF  27  LAST  953   15,2357   03765 0                 SCAXIS
 1241                        15,2360   53435 0          VXV    UNIT
 1242   REF   5  LAST  953   15,2361   02731 0                 STAR
 1243                        15,2362   50206 0          PUSH   DOT             1/2(OA X STAR)    PD 12-17
 1244                        15,2363   00001 0                 0               DOT WITH 1/2(OA X UNITX)  FOR YROT
 1245                        15,2364   65552 0          SL1    ARCCOS
 1246                        15,2365   24033 1          STOVL  26D             STORE THET SCALED IN REVS
 1247                        15,2366   77641 1            OCT               UP 12-17, UP 6-11 FOR C2
 1248                        15,2367   71244 0            BPL      DLOAD    IF THET NEG-GET 360-THET
 1249  REF   1               15,2370   32375 1                     R59D
 1250  REF   2  LAST   251   15,2371   32047 0                     ABOUTONE
 1251                        15,2372   77625 0            DSU
 1252                        15,2373   00033 1                     26D
 1253                        15,2374   00033 1            STORE    26D      360-THET SCALED IN REVS

 1254                        15,2375   70535 0  R59D      SLDAD    SR1
 1255  REF  13  LAST   953   15,2376   02746 0                     OMIN     RESCALE AZ(N) TO REVS
 1256                        15,2377   41415 1            DAD      PUSH     PUSH YROT + AZ(N) REVS
 1257                        15,2400   00033 1                     26D
 1258                        15,2401   77634 0            RTB
 1259  REF   2  LAST   375   15,2402   21615 0                     1STO2S
 1260  REF   3  LAST   318   15,2403   15236 1            STODL    CURSOR   YROT IN 1/2 REVS
 1261                        15,2404   00031 0                     24D      LOAD SROT IN REVS
 1262                        15,2405   77615 0            DAD               12(SEP) + YROT
 1263                        15,2406   77634 0            RTB
 1264  REF   3  LAST   954   15,2407   21615 0                     1STO2S
 1265  REF   3  LAST   318   15,2410   01240 0            STORE    SPIRAL   SROT IN 1/2 REVS
 1266                        15,2411   77776 1            EXIT
 1267  REF   1               15,2412  1 2437 1            TCF      79DISP   GO DISPLAY CURSOR-SPIRAL-POS CODE

 1268                        15,2413   77776 1  ZSPCR     EXIT
 1269  REF 180  LAST   947   15,2414  3 4755 1            CAF      ZERO     STAR ALMOST OPTIC AXIS,ZERO CURSOR
 1270  REF   4  LAST   954   15,2415  55'235 0            TS       CURSOR   AND SPIRAL ANGLES
 1271  REF   4  LAST   954   15,2416  55'237 1            TS       SPIRAL
 1272  REF   2  LAST   954   15,2417  1 2437 1            TCF      79DISP

 1273                        15,2420   77776 1  NXAX      EXIT
 1274  REF   4  LAST   953   15,2421  25'241 1            INCR     POSCODE
 1275  REF   5  LAST   954   15,2422  4 1241 0            CS       POSCODE
 1276  REF  12  LAST   853   15,2423  6 4757 0            AD       SEVEN
 1277                        15,2424  0 0006 1            EXTEND
 1278  REF   1               15,2425  6 2427 1            BZMF     R59ALM   THIS STAR NOT AT ANY POSITION
 1279  REF   1               15,2426  1 2310 0            TCF      INCAZ

 1280  REF  38  LAST   936   15,2427  0 5567 0  R59ALM    TC       ALARM    THIS STAR CANT BE LOCATED IN AOT FIELD
 1281                        15,2430   00404 1            OCT      404
 1282  REF   2  LAST   936   15,2431  3 5006 1            CAF      V05N09   DISPLAY ALARM
 1283  REF 282  LAST   952   15,2432  0 4616 1            TC       BANKCALL
 1284  REF  35  LAST   952   15,2433   20477 1            CADR     GOFLASH
 1285  REF  50  LAST   952   15,2434  1 6001 1            TCF      GOTOPOOH V34-TERMINATE
 1286  REF   4  LAST   952   15,2435  1 2455 0            TCF      R59OUT   V33-PROCEED, GO WITHOUT AQUIRE
 1287  REF   2  LAST   952   15,2436  1 2245 1            TCF      R59      V32-RECYCLE AND TRY ANOTHER STAR

 1288  REF   1               15,2437  3 2464 0  79DISP    CAF      V06N79   DISPLAY CURSOR, SPIRAL AND POS CODE
 1289  REF 283  LAST   954   15,2440  0 4616 1            TC       BANKCALL
 1290  REF  36  LAST   954   15,2441   20477 1            CADR     GOFLASH
 1291  REF  51  LAST   954   15,2442  1 6001 1            TCF      GOTOPOOH V34-TERMINATE
 1292  REF   1              15,2443  1 2445 1              TCF     R59E            V33-PROCEEO TO MARK ROUTINE
 1293  REF   3  LAST  954   15,2444  1 2245 1              TCF     R59             V32-RECYCLE TO TOP OF R59 AGAIN

 1294  REF  13  LAST  954   15,2445  3 4757 0  R59E        CAF     SEVEN           GET OETENT CODE CORRESPONOING TO POSCOOE
 1295  REF   6  LAST  954   15,2446  7 1241 0              MASK    POSCOOE
 1296                       15,2447  0 0006 1              EXTENO
 1297  REF  34  LAST  893   15,2450  7 4745 1              MP      BIT7            OETENT COOE NOW IN L
 1298  REF   6  LAST  952   15,2451  4 7747 0              CS      HIGH9
 1299  REF  10  LAST  952   15,2452  7 0734 0              MASK    AOTCOOE         ISOLATE STAR NO IN BIT 1-6
 1300  REF 167  LAST  953   15,2453  6 0001 0              AO      L
 1301  REF  11  LAST  955   15,2454  54 734 0              TS      AOTCOOE         STORE OETENT 7-9

 1302  REF 284  LAST  954   15,2455  0 4616 1  R590UT      TC      BANKCALL        GO TO AOTMARK FOR SIGHTING
 1303  REF   3  LAST  945   15,2456   16000 0              CAOR    AOTMARK
 1304  REF 285  LAST  955   15,2457  0 4616 1              TC      BANKCALL
 1305  REF   2  LAST  945   15,2460   17703 0              CAOR    AOTSTALL        SLEEP TILL SIGHTING OONE
 1306  REF   7  LAST  947   15,2461  0 5701 1              TC      CURTAINS        BAOENO RETURN FROM AOTMARK
 1307  REF   1              15,2462  1 3037 1              TCF     R59RET          RETURN TO 1 STAR OR 2STAR

 1308                       15,2463   00306 1  V01N70*     VN      170
 1309                       15,2464   01517 0  V06N79      VN      679
 1310                       15,2465   02525 1  OEG30       2DEC    .083333333      30 OEGRESS
 1310                       15,2466   12525 0
 1311                       15,2467   00026 0  OEG.5       2DEC    .00138E88       .5 OEGRESS SCALEO IN REVS
 1311                       15,2470   30131 1
 1312                       15,2471   12525 0  OEG60       OCT     12525           60 DEG COU SCALING
 1313  REF  16  LAST  928      1235            CURSOR      EQUALS  GOT/2
 1314  REF  17  LAST  955      1237            SPIRAL      EQUALS  GOT/2 +2
 1315  REF  18  LAST  955      1241            POSCOOE     EQUALS  GOT/2 +4
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P1316   NAME -   PLANET
R1317   FLNCTION -TO PROVIOE THE REFERENCE VECTCR FOR THE SIGHTEO CELESTIAL
R1318              8ODY. STARS ARE FETCHED FROM THE CATALOG,SUN,EARTH ANC
R1319              MCCN ARE CCMPUTEC EY LOCSAM,PLANET VECTORS ARE ENTEREO
R1320              8Y DSOY INPLT
R1321   CALL  -  CALL
R1322                    PLANET
R1323   INPUT -  TIME IN MPAC
R1324   OUTPUT - VECTOR  IN MPAC
R1325   SLBROLTINES - LOCSAM
R1326   LEBRIS - VAC ,STARAD - STARAD +17
                                   .
 1327   REF   4  LAST  952   15,2000                         SETLOC P50S
 1328                        15,2472                         BANK
 1329   REF   1                                              CCUNT* $$/P51

 1330   REF   8  LAST  946   15,2472   03562 0  PLANET       STORE  TSIGHT
 1331                        15,2473   77420 1               STQ    EXIT
 1332   REF   4  LAST  250   15,2474   C2736 1                      GCTP
 1333   REF   7  LAST  955   15,2475  4 7747 0               CS     HIGH9
 1334   REF  12  LAST  955   15,2476  7 C734 0               MASK   AOTCCOE
 1335                        15,2477  0 0006 1               EXTEND
 1336   PEF   3  LAST  952   15,2500  7 6245 0               MP     REVCNT
 1337   REF 168  LAST  955   15,25C1  56 CC1 0               XCH    L
 1338   REF  12  LAST  952   15,25C2  51'757 0               INOEX  STARIND
 1339   REF  11  LAST  952   15,25C3  55'755 0               TS     BESTI
 1340   REF 285  LAST  952   15,2504  1C 000 0               CCS    A
 1341   REF   1              15,2505  1 2521 1               TCF    NOTPLAN
 1342   REF   1              15,2506  3 2560 0               CAF    VNPLANV
 1343   REF 286  LAST  955   15,2507  C 4616 1               TC     8ANKCALL
 1344   REF  37  LAST  954   15,2510   20477 1               CACR   GOFLASH
 1345                        15,2511  C 2506 C               TC     -3
 1346                        15,2512  0 2514 0               TC     +2
 1347                        15,2513  C 2506 0               TC     -5
 1348   REF 194  LAST  953   15,2514  C 6042 1               TC     INTPRET
 1349                        15,2515   53575 0               VLOAO  UNIT
 1350   REF  21  LAST  946   15,2516   C2707 0                      STARAD
 1351                        15,2517   77650 1               GOTO
 1352   REF   5  LAST  956   15,2520   02736 1                      GCTR
 1353   REF 286  LAST  956   15,2521  4 0000 0  NOTPLAN      CS     A
 1354   REF   2  LAST  952   15,2522  6 2557 1               AO     DEC227
 1355                        15,2523  C 0006 1               EXTENO
 1356   REF   1              15,2524  6 2535 0               BZMF   CALSAM1
 1357   REF  13  LAST  956   15,2525  51'757 0               INOEX  STARINO
 1358   REF  12  LAST  956   15,2526  3 1755 1               CA     8ESTI
 1359   REF  37  LAST  953   15,2527  5G 120 1               INOEX  FIXLOC
 1360   REF  26  LAST  952   15,2530  54 046 1               TS     X1
 1361   REF 195  LAST  956   15,2531  C 6042 1               TC     INTPRET
 1362                        15,2532   52173 ^               VLOAO* GOTO
 1363   REF  12  LAST  952   15,2533   30347 1                      CATLCG,1
 1364   REF   6  LAST  956   15,2534   02736 1                    GCTR
 1365   REF 196  LAST  956   15,2535   0 6042 1  CALSAM1   TC       INTPRET
 1366                        15,2536   45145 0  CALSAM    DLOAD    CALL
 1367   REF   9  LAST  956   15,2537   03562 0                    TSIGHT
 1368   REF   3  LAST  936   15,2540   30500 1                    LOCSAM
 1369                        15,2541   77340 0            LXC,1    VLOAD
 1370   REF  14  LAST  956   15,2542   02757 0                    STARIND
 1371   REF   5  LAST  930   15,2543   02707 0                    VEARTH
 1372                        15,2544   24001 0            STOVL    0D
 1373   REF   4  LAST  930   15,2545   02715 0                    VSUN
 1374   REF   6  LAST  957   15,2546   26707 0            STOVL    VEARTH
 1375                        15,2547   00001 0                    0D
 1376   REF   5  LAST  957   15,2550   02715 0            STORE    VSUN
 1377                        15,2551   70143 0            DLOAD*   LXC,1
 1378   REF  13  LAST  956   15,2552   02756 1                    BESTI,1
 1379   REF 373  LAST  934   15,2553   00154 1                    MPAC
 1380                        15,2554   52173 0            VLOAD*   GOTO
 1381   REF  22  LAST  956   15,2555   02343 1                    STARAD -228D,1
 1382   REF   7  LAST  957   15,2556   02736 1                    GCTR
 1383                        15,2557   00343 0  DEC227    DEC      227
 1384                        15,2560   01530 0  VNPLANV   VN       0688
 1385   REF   4  LAST  853   37,3541            PIPSRINE =         PIPASR +3        EBANK NOT 4 SO DONT LOAD PIPTIME1
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P1386   GRAVITY VECTOR DETERMINATION ROUTINE
R1387   BY KEN VINCENT
R1388   FOR DETAILED DESCRIPTION SEE 504GSOP 5.6.3.2.5
R1389   THIS PROGRAM FINDS THE DIRECTION OF THE MOONS GRAVITY
R1390   WHILE THE LM IS ON THE MOONS SURFACE. IT WILL BE USED
R1391   FOR LUNAR SURFACE ALIGNMENT. THE GRAVITY VECTOR IS
R1392   DETERMINED BY READING THE PIPAS WITH THE IMU AT TWO
R1393   PARTICULAR ORIENTATIONS. THE TWO READINGS ARE AVERAGED
R1394   AND UNITIZED AND TRANSFORMED TO NB COORDINATES. THE TWO
R1395   ORIENTATION WERE CHOSEN TO REDUCE BIAS ERRORS IN THE
R1396   READINGS.
R1397
R1398   CALL-
R1399            TC      BANKCALL
R1400            CADR    GVDETER
R1401   INPUTS-
R1402            PIPAS,CDUS
R1403   OUTPUTS-
R1404            STARSAV1 = UNIT GRAVITY
R1405            GSAV     =   DITTO
R1406            GRAVBIT  = 1
R1407   SUBROUTINES-
R1408            PIPASR,IMUCOARS,IMUFINE,IMUSTALL,1/PIPA,DELAYJOB,CDUTRIG,
R1409            *NBSM* ,*SMNB*, CALCGA,FCFLASH
R1410   DEBRIS-
R1411            VAC,SAC,STARAC,XSM,XNE,THETAD,DELV,COSCDU,SINCDU
 1412   REF   1                15,2561  3 2762 0  GVDETER   CAF     42DEG
 1413   REF  14  LAST  945     15,2562 54 321 0             TS      THETAD
 1414                          15,2563  4 0000 0            COM
 1415   REF  15  LAST  958     15,2564 54 322 0             TS      THETAD +1
 1416   REF   1                15,2565  3 2763 1            CAF     35DEG
 1417   REF  16  LAST  958     15,2566 54 323 1             TS      THETAD +2
 1418   REF 197  LAST  957     15,2567  0 6042 1            TC      INTPRET
 1419                          15,2570   45014 0            CLEAR   CALL
 1420   REF   6  LAST  946     15,2571   01462 1                    REFSMFLG
 1421   REF   1                15,2572   22666 0                    LUNG
R1422   FIND  GIMBAL ANGLES WHICH ROTATE SM 180DEG  ABOUT  G VEC
R1423
R1424    DEFINE G COOR SYS
R1425                          -
R1426                          X     UNIT G
R1427                     *    -               -
R1428                     M=   Y =   UNIT(ZSM * X )
R1429                          -          -    -
R1430                          Z     UNIT(X   * Y )
R1431    THEN   ROTATED  SM WRT  PRESENT IS
R1432
R1433
R1434                         1,  0 , 0
R1435              *      *T           *          *         *
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R1436            XSM =   M  0, -1 , (  M  = 2  (X X ) - 1/2 I  *
R1437                                             I J
R1438                       C,  0 ,-1
R1439
R1440    ALSC   N8 WRT PRES SM  IS
R1441
R1442                   *      *   *
R1443                  XNB = N8SM  I
R1444                               *     *
R1445    GIMBAL ANGLES  = CALCGA( XSM , XN8 )
R1446
 1447   REF    5  LAST   956   15,20CC                        SETLCC R5CS
 1448                          15,2573                        BANK
 1449   REF    1                                              CCUNT* $$/R57
 1450                          15,2573    66370 C             AXT,1  SSR              X1=18
 1451                          15,2574    00022 1                    180              S1= 6
 1452   REF   10  LAST   948   15,2575    CCC51 0                    S1               X2, -2
 1453                          15,2576    00006 1                    60
 1454                          15,2577    77744 0             LXC,2
 1455   REF   11  LAST   959   15,2600    C0050 1                    S1
 1456                          15,2601    45173 0    GRAVEL    VLOAO* CALL
 1457   REF    4  LAST   953   15,2602    54000 0                    XUNIT -6,2
 1458   REF    5  LAST   879   15,2603    47675 0                    *NBSM*           SIN ANO CCS COMRUTEC IN LUNG
 1459   REF    6  LAST   948   15,2604    06707 1             STORE  XNB +18C,1
 1460                          15,26C5    77775 1             VLCAO
 1461   REF    6  LAST   953   15,2606    02731 0                    STAR
 1462                          15,2607    73744 1             LXC,2  VXSC*            COMRLEMENT- UNITX  ARE 8ACKWARO -
 1463   REF   15  LAST   873   15,2610    CC047 I                    X2
 1464   REF    7  LAST   959   15,2611    75040 1                    STAR +6,2        OUTER RROOUCT
 1465                          15,2612    71152 1             VSL2   LXC,2
 1466   REF   16  LAST   959   15,2613    00047 1                    X2
 1467                          15,2614    63047 1             VSU*   INCR,2
 1468   REF    5  LAST   959   15,2615    540CC 0                    XUNIT -6,2
 1469                          15,2616    00002 0                    20
 1470   REF   21  LAST   953   15,2617    06665 1             STCRE  XSM +18C,1
 1471                          15,2620    45IC0 I             TIX,1  CALL
 1472   REF    1               15,2621    32601 1                    GRAVEL
 1473   REF    3  LAST   948   15,2622    47355 1                    CALCGA
 1474                          15,2623    74575 0             VLOAO  VSR1
 1475   REF    1               15,2624    02715 0                    GOUT
 1476   REF   23  LAST   957   15,2625    36723 1             STCALL STARAO +120
 1477   REF    2  LAST   958   15,2626    32666 0                    LUNG
 1478                          15,2627    74575 C             VLOAD  VSR1
 1479   REF    2  LAST   959   15,2630    C2715 0                    GCUT
 1480                          15,2631    53455 0             VAC    UNIT
 1481   REF   24  LAST   959   15,2632    02723 0                    STARAO +12D
 1482   REF    7  LAST   946   15,2633    C2761 0             STORE  STARSAV1
 1483                          15,2634    77641 1             OOT
 1484   REF    6  LAST   787   15,2635    C2231 C                    GSAV
 1485                          15,2636    65552 0             SL1    ACOS
 1486  REF  29  LAST  923   15,2637   01045 1            STORE   OSPTEM1
 1487                       15,2640   77776 1            EXIT
 1488  REF  96  LAST  950   15,2641  0 5516 0            TC      OOWNFLAG      CLEAR FREEFLAG IN CASE OF RECYCLE
 1489  REF   8  LAST  946   15,2642   00014 1            AORES   FREEFLAG

 1490  REF   1              15,2643  3 2761 0            CA      OISGRVER
 1491  REF 287  LAST  956   15,2644  0 4616 1            TC      8ANKCALL
 1492  REF  38  LAST  956   15,2645   20477 1            CAOR    GOFLASH
 1493  REF  52  LAST  954   15,2646  0 6001 0            TC      GOTOPOOH
 1494  REF   1              15,2647  1 2652 0            TCF     PROGRAV       V833-PROCEED
 1495  REF  64  LAST  888   15,2650  0 5504 0            TC      UPFLAG        V832-RECYCLE-STORE GRAV ANO OO IT AGAIN
 1496  REF   9  LAST  960   15,2651   00014 1            AORES   FREEFLAG      ANO SET FREEFLAG TO SHOW RECYCLE

 1497  REF  91  LAST  946   15,2652  0 5353 1  PROGRAV   TC      PHASCHNG
 1498                       15,2653   04024 0            OCT     04024

 1499  REF 198  LAST  958   15,2654  0 6042 1            TC      INTPRET
 1500                       15,2655   77775 1            VLOAO
 1501  REF   8  LAST  959   15,2656   02761 0                    STARSAV1
 1502  REF   7  LAST  959   15,2657   02231 0            STORE   GSAV
 1503                       15,2660   77776 1            EXIT
 1504  REF   1              15,2661  3 4751 0            CAF     FREEF8IT      IF FREEFLAG SET, RE-COMPUTE GRAVITY.
 1505  REF  28  LAST  900   15,2662  7 0074 0            MASK    FLAGWRO0
 1506  REF 287  LAST  956   15,2663  10 000 0            CCS     A
 1507  REF   1              15,2664  1 2561 0            TCF     GVOETER       SET
 1508  REF   1              15,2665  1 3536 0            TCF     ATTCHK        EXIT FROM GVOETER

 1509                       15,2666   77220 1  LUNG      STQ     VLOAO
 1510  REF  14  LAST  954   15,2667   02745 0                    OMIN
 1511  REF   4  LAST  947   15,2670   24007 0                    ZEROVEC
 1512  REF   1              15,2671   02707 0            STORE   GACC
 1513                       15,2672   77776 1            EXIT
 1514  REF  92  LAST  960   15,2673  0 5353 1            TC      PHASCHNG
 1515                       15,2674   04024 0            OCT     04024

 1516  REF 199  LAST  960   15,2675  0 6042 1            TC      INTPRET
 1517                       15,2676   77624 1            CALL
 1518  REF   4  LAST  947   15,2677   31557 1                    COARSE
 1519                       15,2700   77776 1            EXIT
 1520  REF   1              15,2701  3 2760 1            CA      T/2SEC
 1521  REF   8  LAST  957   15,2702  55'736 0            TS      GCTR
 1522  REF   4  LAST  855   15,2703  3 7721 1            CA      PRIO31
 1523  REF  10  LAST  947   15,2704  55'074 1            TS      1/PIPADT
 1524  REF 288  LAST  960   15,2705  0 4616 1            TC      8ANKCALL
 1525  REF   1              15,2706   15707 0            CADR    GCOMPZER      INITIALIZE  COMPENSATION
 1526  REF  93  LAST  960   15,2707  0 5353 1            TC      PHASCHNG
 1527                       15,2710   04024 0            OCT     04024

 1528  REF 289  LAST  960   15,2711  0 4616 1            TC      8ANKCALL       OONT NEED TO INHINY  THIS USEO TO
 1529  REF   1              15,2712   77541 1            CAOR    PIPSRINE      INITIALIZE PIPAS  CONT USE OATA
 1530   REF 200  LAST  960    15,2713  C 6042 1            TC       INTPRET
 1531                         15,2714   77776 1  GREED     EXIT                     = MASK 7776 IN BASIC SO DONT CAPE
 1532   REF   5  LAST  852    15,2715  3 5000 1            CAF      2SECS
 1533   REF  26  LAST  B93    15,2716  C 5173 1            TC       TWIDDLE         SET UP 2 SEC TASK TO READ PIPAS
 1534   RFF   1               15,2717   02721 1            ADRES    GRABGRAV

 1535   REF 141  LAST  923    15,2720  0 5155 0            TC       FNDOFJOB

 1536   REF  47  LAST  919    15,2721  C 4674 0  GRABGRAV  TC       IBNKCALL
 1537   REF   2  LAST  960    15,2722   77541 1            CADR     PIPSRINE
 1538   RFF   2  LAST  740    15,2723  3 5023 0            CAF      PRIO13          RE-ESTABLISH MAINLINE JOB
 1539   REF  40  LAST  868    15,2724  C 5105 0            TC       FINDVAC
 1540   REF  25  LAST  959    E5,1706                      EBANK=   STARAD
 1541   REF   1               15,2725   C2730 1            2CADR    ADDGRAV
 1541   REF   1               15,2726   32065 0

 1542   REF  66  LAST  900    15,2727  0 5261 1            TC       TASKOVER

 1543   RFF 290  LAST  960    15,2730  C 4616 1  ADDGRAV   TC       BANKCALL
 1544   REF   3  LAST  855    15,2731   15271 1            CADR     1/PIPA
 1545   REF   9  LAST  960    15,2732  25'736 1            INCR     GCTR
 1546   REF 201  LAST  961    15,2733  0 6042 1            TC       INTPRET
 1547                         15,2734   53375 0            VLDAD    VAD
 1548   REF   9  LAST  906    15,2735   00325 0                     DELV
 1549   REF   2  LAST  960    15,2736   02707 C                     GACC
 1550   REF   3  LAST  961    15,2737   02707 0            STORE    GACC            ACCUMULATE G VECTOR
 1551                         15,2740   50135 C            SLCAD    BMN
 1552   REF  10  LAST  961    15,2741   02737 C                     GCTR
 1553   REF   1               15,2742   32714 1                     GREED
 1554                         15,2743   53575 0            VLDAD    UNIT
 1555   REF   4  LAST  961    15,2744   02707 0                     GACC
 1556   REF   8  LAST  959    15,2745   36731 1            STCALL   STAR
 1557   REF   6  LAST  94B    15,2746   47541 1                     COLTRIG          TRANSFORM  IN NB CCCR  ANC  STORE
 1558                         15,2747   77624 1            CALL                       IN OUTPUT
 1559   REF   7  LAST  906    15,2750   47673 0                     *SMNB*
 1560   REF   3  LAST  959    15,2751   02715 0            STORE    GOUT
 1561                         15,2752   77776 1            EXIT
 1562   REF  94  LAST  960    15,2753  C 5353 1            TC       PHASCHNG
 1563                         15,2754   04024 0            OCT      04024

 1564   RFF 202  LAST  961    15,2755  C 6042 1  QMINEXIT  TC       INTPRET
 1565                         15,2756   77650 1            GOTO
 1566   REF  15  LAST  960    15,2757   02745 0                     QMIN
 1567                         15,2760   77753 0  T/2SEC    DEC      -20
 1568                         15,2761   01404 0  DISGRVER  VN       0604
 1569                         15,2762   07357 1  42DEG     OCT      07357
 1570                         15,2763   C6211 0  35DEG     OCT      06211
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P1571    NAME  GYROTRIM
R1572
R1573    THIS PROGRAM COMPUTES AND SENDS GYRO COMMANDS WHICH CAUSE THE CDUS
R1574      TO ATTAIN A PRESCRIBED SET OF ANGLES. THIS ROUTINE ASSUMES THE
R1575      VEHICLES ATTITUDE REMAINS STATIONARY DURING ITS OPERATION.
R1576
R1577    CALL      CALL
R1578                      GYROTRIM
R1579
R1580    INPUT     THETAD,+1,+2 = DESIRED CDU ANGLES
R1581              CDUX,CDUY,CDUZ
R1582
R1583    OUTPUT - GYRO TORQUE PULSES
R1584
R1585    SUBROUTINES- TRG*NBSM,*NBSM*,CDUTRIG,AXISGEN,CALCGTA,IMUFINE
R1586                  IMPULSE,IMUSTALL
R1587                 -         -        -         *          *     -
R1588    DEBRIS -  CDUSPOT ,SINCDU ,COSCDU , STARAD ,VAC , XDC , OGC
 1589    REF   2 LAST  959 TO  962:   121   121*          COUNT* $$/P57
 1590                         15,2764    71220 1  GYROTRIM STQ    DLOAD
 1591    REF  16  LAST  961   15,2765    02745 0                  QMIN
 1592    REF  17  LAST  958   15,2766    00322 1                  THETAD
 1593                         15,2767    65325 0           PDDL   PDDL
 1594    REF  18  LAST  962   15,2770    00324 1                  THETAD +2
 1595    REF  19  LAST  962   15,2771    00323 0                  THETAD +1
 1596                         15,2772    77666 1           VDEF
 1597    REF  25  LAST  889   15,2773    24766 0           STOVL  CDUSPOT
 1598    REF   6  LAST  959   15,2774    24005 1                  XUNIT
 1599                         15,2775    77624 1           CALL
 1600    REF   5  LAST  586   15,2776    47666 1                  TRG*NBSM
 1601    REF  26  LAST  961   15,2777    26707 0           STOVL  STARAD
 1602    REF   2  LAST   37   15,3000    24003 1                  YUNIT
 1603                         15,3001    77624 1           CALL
 1604    REF   6  LAST  959   15,3002    47675 0                  *NBSM*
 1605    REF  27  LAST  962   15,3003    36715 1           STCALL STARAD +6
 1606    REF   7  LAST  961   15,3004    47541 1                  CDUTRIG
 1607                         15,3005    77624 1           CALL
 1608    REF   3  LAST  948   15,3006    20030 0                  CALCSMSC
 1609                         15,3007    77775 1           VLOAD
 1610    REF   7  LAST  959   15,3010    02665 0                  XNB
 1611                         15,3011    24007 0           STOVL  6D
 1612    REF   3  LAST  376   15,3012    02673 1                  YNB
 1613                         15,3013    34015 1           STCALL 12D
 1614    REF   3  LAST  946   15,3014    47443 1                  AXISGEN
 1615                         15,3015    77624 1           CALL
 1616    REF   3  LAST  940   15,3016    47251 1                  CALCGTA
 1617                         15,3017    77776 1  JUSTTRIM EXIT
 1618    REF   1              15,3020   3 3027 1           CA     GYROCDR
 1619    REF 291  LAST  961   15,3021   0 4616 1           TC     BANKCALL
 1620    REF   6  LAST  940   15,3022    17314 1           CADR   IMUPULSE
 1621     REF 292  LAST  962   15,3023  0 4616 1             TC      BANKCALL
 1622     REF  12  LAST  947   15,3024   17707 1             CADR    IMUSTALL
 1623     REF   8  LAST  955   15,3025  0 5701 1             TC      CURTAINS
 1624     REF   1              15,3026  1 2755 0             TCF     QMINEXIT

 1625     REF  12  LAST  940   15,3027   02737 0  GYRCDR     ECADR   OGC
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P1626   PERFORM STAR ACUISITION AND STAR SIGHTINGS

 1627   REF 181  LAST  954   15,3030  3 4755 1  2STARS    CAF     ZERO              INITALIZE STARIND
 1628                        15,3031  1 3033 0            TCF     +2                ZERO FOR 1ST STAR, ONE FOR 2ND STAR
 1629   REF  45  LAST  952   15,3032  3 4753 1  1STAR     CAF     BIT1
 1630   REF  15  LAST  957   15,3033  5 5757 1            TS      STARIND

 1631   REF  95  LAST  961   15,3034  0 5353 1            TC      PHASCHNG
 1632                        15,3035   04024 0            OCT     04024

 1633   REF   4  LAST  955   15,3036  1 2245 1            TCF     R59               GO DO STAR AQUIRE AND ACTMARK

 1634   REF  16  LAST  964   15,3037  3 1757 0  R59RET    CA      STARIND           BACK FROM SURFACE MARKING
 1635                        15,3040  0 0006 1            EXTEND
 1636   REF   1              15,3041  1 3052 1            BZF     ASTAR             1ST STAR MARKED

 1637   REF  96  LAST  964   15,3042  0 5353 1            TC      PHASCHNG
 1638                        15,3043   04024 0            OCT     04024

 1639   REF 203  LAST  961   15,3044  0 6042 1            TC      INTPRET
 1640                        15,3045   45145 0            DLOAD   CALL
 1641   REF  10  LAST  957   15,3046   03562 0                    TSIGHT            TIME OF 2ND MARK
 1642   REF   6  LAST  951   15,3047   32472 1                    PLANET
 1643   REF   1              15,3050   37254 0            STCALL  VEC2              STORE 2ND CATALOG VEC (REF)
 1644   REF   1              15,3051   33064 0                    SURFLINE

 1645   REF 204  LAST  964   15,3052  0 6042 1  ASTAR     TC      INTPRET
 1646                        15,3053   77775 1            VLOAD
 1647   REF  28  LAST  962   15,3054   02715 0                    STARAD +6
 1648   REF   9  LAST  960   15,3055   02761 0            STORE   STARSAV1          1ST OBSERVED STAR (SM)
 1649                        15,3056   45145 0            DLOAD   CALL
 1650   REF  11  LAST  964   15,3057   03562 0                    TSIGHT            TIME OF 1ST MARK
 1651   REF   7  LAST  964   15,3060   32472 1                    PLANET
 1652   REF   2  LAST  137   15,3061   03246 1            STORE   VEC1              STORE 1ST CATALOG VEC (REF)
 1653                        15,3062   77776 1            EXIT
 1654   REF   1              15,3063  1 3032 1            TCF     1STAR             GO GET 2ND STAR SIGHTING
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P1655   DC FINE OR COARSE ALIGNMENT OF IMU

 1656                         15,3064   77131 1  SURFLINE SSP      AXT,2
 1657   REF  11  LAST  933    15,3065   00052 0                    S2
 1658                         15,3066   CCCC6 1                    6
 1659                         15,3067   00014 1                    120
 1660                         15,3070   64373 1  WRTOESIR VLCAD*   MXV
 1661   REF   3  LAST  964    15,3071   74515 0                    VFC1 +12D,2      PICK UP VEC IN REF, TRANS TO DESIRED SM
 1662   REF  10  LAST  949    15,3072   03607 0                    XSMD
 1663                         15,3073   77656 1           UNIT
 1664   REF  29  LAST  964    15,3074   12723 1           STORE    STARAD +120,2    VEC IN SM
 1665                         15,3075   77773 1           VLCAD*
 1666   REF  10  LAST  964    15,3076   75CC2 1                    STARSAVJ +I20,2 PICK UP VEC IN PRESENT SM
 1667                         15,3077   10023 1           STORE    180,2
 1668                         15,3100   43104 0           TIX,2    8DN
 1669   REF   1               15,3101   33070 0                    WRTOESIR
 1670   REF   1               15,3102   04315 1                    INITALGN         IF INITIAL PASS (OPTION 0) BYPASS R54
 1671   REF   1               15,3103   33111 0                    INITBY
 1672                         15,3104   77624 1  OOALIGN  CALL
 1673   REF   2  LAST  937    15,3105   31250 1                    R54              DO CHKSDATA
 1674                         15,3106   77614 1           BOFF
 1675   REF  10  LAST  960    15,3107   00354 0                    FREEFLAG
 1676   REF   1               15,3110   33171 0                    P57POST          ASTRO DOES NOT LIKE DATA TEST RESULTS
 1677                         15,3111   77624 1  INITBY   CALL
 1678   REF   4  LAST  962    15,3112   47443 1                    AXISGEN          GET DESIRED ORIENT WRT PRES. XDC,YDC,ZDC
 1679                         15,3113   77624 1           CALL
 1680   REF   4  LAST  962    15,3114   47251 1                    CALCGTA          GET GYRO TORQ ANGLES, OGC,IGC,MGC
 1681                         15,3115   77776 1           EXIT
 1682   REF   1               15,3116  3 4752 0           CAF      INITABIT         IF INITIAL PASS BYPASS NOUN 93 DISPLAY
 1683   REF  15  LAST  955    15,3117  7 0104 0           MASK     FLAGWRD8
 1684   REF 288  LAST  960    15,3120  10 000 0           CCS      A
 1685   REF   1               15,3121  1 3130 1           TCF      5DEGTEST
 1686   REF   1               15,3122  3 3276 1           CAF      DISPGYRO         DISPLAY GYRO TORQ ANGLES V 06N93
 1687   REF 293  LAST  963    15,3123  0 4616 1           TC       BANKCALL
 1688   REF  39  LAST  960    15,3124   20477 1           CADR     GOFLASH
 1689   REF  53  LAST  960    15,3125  0 6001 0           TC       GOTOPOOH         V34-TERMINATE
 1690   REF   2  LAST  965    15,3126  1 3130 1           TCF      5DEGTEST         V833-PROCEED TO COARSE OR FINE
 1691   REF   2  LAST  965    15,3127  1 3172 1           TCF      P57POST +1       V832-RECYCLE, MAYBE RE-ALIGN

 1692   REF 205  LAST  964    15,3130  0 6042 1  5DEGTEST TC       INTPRET          IF ANGLES GREATER THAN 5 DEGS, DO COARSE
 1693                         15,3131   40175 0           VLOAD    80V
 1694   REF  13  LAST  963    15,3132   02740 0                    OGC
 1695   REF   1               15,3133   33134 1                    SURFSUP
 1696   REF   2  LAST  125    15,3134   02750 1  SURFSUP  STORE    OGCT
 1697                         15,3135   40141 1           V/SC     80V
 1698   REF   2  LAST  931    15,3136   30602 0                    5DEGREES
 1699   REF   1               15,3137   33237 1                    COATRIM
 1700                         15,3140   52131 0           SSP      GOTC
 1701   REF  17  LAST  962    15,3141   02746 0                    OMIN
 1702   REF   1               15,3142   33144 0                    SURFDISP
 1703   REF   1                15,3143   33017 1                  JUSTTRIM        ANGLES LESS THAN 5DEG, DO GYRO TORQ

 1704                          15,3144   77776 1  SLREDISP EXIT
 1705   REF  97  LAST   964    15,3145  C 5353 1           TC      PHASCHNG
 1706                          15,3146   04024 0           OCT     04024

 1707   REF 206  LAST   965    15,3147  0 6042 1           TC      INTPRET
 1708                          15,3150   75160 1           AXC,1   AXC,2
 1709   REF  11  LAST   965    15,3151   03606 1                   XSMD
 1710   REF  49  LAST   952    15,3152   C1733 1                   REFSMMAT
 1711                          15,3153   45014 0           SET     CALL
 1712   REF   7  LAST   958    15,3154   01462 0                   REFSMFLG
 1713   REF   5  LAST   948    15,3155   31371 C                   MATMOVE
 1714                          15,3156   77776 1           EXIT
 1715   REF   9  LAST   923    15,3157  11'144 0           CCS     OPTION2          IF OPTION ZERO DO FINISH
 1716   REF   1                15,3160  1 3162 0           TCF     B2F8
 1717   REF   3  LAST   965    15,3161  1 3172 1           TCF     P57POST +1

 1718   REF   2  LAST   965    15,3162  3 4752 0  B2F8     CAF     INITABIT         IF INITIAL FLAG SET, RE-CYCLE.
 1719   REF  16  LAST   965    15,3163  7 0104 0           MASK    FLAGWRD8
 1720   REF 289  LAST   965    15,3164  10 000 0           CCS     A
 1721   REF   1                15,3165  1 3544 C           TCF     P57JUMP          ITS SET
 1722   REF 207  LAST   966    15,3166  0 6042 1           TC      INTPRET
 1723                          15,3167   77624 1           CALL
 1724   REF   2  LAST   787    15,3170   33471 0                   REFMF            GO GET ATTITUDE VEC IN ME(YNBSAV,XNBSAV)
 1725                          15,3171   77776 1  P57POST  EXIT
 1726   REF   3  LAST   937    15,3172  3 5741 0           CAF     OCT14            DISPLAY V50N25 CHK CODE 14
 1727   REF 294  LAST   965    15,3173  0 4616 1           TC      BANKCALL
 1728   REF   9  LAST   945    15,3174   20624 0           CADR    GOPERF1
 1729   REF  54  LAST   965    15,3175  1 6C01 1           TCF     GOTOPOOH         V834-TERMINATE
 1730   REF   2  LAST   966    15,3176  1 3544 0           TCF     P57JUMP          V833-PROCEED TO RE-ALIGN
 1731   REF  45  LAST   923    15,3177  4 4752 1           CS      BIT2             TEST TO SE IF ALIGNED BY OPTION 2
 1732   REF  10  LAST   966    15,3200  6 1144 1           AD      OPTION2
 1733                          15,3201  0 0006 1           EXTEND
 1734                          15,3202  1 3204 0           BZF     +2               YES-GO CALCULATE LANDING SITE
 1735   REF  55  LAST   966    15,3203  1 6001 1           TCF     GOTOPOOH         NO-EXIT R57
 1736   REF  98  LAST   966    15,3204  0 5353 1           TC      PHASCHNG         RESTART PLACE
 1737                          15,3205   04024 0           OCT     04024
 1738   REF 208  LAST   966    15,3206  0 6042 1           TC      INTPRET
 1739                          15,3207   45175 0           VLOAD   CALL             USE GNB
 1740   REF   8  LAST   960    15,3210   C2231 0                   GSAV
 1741   REF   3  LAST   813    15,3211   47663 1                   CDU*NBSM         GO TO SM COORDS
 1742                          15,3212   43105 1           VXM     SET                    ON MOON SO SET LUNAFLAG
 1743   REF  50  LAST   966    15,3213   01734 0                   REFSMMAT               G(REF) = (REFSMMAT)T (NBSM)GNB
 1744   REF   5  LAST   927    15,3214   01463 1                   LUNAFLAG
 1745                          15,3215   51515 1           POVL    ABVAL
 1746   REF  10  LAST   927    15,3216   02023 1                   PLS
 1747                          15,3217   45561 1           VXSC    STADR
 1748   REF   6  LAST   927    15,3220   75745 0           STORE   ALPHAV                 ALPHAV =  PLSMAG * G(REF)
 1749                          15,3221   47014 1           CLEAR   RTB
 1750   REF   3  LAST  927    15,3222    00662 0                      ERADFLAG
 1751   REF  27  LAST  951    15,3223    21574 1                      LOADTIME
 1752                         15,3224    77624 1              CALL
 1753   REF   2  LAST  927    15,3225    30440 1                      N89DISP          SUBROUTINE TO CALC LS AND GIVE RLS BACK
 1754   REF  15  LAST  874    15,3226    01220 0              STORE   RN               RN=RLS B-29 = LM POSITION
 1755                         15,3227    65352 0              VSL2    PDOL             R-TO-RP GETS RLS B-27 AT  0-50 IN POLIST
 1756   REF  19  LAST  955    15,3230    01242 1                      GDT/2 +4         TIME TEMP STORED IN N89DISP
 1757                         15,3231    77606 1              PUSH                     TIME AT  6-7 IN POLIST
 1758   REF  23  LAST  894    15,3232    35234 1              STCALL  RIPTIME          PIPTIME = LM STATE TIME
 1759   REF   2  LAST  786    15,3233    51700 1                      R-TO-RP
 1760   REF  11  LAST  966    15,3234    02023 1              STORE   RLS              RLS IN MOON-FIXED COORDS
 1761                         15,3235    77776 1              EXIT
 1762   REF  56  LAST  966    15,3236  1 6001 1              TCF     GOTOPOOH         EXIT P57
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P1763   COARSE AND FINE ALIGN IMU
 1764                              15,3237    75160 1  COATRIM  AXC,1    AXC,2
 1765   REF   5  LAST  946         15,3240    02664 1                    XOC
 1766   REF  22  LAST  959         15,3241    02642 0                    XSM
 1767                              15,3242    77624 1           CALL
 1768   REF   6  LAST  966         15,3243    31371 0                    MATMOVE
 1769                              15,3244    77624 1           CALL
 1770   REF   8  LAST  962         15,3245    47541 1                    CDUTRIG
 1771                              15,3246    77624 1           CALL
 1772   REF   4  LAST  962         15,3247    20030 0                    CALCSMSC
 1773                              15,3250    77624 1           CALL
 1774   REF   4  LAST  959         15,3251    47355 1                    CALCGA
 1775                              15,3252    77414 0           BOFF     EXIT
 1776   REF   2  LAST  965         15,3253    04355 0                    INITALGN       IF INITIAL ALGNMENT DISPLAY FINAL
 1777   REF   1                    15,3254    33266 0                    CORSIT         GIMBAL ANGLES IF COARSE ANGLES GREATER
 1778   REF   4  LAST  945         15,3255  3 5010 0           CAF      V06N22         THAN 5 DEGREES
 1779   REF 295  LAST  966         15,3256  0 4616 1           TC       BANKCALL
 1780   REF  40  LAST  965         15,3257    20477 1           CADR     GOFLASH
 1781   REF  57  LAST  967         15,3260  0 6001 0           TC       GOTOPOOH
 1782                              15,3261  1 3263 1           TCF      +2
 1783                              15,3262  1 3255 1           TCF      -5
 1784   REF  99  LAST  966         15,3263  0 5353 1           TC       PHASCHNG
 1785                              15,3264    04024 0           OCT      04024

 1786   REF 209  LAST  966         15,3265  0 6042 1           TC       INTPRET
 1787                              15,3266    77624 1  CORSIT   CALL
 1788   REF   5  LAST  960         15,3267    31557 1                    COARSE
 1789                              15,3270    77624 1           CALL
 1790   REF   4  LAST  945         15,3271    31603 0                    NCOARSE
 1791                              15,3272    77624 1           CALL
 1792   REF   1                    15,3273    32764 0                    GYROTRIM
 1793                              15,3274    77650 1           GOTO
 1794   REF   2  LAST  965         15,3275    33144 0                    SURFDISP
 1795                              15,3276    01535 0  DISPGYRO VN       0693
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P1796    LUNAR SURFACE IMU ALIGNMENT PROGRAM

 1797    REF 296  LAST  968    15,3277  0 4616 1  P57       TC      BANKCALL         IS ISS ON - IF NOT, IMUCHK WILL SEND
 1798    REF   2  LAST  945    15,3300   33635 1            CADR    IMUCHK           ALARM CODE 210 AND EXIT VIA GOTOPOOH

 1799    REF  27  LAST  923    15,3301  3 6250 0            CAF     THREE            JAM REFSMMAT OPTION 3 FOR INITIAL DISP.
 1800    REF  11  LAST  966    15,3302  55 144 0            TS      OPTION2
 1801    REF  46  LAST  964    15,3303  3 4753 1  P57OPT    CAF     BIT1
 1802    REF 257  LAST  969    15,3304  0 4616 1            TC      BANKCALL
 1803    REF   2  LAST  923    15,3305   20714 1            CADR    GOPERF4R         FLASH V04N06 FOR ALIGNMENT CODE
 1804    REF  58  LAST  968    15,3306  0 6001 0            TC      GOTOPOOH         V34 TERMINATE
 1805    REF   1               15,3307  1 3314 0            TCF     ALIGNOPT         V33 PROCEED
 1806    REF   1               15,3310  1 3303 0            TCF     P57OPT           V32 RECYCLE

 1807    REF 100  LAST  968    15,3311  0 5353 1            TC      PHASCHNG
 1808                          15,3312   00014 1            OCT     00014
 1809    REF 142  LAST  961    15,3313  0 5155 0            TC      ENDOFJOB

 1810    REF  12  LAST  969    15,3314  3 1144 1  ALIGNOPT  CA      OPTION2
 1811    REF  28  LAST  969    15,3315  7 6250 1            MASK    THREE
 1812    REF 290  LAST  966    15,3316  50 000 1            INDEX   A
 1813                          15,3317  1 3320 1            TCF     +1
 1814    REF   1               15,3320  1 3333 0            TCF     TDISP            OPTION 4 LS ORIENTATION
 1815    REF   1               15,3321  1 3374 0            TCF     PACKOPTN         OPTION 1 PREFERRED
 1816    REF   2  LAST  969    15,3322  1 3303 0            TCF     P57OPT           OPTION 2 INVALID IN P57, RECYCLE
 1817    REF 210  LAST  968    15,3323  0 6042 1            TC      INTPRET          OPTION 3 REFSMMAT
 1818                          15,3324   75160 1            AXC,1   AXC,2            JAM REFSMMAT IN XSMD LOC
 1819    REF  51  LAST  966    15,3325   01733 1                    REFSMMAT
 1820    REF  12  LAST  966    15,3326   03606 1                    XSMD
 1821                          15,3327   77624 1            CALL
 1822    REF   7  LAST  968    15,3330   31371 0                    MATMOVE
 1823                          15,3331   77650 1            GOTO
 1824    REF   2  LAST  969    15,3332   33373 0                    PACKOPTN -1

 1825    REF 211  LAST  969    15,3333  0 6042 1  TDISP     TC      INTPRET
 1826                          15,3334   77745 1            DLOAD
 1827    REF  39  LAST  832    15,3335   03442 0                    TIG              LOAD ASCENT TIME FOR DISPLAY
 1828    REF  30  LAST  960    15,3336   01045 1  P57A      STORE   DSPTEM1
 1829                          15,3337   77776 1            EXIT
 1830    REF   2  LAST  923    15,3340  3 2170 0  P57AA     CAF     V06N34*          DISPLAY TALIGN, TALIGN : DSPTEM1
 1831    REF 298  LAST  969    15,3341  0 4616 1            TC      BANKCALL
 1832    REF  41  LAST  968    15,3342   20477 1            CADR    GOFLASH
 1833    REF  59  LAST  969    15,3343  1 6001 1            TCF     GOTOPOOH         V34-TERMINATE
 1834                          15,3344  1 3346 1            TCF     +2
 1835    REF   1               15,3345  1 3340 1            TCF     P57AA            V32-RECYCLE

 1836    REF 212  LAST  969    15,3346  0 6042 1            TC      INTPRET
 1837                          15,3347   65234 1            RTB     PDDL
 1838    REF  28  LAST  967    15,3350   21574 1                    LOADTIME         PUSH CURRENT TIME AND PICK UP KEY IN
 1839    REF  31  LAST  969    15,3351   01045 1                    DSPTEM1
 1840                          15,3352    65254 1           BZE     PDDL
 1841    REF   1               15,3353    33363 1                   P57C       IF KEY IN TIME ZERO-TALIGN=CURRENT TIME
 1842                          15,3354    51025 1           DSU     BPL        NOT ZERO SO EXCHANGE PD WITH DSPTEM1
 1843    REF  32   LAST  969   15,3355    01045 1                   DSPTEM1
 1844    REF   2   LAST  970   15,3356    33363 1                   P57C
 1845                          15,3357    45545 1           DLOAD   STADR      IF KEYIN TIME GREATER THAN CURRENT TIME
 1846    REF  40   LAST  969   15,3360    74335 1           STORE   TIG        STORE IT IN TIG
 1847    REF   8   LAST  927   15,3361    36775 1           STCALL  TALIGN
 1848    REF   1               15,3362    33365 1                   P57D
 1849                          15,3363    45545 1  P57C     DLOAD   STADR
 1850    REF   9   LAST  970   15,3364    75002 1           STORE   TALIGN
 1851    REF  49   LAST  949   15,3365    34041 0  P57D     STCALL  TDEC1
 1852    REF  11   LAST  930   15,3366    27056 1                   LEMPREC    COMPUTE DESIRED IMU ORIENTATION STORE
 1853                          15,3367    53575 0           VLOAD   UNIT       IN  X,Y,ZSMD
 1854    REF  32   LAST  949   15,3370    00001 0                   RATT
 1855    REF  13   LAST  969   15,3371    37607 1           STCALL  XSMD
 1856    REF   2   LAST  927   15,3372    10757 0                   LSORIENT
 1857                          15,3373    77776 1           EXIT
 1858    REF 182   LAST  964   15,3374   3 4755 1  PACKOPTN CAF     ZERO       PACK FLAG BITS FOR OPTION DISPLAY
 1859    REF   2   LAST  307   15,3375   55'144 0           TS      OPTION1 +1 JAM ZERO IN ALIGNMENT OPTION
 1860    REF   3   LAST  970   15,3376   55'145 1           TS      OPTION1 +2 INITIALIZE FLAG BIT CONFIGURATION
 1861    REF   4   LAST  952   15,3377   3 4737 0           CAF     REFSMBIT
 1862    REF  16   LAST  952   15,3400   7 0077 0           MASK    FLAGWRD3   REFSMFLG
 1863    REF 291   LAST  969   15,3401  10 000 0            CCS     A
 1864    REF  35   LAST  955   15,3402   3 4745 0           CAF     BIT7       SET
 1865    REF   4   LAST  970   15,3403   27'145 1           ADS     OPTION1 +2 CLEAR-JUST ZERO
 1866    REF   1               15,3404   3 4753 1           CAF     ATTFLBIT
 1867    REF  13   LAST  960   15,3405   7 0102 0           MASK    FLAGWRD6   ATTFLG
 1868    REF 292   LAST  970   15,3406  10 000 0            CCS     A
 1869    REF  39   LAST  915   15,3407   3 4750 1           CAF     BIT4       SET
 1870    REF   5   LAST  970   15,3410   27'145 1           ADS     OPTION1 +2 CLEAR-ZERO IN A
 1871    REF  40   LAST  970   15,3411   3 4750 1           CAF     BIT4
 1872    REF   6   LAST  970   15,3412   55'143 1           TS      OPTION1    JAM 00010 IN OPTION1 FOR CHECK LIST

 1873    REF   1               15,3413   3 3634 0  DSPOPTN  CAF     V05N06     DISPLAY OPTION CODE AND FLAG BITS
 1874    REF 299   LAST  969   15,3414   0 4616 1           TC      BANKCALL
 1875    REF  42   LAST  969   15,3415    20477 1           CADR    GOFLASH
 1876    REF  60   LAST  969   15,3416   1 6001 1           TCF     GOTOPOOH   V834-TERMINATE
 1877                          15,3417   1 3421 1           TCF     +2         V33-PROCEED
 1878    REF   1               15,3420   1 3413 0           TCF     DSPOPTN    V32-RECYCLE

 1879    REF   5   LAST  970   15,3421   3 4737 0           CAF     REFSMBIT
 1880    REF  17   LAST  970   15,3422   7 0077 0           MASK    FLAGWRD3
 1881    REF 293   LAST  970   15,3423  10 000 0            CCS     A
 1882    REF   1               15,3424   1 3524 0           TCF     GETLMATT   SET, GO COMPUTE LM ATTITUDE
 1883    REF   2   LAST  970   15,3425   3 4753 1           CAF     ATTFLBIT   CLEAR-CHECK ATTFLAG FOR STORED ATTITUDE.
 1884    REF  14   LAST  970   15,3426   7 0102 0           MASK    FLAGWRD6
 1885    REF 294   LAST  970   15,3427  10 000 0            CCS     A
 1886    REF   1               15,3430   1 3530 0           TCF     BYLMATT    ALLFLG SET, CHK OPTION FOR GRAVITY COMP
 1887    REF  46   LAST  966   15,3431   3 4752 0           CAF     BIT2       SEE IF OPTION 2 OR 3
 1888    REF  13  LAST  969    15,3432  7 1144 0          MASK    OPTION2
 1889    REF 295  LAST  970    15,3433  10 0000 0         CCS     A
 1890    REF   2  LAST  970    15,3434  1 3530 0          TCF     BYLMATT          OPTION 2 OR 3 BUT DONT HAVE ATTITUDE
 1891    REF  39  LAST  954    15,3435  0 5567 0          TC      ALARM            OPTION INCONSISTANT WITH FLAGS-ALARM 701
 1892                          15,3436   00701 1          OCT     701
 1893    REF   3  LAST  954    15,3437  3 5006 1          CAF     V05N09           DISPLAY ALARM FOR ACTION
 1894    REF 300  LAST  970    15,3440  0 4616 1          TC      BANKCALL
 1895    REF  43  LAST  970    15,3441   20477 1          CADR    GOFLASH
 1896    REF  61  LAST  970    15,3442  1 6001 1          TCF     GOTOPOOH         V834-TERMINATE
 1897    REF   2  LAST  970    15,3443  1 3413 0          TCF     DSPOPTN          V33-PROCEED   ********TEMPORARY
 1898    REF   3  LAST  971    15,3444  1 3413 0          TCF     DSPOPTN          V832-RECYCLE TO OPTION DISPLAY V 05N06
```

```
P1899   TRANSFORM VEC1,2 FROM MOON FIXED TO REF AND JAM BACK IN VEC1,2

 1900                             15,3445   40220 0  MFREF     STQ     SETPO
 1901   REF  12  LAST  949        15,3446   02746 0                    QMAJ
 1902                             15,3447   00001 0                    0
 1903                             15,3450   77634 0            RTB
 1904   REF  29  LAST  969        15,3451   21574 1                    LOADTIME
 1905   REF  12  LAST  964        15,3452   27562 0            STOVL   TSIGHT
 1906   REF   4  LAST  965        15,3453   03246 1                    VEC1
 1907                             15,3454   41525 0            PDDL    PUSH
 1908   REF  13  LAST  972        15,3455   03562 0                    TSIGHT
 1909                             15,3456   77624 1            CALL
 1910   REF   4  LAST  927        15,3457   55716 1                    RP-TO-R
 1911   REF   5  LAST  972        15,3460   27246 1            STOVL   VEC1
 1912   REF   2  LAST  964        15,3461   03254 1                    VEC2
 1913                             15,3462   65201 1            SETPD   PDDL
 1914                             15,3463   00001 0                    0
 1915   REF  14  LAST  972        15,3464   03562 0                    TSIGHT
 1916                             15,3465   45006 0            PUSH    CALL
 1917   REF   5  LAST  972        15,3466   55716 1                    RP-TO-R
 1918   REF   3  LAST  972        15,3467   37254 0            STCALL  VEC2
 1919   REF  13  LAST  972        15,3470   02746 0                    QMAJ
```

```
P1920    COMPUTE LM ATTITUDE IN MOON FIXED COORDINATES USING REFSMMAT AND
R1921    STORE IN YNBSAV AND ZNBSAV

 1922                           15,3471   45020 1  REFMF     STG      CALL
 1923    REF  14  LAST  972     15,3472   02746 0                     QMAJ
 1924    REF   9  LAST  968     15,3473   47541 1                     COUTRIG          GET SIN AND COS OF CDUS
 1925                           15,3474   40234 0            RTB      SETPD
 1926    REF  30  LAST  972     15,3475   21574 1                     LOADTIME
 1927                           15,3476   00001 0                     0
 1928    REF  15  LAST  972     15,3477   37562 1            STCALL   TSIGHT
 1929    REF   5  LAST  968     15,3500   20030 0                     CALCSMSC         GET YNB IN SM
 1930                           15,3501   61375 1            VLOAD    VXM
 1931    REF   4  LAST  962     15,3502   02673 1                     YNB
 1932    REF  52  LAST  969     15,3503   01734 0                     REFSMMAT          YNB TO REF
 1933                           15,3504   65256 0            UNIT     PDDL
 1934    REF  16  LAST  973     15,3505   03562 0                     TSIGHT
 1935                           15,3506   45006 0            PUSH     CALL
 1936    REF   3  LAST  967     15,3507   51700 1                     R-TO-RP
 1937    REF   3  LAST  204     15,3510   26237 0            STOVL    YNBSAV           YNB TO MF
 1938    REF   4  LAST  933     15,3511   02701 0                     ZNB
 1939                           15,3512   53505 1            VXM      UNIT
 1940    REF  53  LAST  973     15,3513   01734 0                     REFSMMAT         ZNB TO REF
 1941                           15,3514   41525 0            PDDL     PUSH
 1942    REF  17  LAST  973     15,3515   03562 0                     TSIGHT
 1943                           15,3516   77624 1            CALL
 1944    REF   4  LAST  973     15,3517   51700 1                     R-TO-RP          ZNB TO MF
 1945    REF   1                15,3520   02245 0            STORE    ZNBSAV
 1946                           15,3521   77614 1            SETGO
 1947    REF   1                15,3522   03036 1                     ATTFLAG
 1948    REF  15  LAST  973     15,3523   02746 0                     QMAJ
```

```
P1949    BRANCH TO ALIGNMENT OPTION

 1950    REF 213  LAST  969    15,3524   0 6042 1  GETLMATT TC       INTPRET
 1951                          15,3525    77624 1           CALL
 1952    REF   3  LAST  966    15,3526    33471 0                    REFMF           GO TRANSFORM TO MF IN YNBSAV,ZNBSAV
 1953                          15,3527    77776 1           EXIT

 1954    REF  65  LAST  960    15,3530   0 5504 0  BYLMATT  TC       UPFLAG          SET INITIAL ALIGN FLAG
 1955    REF   3  LAST  968    15,3531    00205 0           ADRES    INITALGN
 1956    REF  47  LAST  969    15,3532   3 4753 1           CAF      BIT1
 1957    REF  14  LAST  971    15,3533   7 1144 0           MASK     OPTION2         SEE IF OPTION 1 OR 3
 1958    REF 296  LAST  971    15,3534  10 000 0            CCS      A
 1959    REF   2  LAST  960    15,3535   1 2561 0           TCF      GVDETER         OPTION 1 OR 2, GET GRAVITY

 1960    REF 101  LAST  969    15,3536   0 5353 1  ATTCHK   TC       PHASCHNG
 1961                          15,3537    04024 0           OCT      04024

 1962    REF   3  LAST  970    15,3540   3 4753 1           CAF      ATTFLBIT        NOT 1 OR 3, CHECK ATTFLAG
 1963    REF  15  LAST  970    15,3541   7 0102 0           MASK     FLAGWRD6
 1964    REF 297  LAST  974    15,3542  10 000 0            CCS      A
 1965    REF   1                15,3543   1 3560 0           TCF      P57OPT0         GET ALIGNMENT VECS FOR OPTION 0
 1966    REF 102  LAST  974    15,3544   0 5353 1  P57JUMP  TC       PHASCHNG
 1967                          15,3545    04024 0           OCT      04024

 1968    REF  97  LAST  960    15,3546   0 5516 0           TC       DOWNFLAG        ATTFLG CLEAR-RESET INTALIGN FLAG
 1969    REF   4  LAST  974    15,3547    00205 0           ADRES    INITALGN
 1970    REF  29  LAST  969    15,3550   3 6250 0           CAF      THREE
 1971    REF  15  LAST  974    15,3551   7 1144 0           MASK     OPTION2         BRANCH ON OPTION CODE
 1972    REF 298  LAST  974    15,3552  50 000 1            INDEX    A
 1973                          15,3553   1 3554 1           TCF      +1
 1974    REF   2  LAST  974    15,3554   1 3560 0           TCF      P57OPT0         OPTION IS 0
 1975    REF   1                15,3555   1 3601 1           TCF      P57OPT1         OPTION IS 1
 1976    REF   1                15,3556   1 3617 0           TCF      P57OPT2         OPTION IS 2
 1977    REF   1                15,3557   1 3620 1           TCF      P57OPT3         OPTION IS 3
```

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P1978   OPTION 0, GET TWO ATTITUDE VECS

 1979   REF 214  LAST  974   15,3560  0 6042 1  P57OPT0   TC      INTPRET
 1980                        15,3561   77775 1            VLOAD
 1981   REF   4  LAST  973   15,3562   02237 0                    YNBSAV          Y AND Z ATTITUDE WILL BE PUT IN REF
 1982   REF   6  LAST  972   15,3563   27246 1            STOVL   VEC1
 1983   REF   2  LAST  973   15,3564   02245 0                    ZNBSAV
 1984   REF   4  LAST  972   15,3565   37254 0            STCALL  VEC2
 1985   REF  10  LAST  973   15,3566   47541 1                    CDUTRIG
 1986                        15,3567   77624 1            CALL
 1987   REF   6  LAST  973   15,3570   20030 0                    CALCSMSC        COMPUTE SC AXIS WRT PRESENT SM
 1988                        15,3571   77775 1            VLOAD
 1989   REF   5  LAST  973   15,3572   02673 1                    YNB
 1990   REF  11  LAST  965   15,3573   26761 0  SAMETYP   STOVL   STARSAV1        Y SC AXIS WRT PRESENT SM
 1991   REF   5  LAST  973   15,3574   02701 0                    ZNB
 1992   REF   8  LAST  946   15,3575   36767 1            STCALL  STARSAV2        Z SC AXIS WRT PRESENT SM
 1993   REF   1              15,3576   33445 1                    MFREF           TRANSFORM VEC1,2 FROM MF TO REF
 1994                        15,3577   77650 1            GOTO
 1995   REF   2  LAST  964   15,3600   33064 0                    SURFLINE

R1996   OPTION 1, GET LANDING SITE AND Z-ATTITUDE VEC

 1997   REF 215  LAST  975   15,3601  0 6042 1  P57OPT1   TC      INTPRET
 1998                        15,3602   53575 0            VLOAD   UNIT
 1999   REF  12  LAST  967   15,3603   02023 1                    RLS             LANDING SITE VEC
 2000   REF   7  LAST  975   15,3604   27246 1            STOVL   VEC1
 2001   REF   3  LAST  975   15,3605   02245 0                    ZNBSAV          Z ATTITUDE VEC
 2002   REF   5  LAST  975   15,3606   37254 0            STCALL  VEC2
 2003   REF  11  LAST  975   15,3607   47541 1                    CDUTRIG
 2004                        15,3610   77624 1            CALL
 2005   REF   7  LAST  975   15,3611   20030 0                    CALCSMSC        GET ZNB AXIS WRT PRES SM FOR STARSAV2
 2006                        15,3612   45175 0            VLOAD   CALL
 2007   REF   9  LAST  966   15,3613   02231 0                    GSAV            TRANS GSAV FROM NB TO SM FOR STARSAV1
 2008   REF   4  LAST  966   15,3614   47663 1                    CDU*NBSM
 2009                        15,3615   77650 1            GOTO
 2010   REF   1              15,3616   33573 0                    SAMETYP         NOW DO SAME AS OPTION 0
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P2011    OPTION 2, GET TWO STAR SIGHTINGS

 2012    REF   1                15,3617  1 3030 0  P57OPT2   TCF     2STARS           DO SIGHTING ON 2 STARS

R2013    OPTION 3, GET LANDING SITE VEC AND ONE STAR SIGHTING

 2014    REF 216  LAST   975    15,3620  0 6042 1  P57OPT3   TC      INTPRET
 2015                           15,3621   53575 0            VLOAD   UNIT
 2016    REF  13  LAST   975    15,3622   02023 1                    RLS              LANDING SITE VEC
 2017    REF   8  LAST   975    15,3623   03246 1            STORE   VEC1
 2018    REF   6  LAST   975    15,3624   27254 1            STOVL   VEC2             DUMMY VEC2 FOR 2ND CATALOG STAR
 2019    REF  10  LAST   975    15,3625   02231 0                    GSAV             GRAVITY VEC NB
 2020                           15,3626   77624 1            CALL
 2021    REF   5  LAST   975    15,3627   47663 1                    CDU*NBSM         TRANS GSAV FROM NB TO SM FOR STARSAV1
 2022    REF  12  LAST   975    15,3630   36761 1            STCALL  STARSAV1
 2023    REF   2  LAST   975    15,3631   33445 1                    MFREF            STARSAV2 IS STORED AS 2ND OBSERVED STAR
 2024                           15,3632   77776 1            EXIT
 2025    REF   2  LAST   964    15,3633  1 3022 1            TCF     1STAR            1STAR GET VEC2,STARSAV2,GOES TO SURFLINE

 2026                           15,3634   01206 1  V05N06    VN      506
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P2027    CHECK IMODES30 TO VARIFY IMU IS ON

 2028    REF  46   LAST  474    15,3635  4 1277 0  IMUCHK    CS      IMODES30
 2029    REF  24   LAST  950    15,3636  7 4743 1            MASK    BIT9
 2030    REF 299   LAST  974    15,3637  10 000 0            CCS     A                 IS IMU ON
 2031                           15,3640  1 3644 0            TCF     +4                YES

 2032    REF  40   LAST  971    15,3641  0 5567 0            TC      ALARM             NO, SEND ALARM AND EXIT
 2033                           15,3642   00210 1            OCT     210
 2034    REF  62   LAST  971    15,3643  0 6001 0            TC      GOTOPOOH

 2035    REF  66   LAST  974    15,3644  0 5504 0            TC      UPFLAG
 2036    REF   5   LAST  390    15,3645   00007 0            ADRES   IMUSE             SET IMUSE FLAG

 2037    REF   4   LAST  541    15,3646  0 4631 1            TC      SWRETURN

 2038                           04,2757                      BANK    04
 2039    REF   2   LAST  250    04,2000                      SETLOC  ACTMARK2
 2040                           04,2757                      BANK
 2041    REF   1                                             COUNT*  $$/P57

 2042                           04,2757   77220 1  LSORIENT  STQ     VLOAD
 2043    REF  16   LAST  973    04,2760   02746 0                    QMAJ
 2044    REF   6   LAST  834    04,2761   01555 0                    RRECTCSM
 2045                           04,2762   47235 0            VXV     VXV
 2046    REF   2   LAST  834    04,2763   01563 0                    VRECTCSM
 2047    REF  14   LAST  970    04,2764   03607 0                    XSMD
 2048                           04,2765   77656 1            UNIT
 2049    REF   5   LAST  949    04,2766   03623 0            STORE   ZSMD
 2050                           04,2767   53435 0            VXV     UNIT
 2051    REF  15   LAST  977    04,2770   03607 0                    XSMD
 2052    REF   6   LAST  949    04,2771   37615 1            STCALL  YSMD
 2053    REF  17   LAST  977    04,2772   02746 0                    QMAJ
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L       LUNAR AND SOLAR EPHEMERIDES SUBROUTINES                                      USER'S PAGE NO.    1      EO S3

R2000   NAME - LSPOS  - LOCATE SUN AND MOON                                                       DATE - 25 OCT 67
R2002   MOD NO.1
R2004   MOD BY NEVILLE                                                                            ASSEMBLY SUNDANCE

R2006   FUNCTIONAL DESCRIPTION

R2007          COMPUTES UNIT POSITION VECTOR OF THE SUN AND MOON IN THE BASIC REFERENCE SYSTEM. THE SUN VECTOR S IS
R2009   LOCATED VIA TWO ANGLES. THE FIRST ANGLE(OBLIQUITY) IS THE ANGLE BETWEEN THE EARTH EQUATOR AND THE ECLIPTIC. THE
R2011   SECOND ANGLE IS THE LONGITUDE OF THE SUN MEASURED IN THE ECLIPTIC.
R2012   THE POSITION VECTOR OF THE SUN IS
R2013          -
R2014          S=(COS(LOS), COS(OBL)*SIN(LOS), SIN(OBL)*SIN(LOS)), WHERE

R2015        LOS=LOS +LOS *T-(C *SIN(2PI*T)/365.24 +C *COS(2PI*T)/365.24)
R2016               0    R     0                     1
R2017        LOS  (RAD) IS THE LONGITUDE OF THE SUN FOR MIDNIGHT JUNE 30TH OF THE PARTICULAR YEAR.
R2019           0
R2020        LOS  (RAD/DAY) IS THE MEAN RATE FOR THE PARTICULAR YEAR.
R2021           R
R2022   LOS  AND LOS  ARE STORED AS LOSC AND LOSR IN RATESP.
R2023      0        R
R2024   COS(OBL) AND SIN(OBL) ARE STORED IN THE MATRIX KONMAT.
R2025   T, TIME MEASURED IN DAYS(24 HOURS), IS STORED IN TIMEP.
R2026   C  AND C  ARE FUDGE FACTORS TO MINIMIZE THE DEVIATION. THEY ARE STORED AS ONE CONSTANT(CMOD), SINCE
R2028    0      1                               2  2 1/2
R2029   C *SIN(X)+C *COS(X) CAN BE WRITTEN AS (C +C )   *SIN(X+PHI), WHERE PHI=ARCTAN(C /C ).
R2031    0         1                            0  1                                   1  0

R2033   THE MOON IS LOCATED VIA FOUR ANGLES. THE FIRST IS THE OBLIQUITY. THE SECOND IS THE MEAN LONGITUDE OF THE MOON,
R2035   MEASURED IN THE ECLIPTIC FROM THE MEAN EQUINOX TO THE MEAN ASCENDING NODE OF THE LUNAR ORBIT, AND THEN ALONG THE
R2037   ORBIT. THE THIRD ANGLE IS THE ANGLE BETWEEN THE ECLIPTIC AND THE LUNAR ORBIT. THE FOURTH ANGLE IS THE LONGITUDE
R2039   OF THE NODE OF THE MOON, MEASURED IN THE LUNAR ORBIT. LET THESE ANGLES BE OBL,LOM,IM, AND LON RESPECTIVELY.

R2041   THE SIMPLIFIED POSITION VECTOR OF THE MOON IS
R2042     -
R2043     M=(COS(LOM), COS(OBL)*SIN(LOM)-SIN(OBL)*SIN(IM)*SIN(LOM-LON), SIN(OBL)*SIN(LOM)+COS(OBL)*SIN(IM)*SIN(LOM-LON))

R2045     WHERE
R2046        LOM=LOM +LOM *T-(A *SIN 2PI*T/27.5545+A *COS(2PI*T/27.5545)+B *SIN 2PI*T/32+B *COS(2PI*T/32)), AND
R2048               0    R     0                    1                     0               1
R2050        LON=LON +LON
R2051               0    R
R2052   A , A , B  AND B  ARE STORED AS AMOD AND BMOD (SEE DESCRIPTION OF CMOD, ABOVE).  COS(OBL), SIN(OBL)*SIN(IM),
R2054    0   1   0      1
R2055   SIN(OBL), AND COS(OBL)*SIN(IM) ARE STORED IN KONMAT AS K1, K2, K3 AND K4, RESPECTIVELY. LOM , LOM , LON , LON
R2057   ARE STORED AS LOMO, LOMR, LONO, AND LONR IN RATESP.                                        0     R     0     R
R2059   THE THREE PHIS ARE STORED AS AARG, BARG, AND CARG(SUN).  ALL CONSTANTS ARE UPDATED BY YEAR.

R2061   CALLING SEQUENCE
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R2062      CALL LSPOS.  RETURN IS VIA CPRET.

R2063    ALARMS OR ABORTS

R2064      NONE

R2065    ERASABLE INITIALIZATION REQUIRED

R2066      TEPHEM - TIME FROM MIDNIGHT 1 JULY PRECEDING THE LAUNCH TO THE TIME OF THE LAUNCH (WHEN THE AGC CLOCK WENT
R2068    TO ZERO). TEPHEM IS TP WITH UNITS OF CENTI-SECONDS.
R2069      TIME2 AND TIME1 ARE IN MPAC AND MPAC +1 WHEN PROGRAM IS CALLED.

R2070    OUTPUT

R2071      UNIT POSITIONAL VECTOR OF SUN IN VSUN.   (SCALED B-1)
R2072      UNIT POSITIONAL VECTOR OF MOON IN VMOON. (SCALED B-1)

R2073    SUBROUTINES USED

R2074      NONE

R2075    DEBRIS

R2076      CURRENT CORE SET,WORK AREA AND FREEFLAG
 2077                                 04,2773                          BANK    04
 207701 REF    1                      15,2000                          SETLOC  EPHEM
 207702                               15,3647                          BANK

 2078   REF    6  LAST   957          E5,1714                          EBANK=  VSUN
 20785  REF    1                                                       COUNT*  $$/EPHEM
 20786  REF    2  LAST   930          15,3647              LUNPOS      EQUALS  LSPOS

 2079                                 15,3647   54201 0    LSPOS       SETPD   SR
 2080                                 15,3650   00001 0                        0
 2082                                 15,3651   20617 0                        14D              TP
 2083                                 15,3652   56371 1                TAD     DDV
 2084   REF    3  LAST   244          15,3653   01707 0                        TEPHEM           TIME OF LAUNCH
 2086   REF    1                      15,3654   12024 1                        CSTODAY          24 HOURS-8640000 CENTI-SECS/DAY B-33
 2087   REF    1                      15,3655   00031 0                STORE   TIMEP            T IN DAYS
 2088                                 15,3656   77170 1                AXT,1   AXT,2
 2089                                 15,3657   00000 1                        0
 2090                                 15,3660   00000 1                        0
 2091                                 15,3661   77614 1                CLEAR
 2092   REF   11  LAST   965          15,3662   00274 0                        FREEFLAG         SWITCH BIT
 2093                                 15,3663   77745 1    POSITA      DLOAD
 2094   REF    1                      15,3664   12004 0                        KONMAT +2        ZEROS
 2095   REF    1                      15,3665   00027 1                STORE   GTMP
 2096                                 15,3666   40745 0    POSITB      DLOAD   DMP*
 2097   REF    2  LAST   979          15,3667   00031 0                        TIMEP            T
 2098   REF    1                      15,3670   12050 1                        VAL67 +4,1       1/27 OR 1/32 OR 1/365
 2099                         15,3671   42661 0            SL      DAD*
 2100                         15,3672   20211 1                    8D
 2101   REF   2  LAST  979    15,3673   12046 0                    VAL67 +2,1        AARG
 2102                         15,3674   40756 1            SIN     DMP*              SIN(T/27+PHI) OR T/32 OR T/365
 2103   REF   3  LAST  980    15,3675   12044 1                    VAL67,1           (A0**2+A1**2)**1/2SIN(X+PHIA)
 2104                         15,3676   62015 1            DAD     INCR,1            PLUS
 2105   REF   2  LAST  979    15,3677   00027 1                    GTMP              (B0**2+B1**2)**1/2SIN(X+PHIB)
 2106                         15,3700   77771 0            DEC     -6
 2107   REF   3  LAST  980    15,3701   00027 1            STORE   GTMP              OR (C0**2+C1**2)**1/2SIN(X+PHIC)
 2108                         15,3702   77614 1            BOFSET
 2109   REF  12  LAST  979    15,3703   00054 0                    FREEFLAG
 2110   REF   1               15,3704   33666 1                    POSITB
 2111                         15,3705   40745 0  POSITD    DLOAD   DMP*
 2112   REF   3  LAST  979    15,3706   00031 0                    TIMEP             T
 2113   REF   1               15,3707   65747 0                    RATESP,2          LOMR,LOSR,LONR
 2114                         15,3710   42661 0            SL      DAD*
 2115                         15,3711   21206 1                    5D
 2116   REF   2  LAST  980    15,3712   65741 0                    RATESP +6,2       LOMC,LOSC,LONC
 2117                         15,3713   77625 0            DSU
 2118   REF   4  LAST  980    15,3714   00027 1                    GTMP
 2119   REF   1               15,3715   10021 0            STORE   STMP,2            LOM,LOS,LON
 2120                         15,3716   63135 0            SLOAD   INCR,2
 2121   REF  17  LAST  959    15,3717   00050 1                    X2
 2122                         15,3720   77775 1            DEC     -2
 2123                         15,3721   53015 0            DAD     BZE
 2124   REF   1               15,3722   12026 0                    RCB-13            PLUS 2
 2125   REF   1               15,3723   33753 0                    POSITE            2ND
 2126                         15,3724   77644 1            BPL
 2127   REF   1               15,3725   33663 1                    POSITA            1ST
 2128                         15,3726   45345 1  POSITF    DLOAD   DSU               3RD
 2129   REF   2  LAST  980    15,3727   00021 1                    STMP              LOM
 2130   REF   3  LAST  980    15,3730   00025 0                    STMP +4           LON
 2131                         15,3731   65356 1            SIN     PDDL              SIN(LOM-LON)
 2132   REF   4  LAST  980    15,3732   00021 1                    STMP
 2133                         15,3733   65356 1            SIN     PDDL              SIN LOM
 2134   REF   5  LAST  980    15,3734   00021 1                    STMP
 2135                         15,3735   55546 0            COS     VDEF              COS LOM
 2136                         15,3736   53521 1            MXV     UNIT
 2137   REF   2  LAST  979    15,3737   12002 0                    KONMAT            K1,K2,K3,K4,
 2138   REF   8  LAST  930    15,3740   02723 0            STORE   VMOON
 2139                         15,3741   65345 0            DLOAD   PDDL
 2140   REF   3  LAST  980    15,3742   12004 0                    KONMAT +2         ZERO
 2141   REF   6  LAST  980    15,3743   00023 0                    STMP +2
 2142                         15,3744   65356 1            SIN     PDDL              SIN LOS
 2143   REF   7  LAST  980    15,3745   00023 0                    STMP +2
 2144                         15,3746   55546 0            COS     VDEF              COS LOS
 2145                         15,3747   53521 1            MXV     UNIT
 2146   REF   4  LAST  980    15,3750   12002 0                    KONMAT
 2147   REF   7  LAST  979    15,3751   02715 0            STORE   VSUN
 2148                         15,3752   77616 0            RVQ
 2149                               15,3753   77745 1  POSITE    DLOAD
 2150   REF    5  LAST   980        15,3754   12004 0                     KONMAT +2        ZEROS
 2151   REF    5  LAST   980        15,3755   00027 1            STORE    GTMP
 2152                               15,3756   77650 1            GOTO
 2153   REF    1                    15,3757   33705 0                     POSITD
 21536  REF    2  LAST    51        05,2000                      SETLOC   EPHEM1
 21537                              05,3505                      BANK

 21538  REF    2 LAST    51 TO    52:     52     52*             COUNT*   $$/EPHEM

 2163                                 0020             STMP      EQUALS   16D

 2164                                 0026             GTMP      EQUALS   22D

 2165                                 0030             TIMEP     EQUALS   24D


*** END OF LEMP50S .119 ***
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R0001    PROGRAM NAME- DOWN TELEMETRY PROGRAM
R0002    MOD NO.- 0        TO COMPLETELY REWRITE THE DOWN TELEMETRY PROGRAM AND DOWNLINK ERASABLE DUMP PROGRAM FOR THE
R0004                      PURPOSE OF SAVING APPROXIMATELY 150 WORDS OF CORE STORAGE.
R0006                      THIS CHANGE REQUIRES AN ENTIRELY NEW METHOD OF SPECIFYING DOWNLINK LISTS.REFER TO DOWNLINK
R0008                      LISTS LOG SECTION FOR MORE DETAILS. HOWEVER THIS CHANGE WILL NOT AFFECT THE GROUND PROCESSING
R0010                      OF DOWN TELEMETRY DATA.
R0011    MOD BY-  KILROY, SMITH, DEWITT
R0012    DATE-    02OCT67
R0013    AUTHORS- KILROY, SMITH, DEWITT, DEWOLF, FAGIN
R0014    LOG SECTION- DOWN-TELEMETRY PROGRAM
R0015    FUNCTIONAL DESCRIPTION- THIS ROUTINE IS INITIATED BY TELEMETRY END
R0016             PULSE FROM THE DOWNLINK TELEMETRY CONVERTER. THIS PULSE OCCURS
R0017             AT 50 TIMES PER SEC(EVERY 20 MS) THEREFORE DODOWNTM IS
R0018             EXECUTED AT THESE RATES. THIS ROUTINE SELECTS THE APPROPRIATE
R0019             AGC DATA TO BE TRANSMITTED DOWNLINK AND LOADS IT INTO OUTPUT
R0020             CHANNELS 34 AND 35. THE INFORMATION IS THEN GATED OUT FROM THE
R0021             LGC IN SERIAL FASHION.
R0022             THIS PROGRAM IS CODED FOR A 2 SECOND DOWNLIST. SINCE DOWNRUPTS
R0023             OCCUR EVERY 20MS AND 2 AGC COMPUTER WORDS CAN BE PLACED IN
R0024             CHANNELS 34 AND 35 DURING EACH DOWNRUPT THE PROGRAM IS CAPABLE
R0025             OF SENDING 200 AGC WORDS EVERY 2 SECONDS.
R0026    CALLING SEQUENCE- NONE
R0027             PROGRAM IS ENTERED VIA TCF DODOWNTM WHICH IS EXECUTED AS A
R0028             RESULT OF A DOWNRUPT. CONTROL IS RETURNED VIA TCF RESUME WHICH
R0029             IN EFFECT IS A RESUME.
R0030    SUBROUTINES CALLED- NONE
R0031    NORMAL EXIT MODE- TCF RESUME
R0032    ALARM OR ABORT EXIT MODE- NONE
R0033    RESTART PROTECTION:
R0034             ON A FRESH START AND RESTART THE 'STARTSUB' SUBROUTINE WILL INITIALIZE THE DOWNLIST POINTER(ACTUALLY
R0036             DNTMGOTO) TO THE BEGINNING OF THE CURRENT DOWNLIST(I.E. CURRENT CONTENTS OF DNLSTADR). THIS HAS THE
R0038             EFFECT OF IGNORING THE REMAINDER OF THE DOWNLIST WHICH THE DOWN-TELEMETRY PROGRAM WAS WORKING ON WHEN
R0040             THE RESTART(OR FRESH START) OCCURRED AND RESUME DOWN TELEMETRY FROM THE BEGINNING OF THE CURRENT
R0042             DOWNLIST.
R0043             ALSO OF INTEREST IS THE FACT THAT ON A RESTART THE AGC WILL ZERO DOWNLINK CHANNELS 13, 34 AND 35.
R0047    DOWNLINK LIST SELECTION:
R0048             THE APPROPRIATE DOWNLINK LISTS ARE SELECTED BY THE FOLLOWING:
R0049             1. FRESH START
R0050             2. V37EXXE  WHERE XX = THE MAJOR MODE BEING SELECTED.
R0051             3. UPDATE PROGRAM(P27)
R0052             4.     NON-V37 SELECTABLE TYPE PROGRAMS(E.G. AGS INITIALIZATION(SUNDANCE,LUMINARY) AND P61-P62
R00522                   TRANSITION(COLOSSUS) ETC.).
R00525   DOWNLINK LIST RULES AND LIMITATIONS:
R00526            READ SECTION(S) WHICH FOLLOW 'DEBRIS' WRITEUP.
R0053    OUTPUT-  EVERY 2 SECONDS 100 DOUBLE PRECISION WORDS(I.E. 200 AGC
R0054             COMPUTER WORDS) ARE TRANSMITTED VIA DOWNLINK.
R0055    ERASABLE INITIALIZATION REQUIRED- NONE
R0056             'DNTMGOTO' AND 'DNLSTADR' ARE INITIALIZED BY THE FRESH START PROGRAM.
R0058    DEBRIS(ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)-
R0059             LDATALST,DNTMBUFF TO DNTMBUFF +21D,TMINDEX,DNQ.
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R0060

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R0065   DODOWNTM IS ENTERED EVERY 20 MS BY AN INTERRUPT TRIGGERED BY THE
R0066   RECEIPT OF AN ENDPULSE FROM THE SPACECRAFT TELEMETRY PROGRAMMER.

R0067   NOTES REGARDING DOWNLINK LISTS ASSOCIATED WITH THIS PROGRAM:
R0068   1. DOWNLISTS. - DOWNLISTS MUST BE COMPILED IN THE SAME BANK AS THE
R0069      DOWN-TELEMETRY PROGRAM. THIS IS DONE FOR EASE OF CODING, FASTER
R0070      EXECUTION.
R0075   2. EACH DOWNLINK LIST CONSISTS OF A CONTROL LIST AND A NUMBER OF
R0076      SUBLISTS.
R0077   3. A SUBLIST REFERS TO A SNAPSHOT OR DATA COMMON TO THE SAME OR OTHER
R0078      DOWNLINK LISTS.  ANY SUBLIST CONTAINING COMMON DATA NEEDS TO BE
R0079      CODED ONLY ONCE FOR THE APPLICABLE DOWNLINK LISTS.
R0080   4. SNAPSHOT SUBLISTS REFER SPECIFICALLY TO HOMOGENEOUS DATA WHICH MUST BE
R0081      SAVED IN A BUFFER DURING ONE DOWNRUPT.
R0082   5. THE 1DNADR FOR THE 1ST WORD OF SNAPSHOT DATA IS FOUND AT THE END
R0083      OF EACH SNAPSHOT SUBLIST, SINCE THE PROGRAM CODING SENDS THIS DP WORD
R0084      IMMEDIATELY AFTER STORING THE OTHERS IN THE SNAPSHOT BUFFER.
R0085   6. ALL LISTS ARE COMBINATIONS OF CODED ERASABLE ADDRESS CONSTANTS
R0086      CREATED FOR THE DOWNLIST PROGRAM.
R0087      A. 1DNADR                1-WORD DOWNLIST ADDRESS.
R0088           SAME AS ECADR, BUT USED WHEN THE WORD ADDRESSED IS THE LEFT
R0089           HALF OF A DOUBLE-PRECISION WORD FOR DOWN TELEMETRY.
R0090      B. 2DNADR - 6DNADR       N-WORD DOWNLIST ADDRESS, N = 2 - 6.
R0091           SAME AS 1DNADR, BUT WITH THE 4 UNUSED BITS OF THE ECADR FORMAT
R0092           FILLED IN WITH 0001-0101.  USED TO POINT TO A LIST OF N DOUBLE-
R0093           PRECISION WORDS, STORED CONSECUTIVELY, FOR DOWN TELEMETRY.
R0094      C. DNCHAN                DOWNLIST CHANNEL ADDRESS.
R0095           SAME AS 1DNADR, BUT WITH PREFIX BITS 0111.  USED TO POINT TO
R0096           A PAIR OF CHANNELS FOR DOWN TELEMETRY.
R0097      D. DNPTR                 DOWN TELEMETRY SUBLIST POINTER.
R0098        SAME AS CAF BUT TAGGED AS A CONSTANT. USED IN CONTROL LIST TO POINT TO A SUBLIST.
R0100        CAUTION--- A DNPTR CANNOT BE USED IN A SUBLIST.
R0101   7. THE WORD ORDER CODE IS SET TO ZERO AT THE BEGINNING OF EACH DOWNLIST (I.E. CONTROL LIST) AND WHEN
R0103      A '1DNADR TIME2' IS DETECTED IN THE CONTROL LIST(ONLY).
R0104   8. IN THE SNAPSHOT SUBLIST ONLY, THE DNADR'S CANNOT POINT TO THE FIRST WORD OF ANY EBANK.

R0106   DOWNLINK LIST RESTRICTIONS:
R0107     (THE FOLLOWING POINTS MAY BE LISTED ELSEWHERE BUT ARE LISTED HERE SO  IT IS CLEAR THAT THESE THINGS CANNOT BE
R0109     DONE)

R0110   1. SNAPSHOT DOWNLIST:
R0111     (A) CANNOT CONTAIN THE FOLLOWING ECADRS(I.E. 1DNADR'S): 0, 400, 1000, 1400, 2000, 2400, 3000, 3400.
R0113     (B) CAN CONTAIN ONLY 1DNADR'S

R0114   2. ALL DOWNLINKED DATA(EXCEPT CHANNELS) IS PICKED UP BY A <DCA<SO DOWNLINK LISTS CANNOT CONTAIN THE
R0116      EQUIVALENT OF THE FOLLOWING ECADRS(I.E. IDNADRS): 377, 777, 1377, 1777, 2377, 27777, 3377, 3777.

R0118      (NOTE: THE TERM EQUIVALENT ' MEANT THAT THE IDNADR  TO 6DNADR  WILL BE PROCESSED LIKE 1 TO 6 ECADRS)

R0120   3. CONTROL LISTS AND SUBLISTS CANNOT HAVE ENTRIES = OCTAL 00000 OR OCTAL 77777
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R0122   4. THE '1DNADR TIME2' WHICH WILL CAUSE THE DOWNLINK PROGRAM TO SET THE WORDER CODE TO 3 MUST APPEAR IN THE
R0124      CONTROL SECTION OF THE DOWNLIST.

R0125   5. 'DNCHAN 0' CANNOT BE USED.

R0126   6. 'DNPTR 0' CANNOT BE USED.

R0127   7. DNPTR CANNOT APPEAR IN A SUBLIST.

R0128


R0129   EBANK SETTINGS
R0130             IN THE PROCESS OF SETTING THE EBANK(WHEN PICKING UP DOWNLINK DATA) THE DOWN TELEMETRY PROGRAM PUTS
R0132             'GARBAGE' INTO BITS15-12 OF EBANK. HUGH BLAIR-SMITH WARNS US THAT BITS15-12 OF EBANK MAY BECOME
R0134             SIGNIFICANT SOMEDAY IN THE FUTURE. IF/WHEN THAT HAPPENS, THE PROGRAM SHOULD INSURE(BY MASKING ETC.)
R0136             THAT BITS15-12 OF EBANK ARE ZERO.
R0137   INITIALIZATION REQUIRED- TC INTERRUPT CURRENT LIST AND START A NEW ONE..
R0138        1.   ADRES OF DOWNLINK LIST INTO DNLSTADR
R0139        2.   NEGONE INTO SUBLIST
R0140        3.   NEGONE INTO DNECADR

 0142                             22,3711                           BANK    22
 0143  *REF   2  LAST  195        05,2000                           SETLOC  DOWNTELM
 0144                             05,3505                           BANK

 0145   REF  17  LAST  206           0340                           EBANK=  DNTMBUFF

 0146   REF   1                                                     COUNT*  $$/DPROG
 0147   REF   5  LAST  814        05,3505   54 016 1  DODOWNTM TS      BANKRUPT
 0148                             05,3506   0 0006 1                EXTEND
 0149   REF   5  LAST  814        05,3507   22 012 1                QXCH    QRUPT               SAVE Q
 0150   REF  36  LAST  970        05,3510   3 4745 0                CA      BIT7                AT THE BEGINNING OF THE LIST THE WORD
 01502                            05,3511   0 0006 1                EXTEND                      ORDER BIT WILL BE SET BACK TO ZERO.
 01503  REF  17  LAST  815        05,3512   02 013 1                RAND    CHAN13
 01504  REF 300  LAST  977        05,3513   10 000 0                CCS     A
 01505  REF   4  LAST  290        05,3514   0 0335 1                TC      DNTMGOTO
 015055 REF   6  LAST  815        05,3515   0 6022 1                TC      C13STALL
 01506  REF  37  LAST  985        05,3516   3 4745 0                CA      BIT7
 0151                             05,3517   0 0006 1                EXTEND                      SET WORD ORDER BIT TO 1 ONLY IF IT
 0152   REF  18  LAST  985        05,3520   05 013 0                WOR     CHAN13              ALREADY ISN'T.
 0153   REF   5  LAST  985        05,3521   0 0335 1                TC      DNTMGOTO            GO TO APPROPRIATE PHASE OF PROGRAM

 01532  REF   3  LAST  985        05,2000                           SETLOC  DOWNTELM
 01534                            05,3522                           BANK

 0154   REF   2  LAST  221        05,3522   3 7752 0  DNPHASE1 CA      NEGONE              INITIALIZE ALL CONTROL WORDS
 0155   REF   1                   05,3523   54 337 1                TS      SUBLIST             WORDS TO MINUS ONE
 0156   REF   1                   05,3524   54 336 0                TS      DNECADR
 0157   REF   1                   05,3525   3 3652 0                CA      LDNPHAS2            SET DNTMGOTO =0 ALL SUBSEQUENT DOWNRUPTS
 0158   REF   6  LAST  985    05,3526  54 335 0           TS      DNTMGOTO      GO TO DNPHASE2
 0159   REF   1               05,3527  1 3543 1           TCF     NEWLIST
 0160   REF   2  LAST  985    05,3530  10 336 0  DNPHASE2 CCS     DNECADR       SENDING OF DATA IN PROGRESS
 0161   REF   1               05,3531  0 3665 1  DODNADR  TC      FETCH2WD      YES - THEN FETCH THE NEXT 2 SP WORDS
 0162   REF  29  LAST  923    05,3532   77753 0  MINTIME2-1DNADR TIME2          NEGATIVE OF TIME2 1DNADR
 0163                         05,3533  1 3534 1           TCF     +1            (ECADR OF  3776 + 74001 = 77777)

 0164   REF   2  LAST  985    05,3534  10 337 1           CCS     SUBLIST       IS THE SUBLIST IN CONTROL
 0165   REF   1               05,3535  1 3700 1           TCF     NEXTINSL      YES
 0166                         05,3536   74001 0  DNADRDCR OCT     74001         DNADR COUNT AND ECADR DECREMENTER

 0167   REF   1               05,3537  3 0334 0  CHKLIST  CA      CTLIST
 0168                         05,3540  0 0006 1           EXTEND
 0169   REF   2  LAST  986    05,3541  6 3543 0           BZMF    NEWLIST       IT WILL BE NEGATIVE AT END OF LIST
 0170   REF   1               05,3542  1 3550 0           TCF     NEXTINCL
 0171   REF   7  LAST  232    05,3543  50 333 1  NEWLIST  INDEX   DNLSTCOD
 0172   REF   1               05,3544  3 2441 1           CA      DNTABLE       INITIALIZE CTLIST WITH
 0173   REF   2  LAST  986    05,3545  54 334 1           TS      CTLIST          STARTING ADDRESS OF NEW LIST
 0174   REF   8  LAST  986    05,3546  4 0333 0           CS      DNLSTCOD
 0175   REF   1               05,3547  1 3767 0           TCF     SENDID +3
 0177   REF   3  LAST  986    05,3550  50 334 0  NEXTINCL INDEX   CTLIST
 0178                         05,3551  3 0000 1           CA      0
 0179   REF 301  LAST  985    05,3552  10 000 0           CCS     A
 0180   REF   4  LAST  986    05,3553  24 334 0           INCR    CTLIST        SET POINTER TO PICK UP NEXT CTLIST WORD
 0181                         05,3554  1 3560 0           TCF     +4            ON NEXT ENTRY TO PROG. (A SHOULD NOT =0)
 0182   REF   5  LAST  986    05,3555  56 334 0           XCH     CTLIST        SET CTLIST TO NEGATIVE AND PLACE(CODING)
 0183                         05,3556  4 0000 0           COM                   UNCOMPLEMENTED DNADR INTO A.     (FOR LA)
 0184   REF   6  LAST  986    05,3557  56 334 0           XCH     CTLIST                                        (ST IN )
 0185   REF 302  LAST  986    05,3560  24 000 1   +4      INCR    A                                             (CTLIST)
 0186   REF   3  LAST  986    05,3561  54 336 0           TS      DNECADR       SAVE DNADR
 0187   REF   1               05,3562  6 3532 0           AD      MINTIME2      TEST FOR TIME2 (NEG. OF ECADR)
 0188   REF 303  LAST  986    05,3563  10 000 0           CCS     A
 0189   REF   1               05,3564  1 3570 1           TCF     SETWO +1      DON'T SET WORD ORDER CODE
 0190                         05,3565   47777 0  MINB1314 OCT     47777         MINUS BIT 13 AND 14  (CAN'T GET HERE)
 0191   REF   2  LAST  986    05,3566  1 3570 1           TCF     SETWO +1      DON'T SET WORD ORDER CODE
 0192   REF   1               05,3567  0 3612 1  SETWO    TC      WOZERO        GO SET WORD ORDER CODE TO ZERO.
 0193   REF   4  LAST  986    05,3570  3 0336 1   +1      CA      DNECADR       RELOAD A WITH THE DNADR.
 0194   REF   1               05,3571  6 3565 1   +2      AD      MINB1314      IS THIS A REGULAR DNADR?
 0195                         05,3572  0 0006 1           EXTEND
 0196   REF   2  LAST  986    05,3573  6 3665 1           BZMF    FETCH2WD      YES. (A MUST NEVER BE ZERO)
 0197   REF   1               05,3574  6 7744 1           AD      MINB12        NO- IS IT A POINTER (DNPTR) OF A
 0198                         05,3575  0 0006 1           EXTEND                    CHANNEL(DNCHAN)
 0199   REF   1               05,3576  6 3623 0           BZMF    DODNPTR       IT'S A POINTER. (A MUST NEVER BE ZERO)

 0200                         05,3577  0 0006 1  DODNCHAN TC      6             (EXECUTED AS EXTEND) IT S A CHANNEL
 0201   REF   5  LAST  986    05,3600  50 336 1           INDEX   DNECADR
 0202                         05,3601   44000 1           INDEX   0 -4000       (EXECUTED AS READ)
 0203   REF 169  LAST  986    05,3602  54 001 1           TS      L
 0204                         05,3603  0 0006 1           TC      6             (EXECUTED AS EXTEND)
 0205   REF   6  LAST  986    05,3604  50 336 1           INDEX   DNECADR
 0206                               05,3605   43'777 1              INDEX   0 -4001          (EXECUTED AS READ)
 0207    REF    7  LAST   986       05,3606   54 336 0              TS      ONECADR          SET ONECADR
 0208    REF    3  LAST   985       05,3607   3 7752 0              CA      NEGONE               TO MINUS
 0209    REF    8  LAST   987       05,3610   56 336 1              XCH     ONECADR                  WHILE PRESERVING A.
 0210    REF    1                   05,3611   1 3713 0              TCF     DNTMEXIT         GO SEND CHANNELS

 0211                               05,3612   0 0006 1   WOZERO     EXTEND
 02111   REF    1                   05,3613   23'265 1              QXCH    C13QSAV
 021115  REF   44  LAST   897       05,3614   22 070 0              LXCH    RUPTREG1
 02112   REF    7  LAST   985       05,3615   0 6022 1              TC      C13STALL

 021125  REF   45  LAST   987       05,3616   22 070 0              LXCH    RUPTREG1
 02113   REF   38  LAST   985       05,3617   4 4745 1              CS      BIT7
 0212                               05,3620   0 0006 1              EXTEND
 0213    REF   19  LAST   985       05,3621   03 013 0              WAND    CHAN13           SET WORD ORDER CODE TO ZERO
 0214    REF    2  LAST   987       05,3622   0 1265 1              TC      C13QSAV

 0215    REF    9  LAST   987       05,3623   50 336 1   DODNPTR    INDEX   ONECADR          ONECADR CONTAINS ADRES OF SUBLIST
 0216                               05,3624   0 0000 1              0       0                CLEAR AND ADD LIST ENTRY INTO A.
 0217    REF  304  LAST   986       05,3625   10 000 0              CCS     A                IS THIS A SNAPSHOT SUBLIST
 0218    REF   10  LAST   987       05,3626   3 0336 1              CA      ONECADR          NO, IT IS A REGULAR SUBLIST.
 0219    REF    1                   05,3627   1 3677 0              TCF     DOSUBLST         A MUST NOT BE ZERO.

 0220    REF   11  LAST   987       05,3630   56 336 1              XCH     ONECADR          YES, IT IS A SNAPSHOT SUBLIST.
 0221    REF    3  LAST   986       05,3631   54 337 1              TS      SUBLIST          C(ONECADR) INTO SUBLIST
 0222    REF  183  LAST   970       05,3632   3 4755 1              CAF     ZERO                 A    INTO    A
 0223    REF    3  LAST    99       05,3633   56 336 1              XCH     TMINDEX          (NOTE.. TMINDEX = ONECADR)


R0224    THE FOLLOWING CODING (FROM SNAPLOOP TO SNAPEND)IS FOR THE PURPOSE OF TAKING A SNAPSHOT OF 12 DP REGISTERS.
R0226    THIS IS DONE BY SAVING 11 DP REGISTERS IN DNTMBUFF AND SENDING THE FIRST DP WORD IMMEDIATELY.
R0228    THE SNAPSHOT PROCESSING IS THE MOST TIME CONSUMING AND THEREFORE THE CODING AND LIST STRUCTURE WERE DESIGNED
R0230    TO MINIMIZE TIME. THE TIME OPTIMIZATION RESULTS IN RULES UNIQUE TO THE SNAPSHOT PORTION OF THE DOWNLIST.
R0232    THESE RULES ARE......
R0233                 1.    ONLY 1DNADR'S CAN APPEAR IN THE SNAPSHOT SUBLIST
R0234                 2.    THE 1DNADR'S CANNOT REFER TO THE FIRST LOCATION IN ANY  BANK.


 0236    REF   56  LAST   953       05,3634   54 003 0   SNAPLOOP   TS      EBANK            SET EBANK
 0237    REF    5  LAST   791       05,3635   7 4357 0              MASK    LOW8             ISOLATE RELATIVE ADDRESS
 0238                               05,3636   0 0006 1              EXTEND
 0239    REF  305  LAST   987       05,3637   5 0000 1              INDEX   A
 0240                               E3,1401                         EBANK=  1401
 0241                               05,3640   3 1402 0              DCA     1401             PICK UP 2 SNAPSHOT WORDS.
 0242    REF   18  LAST   985          0340                         EBANK=  DNTMBUFF
 0243    REF    4  LAST   987       05,3641   50 336 1              INDEX   TMINDEX
 0244    REF   19  LAST   987       05,3642   52 341 0              DXCH    DNTMBUFF         STORE 2 SNAPSHOT WORDS IN BUFFER
 0245    REF    5  LAST   987       05,3643   24 336 1              INCR    TMINDEX          SET BUFFER INDEX FOR NEXT 2 WORDS.
 0246    REF    6  LAST   987       05,3644   24 336 1              INCR    TMINDEX
 0247    REF    4  LAST   987       05,3645   24 337 0   SNAPAGN    INCR    SUBLIST          SET POINTER TO NEXT 2 WORDS OF SNAPSHOT
 0248  REF   5  LAST  987   05,3646  50 337 0           INDEX   SUBLIST
 0249                       05,3647  0 0000 1           0       0            = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
 0250  REF 306  LAST  987   05,3650  10 000 0           CCS     A            TEST FOR LAST TWO WORDS OF SNAPSHOT.
 0251  REF   1              05,3651  1 3634 1           TCF     SNAPLOOP     NOT LAST TWO.
 0252  REF   1              05,3652   03530 1  LDNPHAS2 GENADR  DNPHASE2
 0253  REF   6  LAST  988   05,3653  54 337 1           TS      SUBLIST      YES, LAST.  SAVE A.
 0254  REF   4  LAST  987   05,3654  3 7752 0           CA      NEGONE       SET DNECADR AND
 0255  REF  12  LAST  987   05,3655  54 336 0           TS      DNECADR          SUBLIST POINTERS
 0256  REF   7  LAST  988   05,3656  56 337 0           XCH     SUBLIST              TO NEGATIVE VALUES.
 0257  REF  57  LAST  987   05,3657  54 003 0           TS      EBANK
 0258  REF   6  LAST  987   05,3660  7 4357 0           MASK    LOW8
 0259                       05,3661  0 0006 1           EXTEND
 0260  REF 307  LAST  988   05,3662  5 0000 1           INDEX   A
 0261                       E3,1401                     EBANK=  1401
 0262                       05,3663  3 1402 0           DCA     1401         PICK UP FIRST 2 WORDS OF SNAPSHOT.
 0263  REF  20  LAST  987     0340                      EBANK=  DNTMBUFF
 0264  REF   2  LAST  987   05,3664  1 3713 0  SNAPEND  TCF     DNTMEXIT        NOW GO SEND THEM.

 0265  REF  13  LAST  988   05,3665  3 0336 1  FETCH2WD CA      DNECADR
 0266  REF  58  LAST  988   05,3666  54 003 0           TS      EBANK        SET EBANK
 0267  REF   7  LAST  988   05,3667  7 4357 0           MASK    LOW8         ISOLATE RELATIVE ADDRESS
 0268  REF 170  LAST  986   05,3670  54 001 1           TS      L
 0269  REF   1              05,3671  3 3536 1           CA      DNADRDCR     DECREMENT COUNT AND ECADR
 0270  REF  14  LAST  988   05,3672  26 336 0           ADS     DNECADR
 0271                       05,3673  0 0006 1           EXTEND
 0272  REF 171  LAST  988   05,3674  5 0001 0           INDEX   L
 0273                       E3,1400                     EBANK=  1400
 0274                       05,3675  3 1401 0           DCA     1400         PICK UP 2 DATA WORDS
 0275  REF  21  LAST  988     0340                      EBANK=  DNTMBUFF
 0276  REF   3  LAST  988   05,3676  1 3713 0           TCF     DNTMEXIT        NOW GO SEND THEM.

 0277  REF   8  LAST  988   05,3677  54 337 1  DOSUBLST TS      SUBLIST      SET SUBLIST POINTER
 0278  REF   9  LAST  988   05,3700  50 337 0  NEXTINSL INDEX   SUBLIST
 0279                       05,3701  0 0000 1           0       0            = CA SSSS (SSSS = NEXT ENTRY IN SUBLIST)
 0280  REF 308  LAST  988   05,3702  10 000 0           CCS     A            IS IT THE END OF THE SUBLIST
 0281  REF  10  LAST  988   05,3703  24 337 0           INCR    SUBLIST      NO-
 0282                       05,3704  1 3710 0           TCF     +4
 0283  REF  11  LAST  988   05,3705  54 337 1           TS      SUBLIST      SAVE A.
 0284  REF   5  LAST  988   05,3706  3 7752 0           CA      NEGONE       SET SUBLIST TO MINUS
 0285  REF  12  LAST  988   05,3707  56 337 0           XCH     SUBLIST      RETRIEVE A.
 0286  REF 309  LAST  988   05,3710  24 000 1    +4     INCR    A
 0287  REF  15  LAST  988   05,3711  54 336 0           TS      DNECADR      SAVE DNADR
 0288  REF   3  LAST  986   05,3712  1 3571 0           TCF     SETWD +2     GO USE COMMON CODING(PROBLEMS WOULD
A0289                                                                        OCCUR IF THE PROGRAM ENCOUNTERED A
A0290                                                                        DNPTR NOW)

 0291                       05,3713  0 0006 1  DNTMEXIT EXTEND               DOWN-TELEMETRY EXIT
 0292  REF   1              05,3714  01 034 1           WRITE   DNTM1        TO SEND A + L TO CHANNELS 34 + 35
 0293  REF 172  LAST  988   05,3715  3 0001 0           CA      L            RESPECTIVELY
 0294                       05,3716  0 0006 1  TMEXITL  EXTEND
 0295    REF   1                05,3717  01 035 0             WRITE   DNTM2
 0296    REF  21   LAST   817   05,3720  1 5270 0  TMRESUME  TCF     RESUME             EXIT TELEMETRY PROGRAM VIA RESUME.

 0297    REF   2   LAST   532      7744            MINB12    EQUALS  -1/8
 0298    REF   7   LAST   987      0336            ONECADR   EQUALS  TMINDEX
 0299    REF   2   LAST    99      0334            CTLIST    EQUALS  LDATALST
 0300    REF   2   LAST   100      0337            SUBLIST   EQUALS  DNQ
R03005   MOD BY - DENSMORE - JUNE 1969 - ELIMINATE ERASABLE DUMP COUNT
```

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R0301    SUBROUTINE NAME- DNDUMP
R0302    FUNCTIONAL DESCRIPTION - TO SEND (DUMP) ALL 8 BANKS OF ERASABLE STORAGE TWICE.  BANKS ARE SENT ONE AT A TIME
R0304            EACH BANK IS PRECEEDED BY AN ID WORD, SYNCH BITS, ECADR AND TIME1 FOLLOWED BY THE 256D WORDS OF EACH
R0306            EBANK. EBANKS ARE DUMPED IN ORDER(I.E. EBANK 0 FIRST, THEN EBANK1 ETC.)
R0308    CALLING SEQUENCE- THE GROUND OR ASTRONAUT BY KEYING V74E CAN INITIALIZE THE DUMP.
R0310            AFTER KEYING IN V74E THE CURRENT DOWNLIST WILL BE IMMEDIATELY TERMINATED AND THE DOWNLINK ERASABLE DUMP
R0312            WILL BEGIN.
R0313            ONCE INITIATED THE DOWNLINK ERASABLE DUMP CAN BE TERMINATED (AND INTERRUPTED DOWNLIST REINSTATED) ONLY
R0315            BY THE FOLLOWING:
R0316             1. A FRESH START
R0317             2. COMPLETION OF BOTH COMPLETE DUMPS
R0320             3. AND INVOLUNTARILY BY A RESTART.
R0321    NORMAL EXIT MODE- TCF DNPHASE1
R0322    ALARM OR ABORT MODE- NONE
R0323    *SUBROUTINES CALLED- NONE.
R0324    ERASABLE INITIALIZATION REQUIRED-
R0325            NONE
R0328    DEBRIS- DUMPLOC, DUMPSW, DNTMGOTO, EBANK AND CENTRAL REGISTERS
R0329    TIMING-    TIME(IN SECS) = ((NO.DUMPS)*(NO.EBANKS)* (WDSPEREBANK + NO.IDWDS)) / NO.WDSPERSEC
R0331               TIME(IN SECS) =  (    4     )*(     8     )* (     256      +      4    )   /      100
R0333         THUS TIME(IN SECS TO SEND DUMP OF ERASABLE 4 TIMES VIA DOWNLINK) = 83.2 SECONDS

R0335    STRUCTURE OF ONE EBANK AS IT IS SENT BY DOWNLINK PROGRAM-
R0336       (REMINDER-THIS ONLY DESCRIBES ONE OF THE 8 EBANKS X 4 (DUMPS) = 32 EBANKS WHICH WILL BE SENT BY DNDUMP)
R0338          DOWNLIST                                       W
R0339            WORD   TAKEN FROM CONTENTS OF     EXAMPLE  D  COMMENTS

R0340              1    ERASID                      0177X   0  DOWNLIST I.D. FOR DOWNLINK ERASABLE DUMP (X=7 CSM, 6 LM)
R0342              2    LOWIDCOD                    77340   1  DOWNLINK SYNCH BITS.(SAME ONE USED IN ALL OTHER DOWNLISTS)
R0344              3    DUMPLOC                     13400   1  (SEE NOTES ON DUMPLOC)1= 3RD ERAS DUMP, 3400=ECADR OF 5TH WD
R0346              4    TIME1                       14120   1  TIME IN CENTISECONDS
R0347              5    FIRST WORD OF EBANK X       03400   1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1400 (ECADR 3400)
R0349              6    2ND   WORD OF EBANK X       00142   1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1401 (ECADR 3401)
R0351              7    3RD   WORD OF EBANK X       00142   1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1402 (ECADR 3402)
R0353              .                                        1
R0354              .                                        1
R0355              .                                        1
R0356            260D   256TH WORD OF EBANK X       03777   1  IN THIS EXAMPLE THIS WORD = CONTENTS OF E7,1777 (ECADR 3777)

R0358    NOTE- DUMPLOC CONTAINS THE COUNTER AND ECADR FOR EACH WORD BEING SENT.
R0359          THE BIT STRUCTURE OF DUMPLOC IS FOLLOWS---
R0360                                              X = NOT USED
R0361             X ABC EEE RRRRRRRR             ABC = ERASABLE DUMP COUNTER(I.E. ABC = 0,1,2 OR 3 WHICH MEANS THAT
R0363                                                  COMPLETE ERASABLE DUMP NUMBER  1,2,3 OR 4 RESPECTIVELY IS IN PROGRESS)
R0365                                            EEE = EBANK BITS
R0366                                       RRRRRRRR = RELATIVE ADDRESS WITHIN AN EBANK.

 0368    REF 184   LAST  987    05,3721  3 4755 1  DNDUMPI   CA      ZERO                INITIALIZE DOWNLINK
 0369    REF   1                05,3722  54 336 0            TS      DUMPLOC             ERASABLE DUMP
 0370    REF   2   LAST  986    05,3723  0 3764 1   +2       TC      SENDID              GO SEND ID AND SYNCH BITS
 0371   REF   1                05,3724  3 3733 0           CA      LDNDUMP1        SET DNTMGOTO
 0372   REF   7  LAST  986     05,3725  54 335 0           TS      DNTMGOTO        TO LOCATION FOR NEXT PASS
 0373   REF  16  LAST  947     05,3726  3 0025 0           CA      TIME1           PLACE TIME1
 0374   REF 173  LAST  988     05,3727  56 001 0           XCH     L               INTO L
 0375   REF   2  LAST  990     05,3730  3 0336 1           CA      DUMPLOC         AND ECADR OF THIS EBANK INTO A
 0376   REF   4  LAST  988     05,3731  1 3713 0           TCF     DNTMEXIT        SEND DUMPLOC AND TIME1

 0377   REF   1                05,3732   03734 1  LDNDUMP  ADRES   DNDUMP
 0378   REF   1                05,3733   03746 1  LDNDUMP1 ADRES   DNDUMP1

 0379   REF  63  LAST  913     05,3734  3 4752 0  DNDUMP   CA      TWO             INCREMENT ECADR IN DUMPLOC
 0380   REF   3  LAST  991     05,3735  26 336 0           ADS     DUMPLOC         TO NEXT DP WORD TO BE
 0381   REF   8  LAST  988     05,3736  7 4357 0           MASK    LOW8            DUMPED AND SAVE IT.
 0382   REF 310  LAST  988     05,3737  10 000 0           CCS     A               IS THIS THE BEGINNING OF A NEW EBANK
 0383   REF   1                05,3740  1 3750 1           TCF     DNDUMP2         NO- THEN CONTINUE DUMPING
 0384   REF   4  LAST  991     05,3741  3 0336 1           CA      DUMPLOC         YES- IS THIS THE END OF THE
 0385   REF  38  LAST  953     05,3742  7 4737 1           MASK    BIT13           SECOND COMPLETE ERASABLE DUMP?
 0386                          05,3743  0 0006 1           EXTEND
 0387   REF   2  LAST  290     05,3744  1 3723 0           BZF     DNDUMPI +2      NO - GO BACK AND INITIALIZE NEXT BANK
 0390   REF   2  LAST  225     05,3745  1 3522 0           TCF     DNPHASE1        YES - SEND DOWNLIST AGAIN
 0391   REF   1                05,3746  3 3732 1  DNDUMP1  CA      LDNDUMP         SET DNTMGOTO
 0392   REF   8  LAST  991     05,3747  54 335 0           TS      DNTMGOTO        FOR WORDS 3 TO 256D OF CURRENT EBANK

 0393   REF   5  LAST  991     05,3750  3 0336 1  DNDUMP2  CA      DUMPLOC
 0394   REF  59  LAST  988     05,3751  54 003 0           TS      EBANK           SET EBANK
 0395   REF   9  LAST  991     05,3752  7 4357 0           MASK    LOW8            ISOLATE RELATIVE ADDRESS.
 0396   REF 234  LAST  919     05,3753  54 002 1           TS      Q               (NOTE: MASK INSTRUCTION IS USED TO PICK
 0397   REF  23  LAST  923     05,3754  3 4754 0           CA      NEG0            UP ERASABLE REGISTERS SO THAT EDITING
 0398   REF 174  LAST  991     05,3755  54 001 1           TS      L               REGISTERS 20-23 WILL NOT BE ALTERED.)
 0399   REF 235  LAST  991     05,3756  50 002 0           INDEX   Q
 0400                          E3,1400                     EBANK=  1400            PICK UP LOW ORDER REGISTER OF PAIR
 0401                          05,3757  7 1401 1           MASK    1401            OF ERASABLE REGISTERS.
 0402   REF 175  LAST  991     05,3760  56 001 0           XCH     L
 0403   REF 236  LAST  991     05,3761  50 002 0           INDEX   Q               PICK UP HIGH ORDER REGISTER OF PAIR
 0404                          05,3762  7 1400 0           MASK    1400            OF ERASABLE REGISTERS.
 0405   REF  22  LAST  988        0340                     EBANK=  DNTMBUFF
 0406   REF   5  LAST  991     05,3763  1 3713 0           TCF     DNTMEXIT        GO SEND THEM


 0407                          05,3764  0 0006 1  SENDID   EXTEND                  **ENTRANCE USED BY ERASABLE DUMP PROG.**
 0408   REF   9  LAST  991     05,3765  22 335 1           QXCH    DNTMGOTO        SET DNTMGOTO SO NEXT TIME PROG WILL GO
 0409   REF   1                05,3766  3 5011 1           CAF     ERASID          TO LOCATION FOLLOWING :TC SENDID:

 0410   REF 176  LAST  991     05,3767  54 001 1           TS      L               **ENTRANCE USED BY REGULAR DOWNLINK PG**
 0411   REF   2  LAST  986     05,3770  0 3612 1           TC      WOZERO          GO SET WORD ORDER CODE TO ZERO
 0412   REF   1                05,3771  3 2065 0           CAF     LOWIDCOD        PLACE SPECIAL ID CODE INTO L
 0413   REF 177  LAST  991     05,3772  56 001 0           XCH     L               AND ID BACK INTO A
 0414   REF   6  LAST  991     05,3773  1 3713 0           TCF     DNTMEXIT        SEND DOWNLIST ID CODE(S).
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L        INTER-BANK COMMUNICATION                                                        USER'S PAGE NO.   1      E0 S3

R0001              THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
R0003    CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

 0005                               4616                 BLOCK  02
 00055   REF   1                                         COUNT* $$/BANK
 0006    REF   6  LAST  495         4616  52 134 0  BANKCALL DXCH   BUF2                SAVE INCOMING A,L.
 0007    REF 237  LAST  991         4617  50 002 0           INDEX  Q                   PICK UP CADR.
 0008                               4620  3 0000 1           CA     0
 0009    REF 238  LAST  992         4621  24 002 0           INCR   Q                   SO WE RETURN TO THE LOC. AFTER THE CADR.

R0010              SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

 0012    REF 178  LAST  991         4622  54 001 1  SWCALL   TS     L
 0013    REF   4  LAST  566         4623  22 004 0           LXCH   FBANK               SWITCH BANKS, SAVING RETURN.
 0014    REF   8  LAST  746         4624  7 5012 0           MASK   LOW10               GET SUB-ADDRESS OF CADR.
 0015    REF 239  LAST  992         4625  56 002 0           XCH    Q                   A,L NOW CONTAINS DP RETURN.
 0016    REF   7  LAST  992         4626  52 134 0           DXCH   BUF2                RESTORING INPUTS IF THIS IS A BANKCALL.
 0017    REF 240  LAST  992         4627  50 002 0           INDEX  Q
 0018                               4630  0 2000 0           TC     10000               SETTING Q TO SWRETURN.

 0019    REF   8  LAST  992         4631  56 134 1  SWRETURN XCH    BUF2 +1             COMES HERE TO RETURN TO CALLER. C(A,L)
 0020    REF   5  LAST  992         4632  56 004 0           XCH    FBANK               ARE PRESERVED FOR RETURN.
 0021    REF   9  LAST  992         4633  56 134 1           XCH    BUF2 +1
 0022    REF  10  LAST  992         4634  0 0133 0           TC     BUF2


R0023              THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
R0025    FOLLOWING THE TC POSTJUMP INSTRUCTION.

 0026    REF 241  LAST  992         4635  56 002 0  POSTJUMP XCH    Q                   SAVE INCOMING C(A).
 0027    REF 311  LAST  991         4636  50 000 1           INDEX  A                   GET CADR.
 0028                               4637  3 0000 1           CA     0

R0029              BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

 0031    REF   6  LAST  992         4640  54 004 1  BANKJUMP TS     FBANK
 0032    REF   9  LAST  992         4641  7 5012 0           MASK   LOW10
 0033    REF 242  LAST  992         4642  56 002 0           XCH    Q                   RESTORING INPUT C(A) IF THIS WAS A
 0034    REF 243  LAST  992         4643  50 002 0  Q+10000  INDEX  Q                   POSTJUMP.
 0035                               4644  1 2000 1  PRIO12   TCF    10000               PRIO12 = TCF   10000 = 12000
```

```
P0036               THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

 0038    REF  10  LAST  992          4645  3 5012 1  MAKECADR CAF      LOW10
 0039    REF  11  LAST  992          4646  7 0133 1           MASK     BUF2
 0040    REF  12  LAST  993          4647  6 0134 1           AD       BUF2 +1
 0041    REF 244  LAST  992          4650  0 0002 0           TC       Q


 00465   REF   5  LAST  878          4651  54 135 1  SUPDACAL TS       MPTEMP
 0047    REF   7  LAST  992          4652  56 004 0           XCH      FBANK              SET FBANK FOR DATA.
 00475                               4653  0 0006 1           EXTEND
 0048    REF  11  LAST  559          4654  04 007 1           RDR      SUPERBNK           SAVE FBANK IN BITS 15-11, AND
 00485   REF   6  LAST  993          4655  56 135 0           XCH      MPTEMP              SUPERBANK IN BITS  7-5.
 0049    REF  11  LAST  993          4656  7 5012 0           MASK     LOW10
 00495   REF 179  LAST  992          4657  56 001 0           XCH      L                  SAVE REL. ADR. IN BANK, FETCH SUPERBITS.
 0050                                4660  0 0004 0           INHINT                      BECAUSE RUPT DOES NOT SAVE SUPERBANK.
 00505                               4661  0 0006 1           EXTEND
 0051    REF  12  LAST  993          4662  01 007 1           WRITE    SUPERBNK           SET SUPERBANK FOR DATA.
 0052    REF 180  LAST  993          4663  50 001 0           INDEX    L
 00525                               4664  3 2000 0           CA       10000              PINBALL (FIX MEM DISP) PREVENTS DCA HERE
 0053    REF   7  LAST  993          4665  56 135 0           XCH      MPTEMP             SAVE 1ST WD, FETCH OLD FBANK AND SBANK.
 00534                               4666  0 0006 1           EXTEND
 00535   REF  13  LAST  993          4667  01 007 1           WRITE    SUPERBNK           RESTORE SUPERBANK.
 0054                                4670  0 0003 1           RELINT
 00545   REF   8  LAST  993          4671  54 004 1           TS       FBANK              RESTORE FBANK.
 0055    REF   8  LAST  993          4672  3 0135 0           CA       MPTEMP             RECOVER FIRST WORD OF DATA.
 00555                               4673  0 0002 0           RETURN                      24 WDS. DATACALL 516 MU, SUPDACAL 432 MU
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P0056                   THE FOLLOWING ROUTINES ARE IDENTICAL TC BANKCALL AND SWCALL EXCEPT THAT THEY ARE USED IN INTERRUPT.

 0058   REF   9   LAST  990       4674  52 073 1  IBNKCALL DXCH    RUPTREG3        USES RUPTREG3,4 FOR OP RETURN ADDRESS.
 0059   REF 245   LAST  993       4675  50 002 0           INDEX   Q
 0060                             4676   3 0000 1          CAF     0
 0061   REF 246   LAST  994       4677  24 002 0           INCR    Q

 0062   REF 181   LAST  993       4700  54 001 1  ISWCALL  TS      L
 0063   REF   9   LAST  993       4701  22 004 0           LXCH    FBANK
 0064   REF  12   LAST  993       4702   7 5012 0          MASK    LOW10
 0065   REF 247   LAST  994       4703  56 002 0           XCH     Q
 0066   REF  10   LAST  994       4704  52 073 1           DXCH    RUPTREG3
 0067   REF 248   LAST  994       4705  50 002 0           INDEX   Q
 0068                             4706   0 2000 0          TC      10000

 0069   REF   3   LAST   95       4707  56 073 0  ISWRETRN XCH     RUPTREG4
 0070   REF  10   LAST  994       4710  56 004 0           XCH     FBANK
 0071   REF   4   LAST  994       4711  56 073 0           XCH     RUPTREG4
 0072   REF  11   LAST  994       4712   0 0072 1          TC      RUPTREG3

R0090   2. USPRCADR ACCESSES INTERPRETIVE CODING IN OTHER THAN THE USER'S FBANK. THE CALLING SEQUENCE IS AS FOLLOWS:

A0092                                             L        TC      USPRCADR
A0093                                             L+1      CADR    INTPRETX        INTPRETX IS THE INTERPRETIVE CODING
A0094                                                                              RETURN IS TC L+2

 0103   REF   5   LAST  462       4713  54 164 0  USPRCADR TS      LOC             SAVE A
 0104   REF  34   LAST  950       4714   3 4744 1          CA      BIT8
 0105   REF   7   LAST  457       4715  54 023 1           TS      EDOP            EXIT INSTRUCTION TO EDOP
 0106   REF  24   LAST  820       4716   3 0006 1          CA      BBANK
 0107   REF   1                   4717  54 165 1           TS      BANKSET         USER'S BBANK TO BANKSET
 0108   REF 249   LAST  994       4720  50 002 0           INDEX   Q
 0109                             4721   3 0000 1          CA      0
 0110   REF  11   LAST  994       4722  54 004 1           TS      FBANK           INTERPRETIVE BANK TO FBANK
 0111   REF  13   LAST  994       4723   7 5012 0          MASK    LOW10           YIELDS INTERPRETIVE RELATIVE ADDRESS
 0112   REF 250   LAST  994       4724  56 002 0           XCH     Q               INTERPRETIVE ADDRESS TO Q, FETCHING L+1
 0113   REF   6   LAST  994       4725  56 164 1           XCH     LOC             L+1 TO LOC, RETRIEVING ORIGINAL A
 0114   REF   1                   4726   1 4643 0          TCF     Q+10000
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P0117   THERE ARE FOUR POSSIBLE SETTINGS FOR CHANNEL 07. (CHANNEL 07 CONTAINS THE SUPERBANK SETTING.)
R0119                                                PSEUDO-FIXED      OCTAL PSEUDO
R0120   SUPERBANK      SETTING     S-REG. VALUE      BANK NUMBERS      ADDRESSES
R0121   ----------     -------     ------------      ------------      ------------

R0122   SUPERBANK 3      0XX       2000 - 3777         30 - 37         70000 - 107777  (WHERE XX CAN BE ANYTHING AND
R0124                                                                                  WILL USUALLY BE SEEN AS 11)
R0126   SUPERBANK 4      100       2000 - 3777         40 - 47         110000 - 127777 (AS FAR AS IT CAN BE SEEN,
R0128                                                                                  ONLY BANKS 40-43 WILL EVER BE
R0130                                                                                  AND ARE PRESENTLY AVAILABLE)
R0132   SUPERBANK 5      101       2000 - 3777         50 - 57         130000 - 147777 (PRESENTLY NOT AVAILABLE TO
R0134                                                                                  THE USER)
R0136   SUPERBANK 6      110       2000 - 3777         60 - 67         150000 - 167777 (PRESENTLY NOT AVAILABLE TO
R0138                                                                                  THE USER)
R0142   ***  THIS ROUTINE MAYBE CALLED BY ANY PROGRAM LOCATED IN BANKS 00 - 27.  I.E., NO PROGRAM LIVING IN ANY
R0144   SUPERBANK SHOULD USE SUPERSW.  ***

R0145   SUPERSW MAYBE CALLED IN THIS FASHION:

R0146             CAF      ABBCON           WHERE  --  ABBCON   BBCON  SOMETHIN  --
R0147             TCR      SUPERSW          (THE SUPERBNK BITS ARE IN THE BBCON)
R0148             ...       ...
R0149              .         .
R0150              .         .

R0151   OR IN THIS FASHION :

R0152             CAF      SUPERSET         WHERE SUPERSET IS ONE OF THE FOUR AVAILABLE
R0154             TCR      SUPERSW          SUPERBANK BIT CONSTANTS:
R0155             ...       ...                                   SUPER011 OCTAL  60
R0157              .         .                                    SUPER100 OCTAL 100
R0159              .         .                                    SUPER101 OCTAL 120
R0161                                                             SUPER110 OCTAL 140

 0163                              4727  0 0006 1  SUPERSW  EXTEND
 0164   REF  14  LAST  993         4730  01 007 1           WRITE   SUPERBNK         WRITE BITS 7-6-5 OF THE ACCUMULATOR INTO
A0165                                                                                CHANNEL 07
 0166   REF 251  LAST  994         4731  0 0002 0           TC      Q                TC TO INSTRUCTION FOLLOWING
A0167                                                                                  TC  SUPERSW
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L        INTERPRETER                                                                  USER'S PAGE NO.   1      E0 S3

R0001    SECTION 1  DISPATCHER

R0002              ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST  INSTRUCTION, BANKSET TO THE BBANK OF THE
R0004    OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006    VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008    (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPERBANKS.
R0010    E-BANK SWITCHING OCCURS WHENEVER GENERAL ERASABLE (100 - 3777) IS ADDRESSED.


 0012                          6042                          BLOCK  03

 0013    REF   1                                             COUNT* $$/INTER
 00135                         6042   0 0003 1   INTPRET     RELINT
 0014                          6043   0 0006 1               EXTEND                        SET LOC TO THE WORD FOLLOWING THE TC.
 0015    REF   7  LAST  994    6044  22 164  1               DXCH    LOC

 0016    REF  25  LAST  994    6045   3 0006 1     +2        CA      BBANK                 INTERPRETIVE BRANCHES FINISH HERE.
 0017    REF   2  LAST  994    6046  54 165  1               TS      BANKSET
 0018    REF  36  LAST  893    6047   7 4735 0               MASK    BIT15                 GET 15TH BIT FOR INDEXABLE ADDRESSES.
 0019    REF   5  LAST   96    6050  54 115  0               TS      INTBIT15

 0020    REF   8  LAST  994    6051  54 023  1               TS      EDOP                  MAKE SURE NO INSTRUCTIONS LEFT OVER

 0021    REF   1               6052   1 6073 1               TCF     NEWOPS                PICK UP OP CODE PAIR AND BEGIN.


 0022    REF  26  LAST  996    6053  22 006  1   INTRSM      LXCH    BBANK                 RESUME SUSPENDED INTERPRETIVE JOB
 0023    REF 217  LAST  976    6054   1 6045 1               TCF     INTPRET +3
R0024             DLOAD LOADS MPAC, MPAC +1, LEAVING ZERO IN MPAC +2.

 0025                          6055   0 0006 1   DLOAD       EXTEND
 0026    REF   4  LAST  916    6056   5 0116 1               INDEX   ADDRWD
 0027                          6057   3 0001 0               DCA     0                     LOAD OP C(C(ADDRWD)) INTO MPAC,MPAX +1
 0028    REF 374  LAST  957    6060  52 155  1   SLOAD2      DXCH    MPAC
 0029    REF 185  LAST  990    6061   3 4755 1               CAF     ZERO                  ZERO MPAC +2
```

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P0030              AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

 0032   REF 375  LAST  996       6062  54 156 1            TS      MPAC +2          AND DECLARE OP MODE

 0033   REF  15  LAST  879       6063  54 163 1  NEWMODE   TS      MODE             PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0034   REF   3  LAST  996       6064  3 0165 0  DANZIG    CA      BANKSET          SET BBANK BEFORE TESTING NEWJOB SO THAT
 0035   REF  27  LAST  996       6065  54 006 0            TS      BBANK            IT MAY BE SAVED DIRECTLY BY CHANJOB.

 0036   REF   9  LAST  996       6066  10 023 1  NOIBNKSW  CCS     EDOP             SEE IF AN ORDER CODE IS LEFT OVER FROM
 0037   REF   1                  6067  1 6102 0            TCF     DPJUMP           THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0038                                                                               EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0039   REF   6  LAST  719       6070  10 067 1            CCS     NEWJOB           SEE IF A JOB OF HIGHER PRIORITY IS
 0040   REF   1                  6071  1 5126 0            TCF     CHANG2           PRESENT, AND IF SO, CHANGE JOBS.

 0041   REF   8  LAST  996       6072  24 164 1            INCR    LOC              ADVANCE THE LOCATION COUNTER.
R0042            ITRACE (1) REFERS TO "NEWOPS".
 0043   REF   9  LAST  997       6073  50 164 1  NEWOPS    INDEX   LOC              ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0044                            6074  3 0000 1            CA      0                MAY BE AN OPCODE PAIR OR A STORE CODE.
 0045   REF 312  LAST  992       6075  10 000 0            CCS     A                TEST SIGN AND GET DABS(A).
 0046   REF   1                  6076  1 6365 0            TCF     DOSTORE          PROCESS STORE CODE.

 0047                            6077   00177 0  LOW7      OCT     177

 0048   REF  10  LAST  997       6100  54 023 1            TS      EDOP             OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0049   REF   6  LAST  457       6101  7 6077 0            MASK    LOW7             WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0050   REF   9  LAST  464       6102  54 020 1  OPJUMP    TS      CYR              LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0051   REF  10  LAST  997       6103  10 020 1            CCS     CYR              CODE IS TO BE PROCESSED. TEST PREFICES.
 0052   REF   1                  6104  1 6252 0            TCF     OPJUMP2          TEST SECOND PREFIX BIT.

 0053   REF   1                  6105  1 6746 0            TCF     EXIT             +0 OP CODE IS EXIT.
```

```
P0054            PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

 0056   REF  48  LAST  974     6106  7 4753 0  ADDRESS  MASK   BIT1           SEE IF ADDRESS IS INDEXED. CYR CONTAINED
 0057   REF 313  LAST  997     6107  10 000 0           CCS    A              400XX, SO BIT 1 IS NOW AS IT WAS IN CYR.
 0058   REF   1                6110  1 6151 0           TCF    INDEX          FORM INDEXED ADDRESS.

 0059   REF  10  LAST  997     6111  50 164 1  DIRADRES INDEX  LOC            LOOK AHEAD TO NEXT WORD TO SEE IF
 0060                          6112  4 0001 1  CCT4DDD1 CS     1              ADDRESS IS GIVEN.
 0061   REF 314  LAST  998     6113  10 000 0           CCS    A
 0062   REF   1                6114  1 6220 0           TCF    PUSHUP         IF NOT.

 0063                          6115   77773 1  NEG4     DEC    -4

 0064   REF  11  LAST  998     6116  24 164 1           INCR   LOC            IF SO, TO SHOW WE PICKED UP A WORD.
 0065   REF   5  LAST  996     6117  54 116 0           TS     ADDRWD
```

```
P0066          FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0068     REQUIRED 12-BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED E OR F BANK SWITCHING DONE. ADDRESSES LESS
R0070     THAN 45D ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.


 0072     REF   1                   6120  6 6254 1             AD      -ENCVAC          SEE IF ADDRESS RELATIVE TO WORK AREA.
 0073     REF 315  LAST  998        6121  10 000 0             CCS     A
 0074     REF   1                   6122  6 7746 0             AD      -ENCERAS         IF NOT, SEE IF IN GENERAL ERASABLE.
 0075     REF   1                   6123  1 6130 1             TCF     IERASTST

 0076     REF  38  LAST  956        6124  3 0120 1  NETZERC    CA      FIXLCC           IF SO, LEAVE THE MODIFIED ADDRESS IN
 0077     REF   6  LAST  998        6125  26 116 0             ADS     ADDRWC           ADDRWD AND DISPATCH.
 0078     REF  11  LAST  997        6126  50 020 0  ITR15      INDEX   CYR              THIS INDEX MAKES THE NEXT INSTRUCTION
 0079     REF   1                   6127  7 6276 0             7       INCJUMP -1       TCF INDJUMP + OP, EDITING CYR.

 0080                               6130  0 0006 1  IERASTST EXTEND
 0081     REF   1                   6131  6 6141 0             BZMF    GEADDR           GO PROCESS GENERAL-ERASABLE ADDRESS.

 0082     REF  14  LAST  994        6132  7 5012 0             MASK    LOW10            FIXED BANK ADDRESS. RESTORE AND ADD 815.
 0083     REF  15  LAST  999        6133  6 5012 1             AD      LOW10            SWITCH BANKS AND LEAVE SUBADDRESS IN
 0084     REF   7  LAST  999        6134  56 116 1             XCH     ACCRWC           ADDRWD FOR OPERAND RETRIEVAL. (THIS
 0085     REF   6  LAST  996        6135  6 0115 1             AD      INTBIT15         METHOD PRECLUDES USE OF THE LAST
 0086     REF  12  LAST  994        6136  54 004 1             TS      FBANK            LOCATION IN EACH FBANK.)
 0087     REF  12  LAST  999        6137  50 020 0  ITR12      INDEX   CYR
 0088     REF   2  LAST  999        6140  7 6276 0             7       INDJUMP -1

 0089     REF  10  LAST  991        6141  7 4357 0  GEACDR     MASK    LOWB
 0090     REF   3  LAST  464        6142  6 5007 0             AO      OCT1400
 0091     REF   8  LAST  999        6143  56 116 1             XCH     ADDRWD
 0092     REF  60  LAST  991        6144  54 003 0             TS      EBANK
 0093     REF  13  LAST  999        6145  50 020 0  ITR10      INDEX   CYR
 0094     REF   3  LAST  999        6146  7 6276 0             7       INCJUMP -1
```

```
R0095            THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0097      CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0099      BANK, OR ANY INTEGER IN THAT RANGE.

 0100      REF   1                  6147   3 7736 1  DODLOAD* CAF     DLOAD*           STODL* COMES HERE TO PROCESS LOAD ADR.
 0101      REF  14  LAST  999       6150  54 020 1            TS      CYR              (STOVL* ENTERS HERE).

 0102      REF  39  LAST  999       6151   3 0120 1  INDEX    CA      FIXLOC           SET UP INDEX LOCATION.
 0103      REF   1                  6152  54 130 1            TS      INDEXLOC
 0104      REF  12  LAST  998       6153  24 164 1            INCR    LOC              (ADDRESS ALWAYS GIVEN).
 0105      REF  13  LAST 1000       6154  50 164 1            INDEX   LOC
 0106                               6155   4 0000 0           CS      0
 0107      REF 316  LAST  999       6156  10 000 0            CCS     A                INDEX 2 IF ADDRESS STORED COMPLEMENTED.
 0108      REF   2  LAST 1000       6157  24 130 0            INCR    INDEXLOC
 0109                               6160   1 6161 0           NOOP

 0110      REF   9  LAST  999       6161  54 116 0            TS      ADDRWD           14 BIT ADDRESS TO ADDRWD.
 0111      REF   1                  6162   7 7745 1           MASK    HIGH4            IF ADDRESS GREATER THAN 2K, ADD INTBIT15
 0112                               6163   0 0006 1           EXTEND
 0113      REF   1                  6164   1 6167 0           BZF     INDEX2
 0114      REF   7  LAST  999       6165   3 0115 1           CA      INTBIT15
 0115      REF  10  LAST 1000       6166  26 116 0            ADS     ADDRWD

 0116      REF   3  LAST 1000       6167  50 130 0   INDEX2   INDEX   INDEXLOC
 0117      REF  27  LAST  956       6170   4 0046 1           CS      X1
 0118      REF  11  LAST 1000       6171  26 116 0            ADS     ADDRWD           DO AUGMENT, IGNORING AND CORRECTING OVF.

 0119      REF   8  LAST  956       6172   7 7747 0           MASK    HIGH9            SEE IF ADDRESS IS IN WORK AREA.
 0120                               6173   0 0006 1           EXTEND
 0121      REF   1                  6174   1 6207 0           BZF     INDWORK
 0122      REF   2  LAST 1000       6175   7 7745 1           MASK    HIGH4            SEE IF IN FIXED BANK.
 0123                               6176   0 0006 1           EXTEND
 0124      REF   1                  6177   1 6211 1           BZF     INDERASE

 0125      REF  12  LAST 1000       6200   3 0116 1           CA      ADDRWD           IN FIXED - SWITCH BANKS AND CREATE
 0126      REF  13  LAST  999       6201  54 004 1            TS      FBANK            SUB-ADDRESS.
 0127      REF  16  LAST  999       6202   7 5012 0           MASK    LOW10
 0128      REF   1                  6203   6 4741 1           AD      2K
 0129      REF  13  LAST 1000       6204  54 116 0            TS      ADDRWD
 0130      REF  15  LAST 1000       6205  50 020 0   ITR11    INDEX   CYR
 0131      REF   4  LAST  999       6206   3 6276 1           CA      INDJUMP -1

 0132      REF  40  LAST 1000       6207   3 0120 1  INDWORK  CA      FIXLOC           MAKE ADDRWD RELATIVE TO WORK AREA.
 0133      REF   1                  6210   1 6215 0           TCF     ITR13 -1

 0134      REF   4  LAST  999       6211   3 5007 0  INDERASE CA      OCT1400
 0135      REF  14  LAST 1000       6212  56 116 1            XCH     ADDRWD
 0136      REF  61  LAST  999       6213  54 003 0            TS      EBANK
 0137      REF  11  LAST  999       6214   7 4357 0           MASK    LOW8
 0138      REF  15  LAST 1000       6215  26 116 0     -1     ADS     ADDRWD
 0139    REF  16  LAST 1000        6216  50 020 0  ITR13     INDEX  CYR
 0140    REF   5  LAST 1000        6217  3 6276 1            3      INDJUMP -1
```

```
R0141          PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0143    LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0145    IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0147    BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0148          1. VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0150    RESULT, VXSC WANTS A SCALAR.

R0151          2. THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0153    INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0154          3. SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0156    THIS INCLUDES SIGN WANTING OP AND TAD REQUIRING TP.

 0157    REF   2  LAST  741      6220  3 4360 0  PUSHUP    CAF     OCT23           IF THE LOW 5 BITS OF CYR ARE LESS THAN
 0158    REF  17  LAST 1001      6221  7 0020 1            MASK    CYR             20, THIS OP REQUIRES SPECIAL ATTENTION.
 0159    REF   1                 6222  6 6225 1            AD      -OCT10          (NO -0).
 0160    REF 317  LAST 1000      6223  10 000 0            CCS     A
 0161    REF   1                 6224  1 6236 1            TCF     REGUP           FOR ALL CODES GREATER THAN OCT 7.

 0162                            6225   77767 1  -OCT10    OCT     -10

 0163    REF   1                 6226  6 6115 1            AD      NEG4            WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
 0164    REF 318  LAST 1002      6227  10 000 0            CCS     A               THE OP CODE (MOD4) IS THREE (REVERSE).
 0165    REF 319  LAST 1002      6230  50 000 1            INDEX   A               NO - THE MODE IS DEFINITE. PICK UP THE
 0166    REF   1                 6231  4 6247 1            CS      NO.WDS
 0167    REF   2  LAST 1002      6232  1 6240 0            TCF     REGUP +2

 0168    REF  16  LAST  997      6233  50 163 0            INDEX   MODE            FOR VXSC AND V/SC WE WANT THE REQUIRED
 0169    REF   4  LAST  956      6234  4 6245 0            CS      REVCNT          PUSHLOC DECREMENT WITHOUT CHANGING THE
 0170    REF   3  LAST 1002      6235  1 6240 0            TCF     REGUP +2        MODE AT THIS TIME.

 0171    REF  17  LAST 1002      6236  50 163 0  REGUP     INDEX   MODE            MOST ALL OP CODES PUSHUP HERE.
 0172    REF   2  LAST 1002      6237  4 6247 1            CS      NO.WDS
 0173    REF  11  LAST  879      6240  26 166 1   +2       ADS     PUSHLOC
 0174    REF  16  LAST 1000      6241  54 116 0            TS      ADDRWD
 0175    REF  18  LAST 1002      6242  50 020 0  ITR14     INDEX   CYR
 0176    REF   6  LAST 1001      6243  7 6276 0            7       INDJUMP -1      (THE INDEX MAKES THIS A TCF.)

 0177                            6244   00002 0            OCT     2               REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
 0178                            6245   00006 1  REVCNT    OCT     6               WORDS, SCALAR TAKES 6.
 0179                            6246   00006 1            OCT     6
 0180                            6247   00002 0  NO.WDS    OCT     2               CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
 0181                            6250   00003 1  OCTAL3    OCT     3               2 IN OP, AND 3 IN TP.
 0182                            6251   00006 1            OCT     6
```

```
P0183            TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

 0185    REF  19  LAST 1002       6252  10 020 1  OPJUMP2  CCS     CYR              TEST SECOND PREFIX BIT.
 0186    REF   1                  6253  1 6266 1           TCF     OPJUMP3          TEST THIRD BIT TO SEE IF UNARY OR SHIFT.

 0187                             6254   77722 0  -ENDVAC  DEC     -45

R0188            THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0190    IN THE RANGE 0 - 52, ERASABLE ECADR CONSTANTS FROM 100 - 3777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0192    IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

 0193    REF  14  LAST 1000       6255  24 164 1  15BITADR INCR    LOC              (ENTRY HERE FROM STCALL).
 0194    REF  15  LAST 1003       6256  50 164 1           INDEX   LOC              PICK UP ADDRESS WORD.
 0195                             6257  3 0000 1           CA      0
 0196    REF   6  LAST   98       6260  54 117 1           TS      POLISH           WE MAY NEED A SUBADDRESS LATER.

 0197    REF   1                  6261  3 5013 0           CAE     LOW7+2K          THESE INSTRUCTIONS ARE IN BANK 1.
 0198    REF  14  LAST 1000       6262  54 004 1           TS      FBANK
 0199    REF  20  LAST 1003       6263  7 0020 1           MASK    CYR
 0200    REF 320  LAST 1002       6264  50 000 1  ITR7     INDEX   A
 0201    REF   1                  6265  1 6337 1           TCF     MISCJUMP
```

```
P0202           COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

 0203  REF  15  LAST 1003     6266  54 004 1  CPJUMP3  TS      FBANK        CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
R0204           ITRACE (6) REFERS TO "CPJUMP3".
 0205  REF  21  LAST 1003     6267  10 020 1           CCS     CYR          TEST THIRD PREFIX BIT.
 0206  REF 321  LAST 1003     6270  50 000 1           INDEX   A            THE DECREMENTED UNARY CODE IS IN BITS
 0207  REF   1                6271  1 2000 1           TCF     UNAJUMP      1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

 0208  REF  18  LAST 1002     6272  10 163 1           CCS     MODE         ITS A SHORT SHIFT CODE. SEE IF PRESENT
 0209  REF   1                6273  1 2017 1           TCF     SHORTT       SCALAR OR VECTOR.
 0210  REF   2  LAST 1004     6274  1 2017 1           TCF     SHORTT
 0211  REF   1                6275  1 2121 0           TCF     SHORTV       CALLS THE APPROPRIATE ROUTINE.


 0212  REF   1                4350            FBANKMSK EQUALS  BANKMASK
 0213  REF  34  LAST  608     6276   00122 0  LVBUF    ADRES   VBUF
```

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P0214             THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

 0216   REF   1                  6277  1 6510 1  INDJUMP  TCF     VLDAD           00 - LOAD MPAC WITH A VECTOR.
 0217   REF   1                  6300  1 7074 1           TCF     TAD             01 - TRIPLE PRECISION ADD TO MPAC.
 0218   REF   1                  6301  1 7660 1           TCF     SIGN            02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
 0219   REF   1                  6302  1 7404 1           TCF     VXSC            03 - VECTOR TIMES SCALAR.
 0220   REF   1                  6303  1 6706 1           TCF     CGOTO           04 - COMPUTED GO TO.
 0221   REF   2  LAST   359      6304  1 6473 0           TCF     TLOAD           05 - LOAD MPAC WITH TRIPLE PRECISION.
 0222   REF   1                  6305  1 6055 0           TCF     DLOAD           06 - LOAD MPAC WITH A DP SCALAR.
 0223   REF   1                  6306  1 7627 1           TCF     V/SC            07 - VECTOR DIVIDED BY SCALAR.

 0224   REF   1                  6307  1 6504 1           TCF     SLOAD           10 - LOAD MPAC IN SINGLE PRECISION.
 0225   REF   1                  6310  1 6623 1           TCF     SSP             11 - SET SINGLE PRECISION INTO X.
 0226   REF   1                  6311  1 6526 1           TCF     PDDL            12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
 0227   REF   1                  6312  1 7337 0           TCF     MXV             13 - MATRIX POST-MULTIPLIED BY VECTOR.
 0228   REF   1                  6313  1 6562 1           TCF     PDVL            14 - PUSH DOWN AND VECTOR LOAD.
 0229   REF   1                  6314  1 6631 1           TCF     CCALL           15 - COMPUTED CALL.
 0230   REF   1                  6315  1 7342 1           TCF     VXM             16 - MATRIX PRE-MULTIPLIED BY VECTOR.
 0231   REF   1                  6316  1 7621 1           TCF     TSLC            17 - NORMALIZE MPAC (SCALAR ONLY).

 0232   REF   1                  6317  1 7577 1           TCF     DMPR            20 - DP MULTIPLY AND ROUND.
 0233   REF   1                  6320  1 7602 0           TCF     DDV             21 - DP DIVIDE BY.
 0234   REF   1                  6321  1 7606 1           TCF     BDDV            22 - DP DIVIDE INTO.
 0235   REF   1                  6322  1 7624 1           TCF     GSHIFT          23 - GENERAL SHIFT INSTRUCTION.
 0236   REF   1                  6323  1 6754 0           TCF     VAD             24 - VECTOR ADD.
 0237   REF   1                  6324  1 6752 0           TCF     VSU             25 - VECTOR SUBTRACT.
 0238   REF   1                  6325  1 7041 1           TCF     BVSU            26 - VECTOR SUBTRACT FROM.
 0239   REF   1                  6326  1 7334 0           TCF     DOT             27 - VECTOR DOT PRODUCT.

 0240   REF   1                  6327  1 7463 0           TCF     VXV             30 - VECTOR CROSS PRODUCT.
 0241   REF   1                  6330  1 7430 0           TCF     VPROJ           31 - VECTOR PROJECTION.
 0242   REF   1                  6331  1 7010 0           TCF     DSU             32 - DP SUBTRACT.
 0243   REF   1                  6332  1 7065 1           TCF     BDSU            33 - DP SUBTRACT FROM.
 0244   REF   1                  6333  1 7000 1           TCF     DAD             34 - DP ADD.
 0245                            6334  1 6334 1           TCF                     35 - AVAILABLE
 0246   REF   1                  6335  1 7575 0           TCF     DMP1            36 - DP MULTIPLY.
 0247   REF   1                  6336  1 7616 0           TCF     SETPD           37 - SET PUSH DOWN POINTER (DIRECT ONLY)

R0248   CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.
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P0250            THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

 0252    REF    1                    6337  1 2345 0  MISCJUMP TCF     AXT               00 - ADDRESS TO INDEX TRUE.
 0253    REF    1                    6340  1 2352 0           TCF     AXC               01 - ADDRESS TO INDEX COMPLEMENTED.
 0254    REF    1                    6341  1 2355 1           TCF     LXA               02 - LOAD INDEX FROM ERASABLE.
 0255    REF    1                    6342  1 2361 0           TCF     LXC               03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
 0256    REF    1                    6343  1 2365 1           TCF     SXA               04 - STORE INDEX IN ERASABLE.
 0257    REF    1                    6344  1 2373 0           TCF     XCHX              05 - EXCHANGE INDEX WITH ERASABLE.
 0258    REF    1                    6345  1 2407 1           TCF     INCR              06 - INCREMENT INDEX REGISTER.
 0259    REF    1                    6346  1 2416 1           TCF     TIX               07 - TRANSFER ON INDEX.

 0260    REF    1                    6347  1 2401 1           TCF     XAD               10 - INDEX REGISTER ADD FROM ERASABLE.
 0261    REF    1                    6350  1 2412 0           TCF     XSU               11 - INDEX SUBTRACT FROM ERASABLE.
 0262    REF    1                    6351  1 2470 1           TCF     BZE/GOTO          12 - BRANCH ZERO AND GOTO.
 0263    REF    1                    6352  1 2475 1           TCF     BPL/BMN           13 - BRANCH PLUS AND BRANCH MINUS.
 0264    REF    1                    6353  1 2450 0           TCF     RTB/BHIZ          14 - RETURN TO BASIC AND BRANCH HI ZERO.
 0265    REF    1                    6354  1 2510 0           TCF     CALL/ITA          15 - CALL AND STORE QPRET.
 0266    REF    1                    6355  1 2517 1           TCF     SW/               16 - SWITCH INSTRUCTIONS AND AVAILABLE.
 0267    REF    1                    6356  1 2460 0           TCF     BOV(B)            17 - BRANCH ON OVERFLOW TO BASIC OR INT.
```

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P0268               THE FOLLOWING JUMP TABLE APPIES TO UNARY INSTRUCTIONS.

 0269    REF    2 LAST   996 TO 1007:    205    205*         COUNT* $$/INTER
 0270                           00,2000                       BANK    0                 00 - EXIT - DETECTED EARLIER.
 0271    REF    1               00,2000  1 3207 0  UNAJUMP    TCF     SQRT              01 - SQUARE ROOT.
 0272    REF    1               00,2001  1 3530 0             TCF     SINE              02 - SIN.
 0273    REF    1               00,2002  1 3517 0             TCF     COSINE            03 - COS.
 0274    REF    1               00,2003  1 3610 1             TCF     ARCSIN            04 - ARC SIN.
 0275    REF    1               00,2004  1 3612 0             TCF     ARCCOS            05 - ARC COS.
 0276    REF    1               00,2005  1 3174 1             TCF     DSQ               06 - DP SQUARE.
 0277    REF    1               00,2006  1 2116 1             TCF     ROUND             07 - ROUND TO DP.

 0278    REF    1               00,2007  1 7673 0             TCF     COMP              10 - COMPLEMENT VECTOR OR SCALAR.
 0279    REF    1               00,2010  1 3232 0             TCF     VDEF              11 - VECTOR DEFINE.
 0280    REF    2   LAST   606  00,2011  1 3023 1             TCF     UNIT              12 - UNIT VECTOR.
 0281    REF    1               00,2012  1 3176 0             TCF     ABVALABS          13 - LENGTH OF VECTOR OR MAG OF SCALAR.
 0282    REF    1               00,2013  1 3245 0             TCF     VSQ               14 - SQUARE OF LENGTH OF VECTOR.
 0283    REF    1               00,2014  1 6357 1             TCF     STADR             15 - PUSH UP ON STORE CODE.
 0284    REF    1               00,2015  1 3274 1             TCF     RVQ               16 - RETURN VIA QPRET.
 0285    REF    1               00,2016  1 3247 1             TCF     PUSH              17 - PUSH MPAC DOWN.
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P0286    SECTION 2  LOAD AND STORE PACKAGE.

R0287              A SET OF EIGHT STORE CODES IS PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0289    ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0291    STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0293    FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0295              1. STORE                  STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0297              2. STODL                  STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (THE LOAD MAY BE INDEXED).
R0299              3. STOVL                  STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0301              4. STCALL                 STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0303              STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.


 0305                               6357                           BLOCK   3

 0306    REF    3 LAST 1007 TO 1008:    15   220*                  COUNT*  $$/INTER
 0307    REF    4  LAST   997       6357  3 0165 0  STADR      CA      BANKSET              THE STADR CODE (PUSHUP UP ON STORE
 0308    REF   16  LAST 1004        6360  54 004 1             TS      FBANK                ADDRESS) ENTERS HERE.
 0309    REF   16  LAST 1003        6361  24 164 1             INCR    LOC
 0310    REF   17  LAST 1008        6362  50 164 1  ITR1       INDEX   LOC                  THE STORECODE WAS STORED COMPLEMENTED TO
 0311                               6363  4 0000 0             CS      0                    MAKE IT LOOK LIKE AN OPCODE PAIR.
 0312    REF    6  LAST   988       6364  6 7752 0             AD      NEGONE               (YUL CANT REMOVE 1 BECAUSE OF EARLY CCS)

 0313    REF   17  LAST 1002        6365  54 116 0  DOSTORE    TS      ADDRWD
 0314    REF    7  LAST   465       6366  7 4356 1             MASK    LOW11                ENTRY FROM DISPATCHER. SAVE THE ERASABLE
 0315    REF   18  LAST 1008        6367  56 116 1             XCH     ADDRWD               ADDRESS AND JUMP ON THE STORE CODE NO.
 0316    REF    1                   6370  7 7725 1             MASK    B12T14
 0317                               6371  0 0006 1             EXTEND
 0318    REF   37  LAST   816       6372  7 4747 0             MP      BIT5                 EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
 0319    REF  322  LAST 1004        6373  50 000 1  ITR3       INDEX   A
 0320    REF    1                   6374  1 6375 1             TCF     STORJUMP
```

```
P0321              STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0323      A SUPPLIED OPERATION CODE.

R03231             STORE STORE,1 AND STORE,2 RETURN TO DANZIG, THUS RESETTING THE EBANK TO ITS STATE AT INTPRET.

 0324     REF   1                 6375  0 6425 1  STORJUMP TC       STORE           STORE.
 0325     REF   2  LAST  943      6376  1 6064 1           TCF      DANZIG          PICK UP NEW OP CODE(S).
 0326     REF   1                 6377  0 6417 0           TC       STORE,1
 0327     REF   3  LAST 1009      6400  1 6064 1           TCF      DANZIG
 0328     REF   1                 6401  0 6422 0           TC       STORE,2
 0329     REF   4  LAST 1009      6402  1 6064 1           TCF      DANZIG

 0330     REF   2  LAST 1009      6403  0 6425 1           TC       STORE           STODL.
 0331     REF   1                 6404  1 6463 1           TCF      DODLOAD

 0332     REF   3  LAST 1009      6405  0 6425 1           TC       STORE           STODL WITH INDEXED LOAD ADDRESS.
 0333     REF   1                 6406  1 6147 1           TCF      DODLOAD*

 0334     REF   4  LAST 1009      6407  0 6425 1           TC       STORE           STOVL.
 0335     REF   1                 6410  1 6466 1           TCF      DOVLOAD

 0336     REF   5  LAST 1009      6411  0 6425 1           TC       STORE           STOVL WITH INDEXED LOAD ADDRESS.
 0337     REF   1                 6412  1 6471 1           TCF      DOVLOAD*
 0338     REF   6  LAST 1009      6413  0 6425 1           TC       STORE           STCTC.
 0339     REF   2  LAST  281      6414  3 4766 1           CAF      CALLCODE
 0340     REF  22  LAST 1004      6415  54 020 1           TS       CYR
 0341     REF   1                 6416  1 6255 1           TCF      15BITADR        GET A 15 BIT ADDRESS.
```

```
P0342                  STORE CODE ADDRESS PROCESSOR.

 0343    REF  41  LAST 1000       6417  50 120 1  STORE,1  INDEX   FIXLOC
 0344    REF  28  LAST 1000       6420  4 0046 1           CS      X1
 0345    REF   1                  6421  1 6424 1           TCF     PRESTORE

 0346    REF  42  LAST 1010       6422  50 120 1  STORE,2  INDEX   FIXLOC
 0347    REF  18  LAST  980       6423  4 0047 0           CS      X2
 0348    REF  19  LAST 1008       6424  26 116 0  PRESTORE ADS     ADDRWD           RESULTANT ADDRESS IS IN ERASABLE.

 0349    REF  20  LAST 1010       6425  4 0116 0  STORE    CS      ADDRWD
 0350    REF   1                  6426  6 4772 1           AD      DEC45
 0351    REF 323  LAST 1008       6427  10 000 0           CCS     A                DOES THE ADDRESS POINT TO THE WORK AREA?
 0352    REF  43  LAST 1010       6430  3 0120 1           CA      FIXLOC           YES.
 0353    REF   1                  6431  1 6436 1           TCF     AHEAD5
 0354    REF   5  LAST 1000       6432  3 5007 0           CA      OCT1400          NO.  SET EBANK & MAKE UP SUBADDRESS.
 0355    REF  21  LAST 1010       6433  56 116 1           XCH     ADDRWD
 0356    REF  62  LAST 1000       6434  54 003 0           TS      EBANK
 0357    REF  12  LAST 1000       6435  7 4357 0           MASK    LOW8
 0358    REF  22  LAST 1010       6436  26 116 0  AHEAD5   ADS     ADDRWD
```

```
P0359                 STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0360                                    6437  0 0006 1  STARTSTO EXTEND                        MPAC,+1 MUST BE STORED IN ANY EVENT.
R0361                 ITRACE (5) REFERS TO "STARTSTO".
 0362   REF 376  LAST  997               6440  3 0155 0           DCA     MPAC
 0363   REF  23  LAST 1010               6441  50 116 1           INDEX   ADDRWD
 0364                                    6442  52 001 1           DXCH    0

 0365   REF  19  LAST 1004               6443  10 163 1           CCS     MODE
 0366   REF   1                          6444  1 6457 0           TCF     TSTORE
 0367   REF 252  LAST  995               6445  0 0002 0           TC      Q

 0368                                    6446  0 0006 1  VSTORE   EXTEND
 0369   REF 377  LAST 1011               6447  3 0160 0           DCA     MPAC +3
 0370   REF  24  LAST 1011               6450  50 116 1           INDEX   ADDRWD
 0371                                    6451  52 003 0           DXCH    2

 0372                                    6452  0 0006 1           EXTEND
 0373   REF 378  LAST 1011               6453  3 0162 1           DCA     MPAC +5
 0374   REF  25  LAST 1011               6454  50 116 1           INDEX   ADDRWD
 0375                                    6455  52 005 0           DXCH    4
 0376   REF 253  LAST 1011               6456  0 0002 0           TC      Q

 0377   REF 379  LAST 1011               6457  3 0156 0  TSTORE   CA      MPAC +2
 0378   REF  26  LAST 1011               6460  50 116 1           INDEX   ADDRWD
 0379                                    6461  54 002 1           TS      2
 0380   REF 254  LAST 1011               6462  0 0002 0           TC      Q
```

```
L       INTERPRETER                                                                              USER'S PAGE NO.  17      EQ $3

P0381              ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE
R0383   ITSELF.

 0384   REF   1                     6463  3 7735 1  DODLOAD   CAF    DLOADCOD
 0385   REF  23  LAST 1009          6464 54 020  1            TS     CYR
 0386   REF   1                     6465  1 6111 1            TCF    DIRADRES          GO GET A DIRECT ADDRESS.

 0387   REF   1                     6466  3 4735 1  DOVLOAD   CAF    VLOADCOD
 0388   REF  24  LAST 1012          6467 54 020  1            TS     CYR
 0389   REF   2  LAST 1012          6470  1 6111 1            TCF    DIRADRES

 0390   REF   1                     6471  3 6112 0  DOVLOAD*  CAF    VLOAD*
 0391   REF   2  LAST 1009          6472  1 6150 1            TCF    DODLOAD* +1       PROLOGUE TO INDEX ROUTINE.
```

```
P0392             THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

 0394   REF  27  LAST 1011     6473  50 116 1  TLOAD     INDEX   ADDRWD
 0395                          6474  3 0002 0            CA      2                LOAD A TRIPLE PRECISION ARGUMENT INTO
 0396   REF 380  LAST 1011     6475  54 156 1            TS      MPAC +2          THE FIRST THREE MPAC REGISTERS, WITH THE
 0397                          6476  0 0006 1            EXTEND                   CONTENTS OF THE OTHER FOUR IRRELEVANT.
 0398   REF  28  LAST 1013     6477  5 0116 1            INDEX   ADDRWD
 0399                          6500  3 0001 0            DCA     0
 0400   REF 381  LAST 1013     6501  52 155 1            DXCH    MPAC
 0401   REF 105  LAST  919     6502  3 4753 1  TMODE     CAF     ONE
 0402   REF   1                6503  1 6063 0            TCF     NEWMODE          DECLARE TRIPLE PRECISION MODE.

 0403                          6504  22 007 0  SLOAD     ZL                       LOAD A SINGLE PRECISION NUMBER INTO
 0404   REF  29  LAST 1013     6505  50 116 1            INDEX   ADDRWD           MPAC, SETTING MPAC+1,2 TO ZERO. THE
 0405                          6506  3 0000 1            CA      0                CONTENTS OF THE REMAINING MPAC REGISTERS
 0406   REF   1                6507  1 6060 0            TCF     SLOAD2           ARE IRRELEVANT.

 0407                          6510  0 0006 1  VLOAD     EXTEND                   LOAD A DOUBLE PRECISION VECTOR INTO
 0408   REF  30  LAST 1013     6511  5 0116 1            INDEX   ADDRWD           MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
 0409                          6512  3 0001 0            DCA     0                CONTENTS OF MPAC +2 ARE IRRELEVANT.
 0410   REF 382  LAST 1013     6513  52 155 1            DXCH    MPAC

 0411                          6514  0 0006 1  ENDVLOAD  EXTEND                   PDVL COMES HERE TO FINISH UP FOR DP, TP.
 0412   REF  31  LAST 1013     6515  5 0116 1            INDEX   ADDRWD
 0413                          6516  3 0003 1            DCA     2
 0414   REF 383  LAST 1013     6517  52 160 1            DXCH    MPAC +3

 0415                          6520  0 0006 1   +4       EXTEND                   TPDVL FINISHES HERE.
 0416   REF  32  LAST 1013     6521  5 0116 1            INDEX   ADDRWD
 0417                          6522  3 0005 1            DCA     4
 0418   REF 384  LAST 1013     6523  52 162 0            DXCH    MPAC +5

 0419   REF 106  LAST 1013     6524  4 4753 0  VMODE     CS      ONE              DECLARE VECTOR MODE.
 0420   REF   2  LAST 1013     6525  1 6063 0            TCF     NEWMODE
```

```
P0421              THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0423              1.  PUSH                 PUSHDOWN AND NO LOAD.
R0424              2.  PDDL                 PUSHDOWN AND DOUBLE PRECISION LOAD.
R0425              3.  PDVL                 PUSHDOWN AND VECTOR LOAD.

0426                              6526   0 0006 1  PDDL      EXTEND
0427    REF   33  LAST 1013       6527   5 0116 1            INDEX    ADDRWD              LOAD MPAC,+1, PUSHING THE FORMER
0428                              6530   3 0001 0            DCA      0                   CONTENTS DOWN.
0429    REF  385  LAST 1013       6531   52 155 1            DXCH     MPAC
0430    REF   12  LAST 1002       6532   50 166 0            INDEX    PUSHLOC
0431                              6533   52 001 1            DXCH     0

0432    REF   20  LAST 1011       6534   50 163 0            INDEX    MODE                ADVANCE THE PUSHDOWN POINTER APPRO-
0433    REF    3  LAST 1002       6535   3 6247 0            CAF      NO.WDS              PRIATELY.
0434    REF   13  LAST 1014       6536   26 166 1            ADS      PUSHLOC

0435    REF   21  LAST 1014       6537   10 163 1            CCS      MODE
0436    REF    1                  6540   1 6555 0            TCF      ENDTPUSH
0437    REF    1                  6541   1 6553 0            TCF      ENDDPUSH

0438    REF   22  LAST 1014       6542   54 163 1            TS       MODE                NOW DP.
0439    REF  386  LAST 1014       6543   54 156 1  ENDVPUSH  TS       MPAC +2
0440    REF  387  LAST 1014       6544   52 160 1            DXCH     MPAC +3             PUSH DOWN THE REST OF THE VECTOR HERE.
0441    REF   14  LAST 1014       6545   50 166 0            INDEX    PUSHLOC
0442                              6546   51'775 0            DXCH     0 -4

0443    REF  388  LAST 1014       6547   52 162 0            DXCH     MPAC +5
0444    REF   15  LAST 1014       6550   50 166 0            INDEX    PUSHLOC
0445                              6551   51'777 1            DXCH     0 -2

0446    REF    5  LAST 1009       6552   1 6064 1            TCF      DANZIG

0447    REF  389  LAST 1014       6553   54 156 1  ENDDPUSH  TS       MPAC +2             SET MPAC +2 TO ZERO AND EXIT ON DP.
0448    REF    6  LAST 1014       6554   1 6064 1            TCF      DANZIG

0449    REF   23  LAST 1014       6555   54 163 1  ENDTPUSH  TS       MODE
0450    REF  390  LAST 1014       6556   56 156 0            XCH      MPAC +2             ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
0451    REF   16  LAST 1014       6557   50 166 0   +2       INDEX    PUSHLOC             DOWN THE OLD CONTENTS
0452                              6560   53'777 0            TS       0 -1
0453    REF    7  LAST 1014       6561   1 6064 1            TCF      DANZIG
```

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L         INTERPRETER                                                                           USER'S PAGE NO.  20        E0 S3

P0454                PDVL - PUSHDOWN AND VECTOR LOAD.

 0455                                6562  0 0006 1   PDVL      EXTEND                   RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
 0456     REF  34   LAST 1014        6563  5 0116 1             INDEX   ADDRWD
 0457                                6564  3 0001 0             DCA     0
 0458     REF 391   LAST 1014        6565  52 155 1             DXCH    MPAC
 0459     REF  17   LAST 1014        6566  50 166 0             INDEX   PUSHLOC
 0460                                6567  52 001 1             DXCH    0

 0461     REF  24   LAST 1014        6570  50 163 0             INDEX   MODE             ADVANCE THE PUSHDOWN POINTER.
 0462     REF   4   LAST 1014        6571  3 6247 0             CAF     NO.WDS
 0463     REF  18   LAST 1015        6572  26 166 1             ADS     PUSHLOC

 0464     REF  25   LAST 1015        6573  10 163 1             CCS     MODE             TEST PAST MODE.
 0465     REF   1                    6574  1 6613 1             TCF     TPDVL
 0466     REF   1                    6575  1 6514 0             TCF     ENDVLOAD         JUST LOAD LAST FOUR REGISTERS ON DP.

 0467                                6576  0 0006 1   VPDVL     EXTEND                   PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
 0468     REF  35   LAST 1015        6577  5 0116 1             INDEX   ADDRWD
 0469                                6600  3 0003 1             DCA     2
 0470     REF 392   LAST 1015        6601  52 160 1             DXCH    MPAC +3
 0471     REF  19   LAST 1015        6602  50 166 0             INDEX   PUSHLOC
 0472                                6603  51'775 0             DXCH    0 -4

 0473                                6604  0 0006 1             EXTEND
 0474     REF  36   LAST 1015        6605  5 0116 1             INDEX   ADDRWD
 0475                                6606  3 0005 1             DCA     4
 0476     REF 393   LAST 1015        6607  52 162 0             DXCH    MPAC +5
 0477     REF  20   LAST 1015        6610  50 166 0             INDEX   PUSHLOC
 0478                                6611  51'777 1             DXCH    0 -2

 0479     REF   8   LAST 1014        6612  1 6064 1             TCF     DANZIG

 0480                                6613  0 0006 1   TPDVL     EXTEND                   ON TP, WE MUST LOAD THE Y COMPONENT
 0481     REF  37   LAST 1015        6614  5 0116 1             INDEX   ADDRWD           BEFORE STORING MPAC +2 INCASE THIS IS A
 0482                                6615  3 0003 1             DCA     2                PUSHUP.
 0483     REF 394   LAST 1015        6616  52 160 1             DXCH    MPAC +3

 0484     REF 395   LAST 1015        6617  3 0156 0             CA      MPAC +2
 0485     REF  21   LAST 1015        6620  50 166 0             INDEX   PUSHLOC          IN DP.
 0486                                6621  53'777 0             TS      0 -1
 0487     REF   2   LAST 1015        6622  1 6520 1             TCF     ENDVLOAD +4

R0488                SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

 0489     REF  18   LAST 1008        6623  24 164 1   SSP       INCR    LOC              PICK UP THE WORD FOLLOWING THE GIVEN
 0490     REF  19   LAST 1015        6624  50 164 1             INDEX   LOC              ADDRESS AND STORE IT AT X.
 0491                                6625  3 0000 1             CA      0
 0492     REF  38   LAST 1015        6626  50 116 1   STORE1    INDEX   ADDRWD           SOME INDEX AND MISCELLANEOUS OPS END
 0493                                6627  54 000 0             TS      0                HERE.
 0494   REF   9  LAST 1015       6630  1 6064 1          TCF     DANZIG
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P0495   SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0496               THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0498               1.  GOTO                GO TO.
R0499               2.  CALL                CALL SUBROUTINE SETTING QPRET.
R0500               3.  CGOTO               COMPUTED GO TO.
R0501               4.  CCALL               COMPUTED CALL.
R0502               7.  BPL                 BRANCH IF MPAC POSITIVE OR ZERO.
R0503               8.  BZE                 BRANCH IF MPAC ZERO.
R0504               9.  BMN                 BRANCH IF MPAC NEGATIVE NON-ZERO.

 0505   REF  20  LAST 1015      6631  24 164 1  CCALL    INCR    LOC              MAINTAIN LOC FOR QPRET COMPUTATION.
 0506   REF  21  LAST 1017      6632  50 164 1           INDEX   LOC
 0507                           6633  3 0000 1           CAF     0                GET BASE ADDRESS OF CADR LIST.
 0508   REF  39  LAST 1015      6634  50 116 1           INDEX   ADDRWD
 0509                           6635  6 0000 1           AD      0                ADD INCREMENT.
 0510   REF  17  LAST 1008      6636  54 004 1           TS      FBANK            SELECT DESIRED CADR.
 0511   REF  17  LAST 1000      6637  7 5012 0           MASK    LOW10
 0512   REF 324  LAST 1010      6640  50 000 1           INDEX   A
 0513                           6641  3 2000 0           CAF     10000
 0514   REF   7  LAST 1003      6642  54 117 1           TS      POLISH

 0515   REF   5  LAST 1008      6643  3 0165 0  CALL     CA      BANKSET          FOR ANY OF THE CALL OPTIONS, MAKE UP THE
 0516   REF   2  LAST 1004      6644  7 4350 1           MASK    BANKMASK         ADDRESS OF THE NEXT OP-CODE PAIR/STORE
 0517   REF   3  LAST 1017      6645  6 4350 0           AD      BANKMASK         CODE AND LEAVE IT IN QPRET.  NOTE THAT
 0518   REF  22  LAST 1017      6646  6 0164 1           AD      LOC              BANKMASK = -(2000 - 1).
 0519   REF  44  LAST 1010      6647  50 120 1           INDEX   FIXLOC
 0520   REF   8  LAST  934      6650  54 052 1           TS      QPRET

 0521   REF   8  LAST 1017      6651  3 0117 0  GOTO     CA      POLISH           BASIC BRANCHING SEQUENCE.
 0522   REF   3  LAST 1000      6652  7 7745 1   +1      MASK    HIGH4
 0523                           6653  0 0006 1           EXTEND
 0524   REF   1                 6654  1 6665 0           BZF     GOTOERS          SEE IF ADDRESS POINTS TO FIXED OR ERAS.
 0525   REF   6  LAST 1017      6655  3 0165 0   +4      CA      BANKSET          SET EBANK PART OF BBANK. NEXT, SET UP
 0526   REF  28  LAST  997      6656  54 006 0           TS      BBANK            FBANK. THE COMBINATION IS PICKED UP &
 0527   REF   9  LAST 1017      6657  3 0117 0           CA      POLISH           PUT INTO BANKSET AT INTPRET +2.
 0528   REF  18  LAST 1017      6660  54 004 1           TS      FBANK
 0529   REF  18  LAST 1017      6661  7 5012 0           MASK    LOW10
 0530   REF   2  LAST 1000      6662  6 4741 1           AD      2K
 0531   REF  23  LAST 1017      6663  54 164 0           TS      LOC
 0532   REF 218  LAST  996      6664  1 6045 1           TCF     INTPRET +3

 0533                       E3,1400                      EBANK=  1400             SO YUL DOESN'T CUSS THE "CA 1400" BELOW.

 0534   REF  10  LAST 1017      6665  3 0117 0  GOTOERS  CA      POLISH           THE GIVEN ADDRESS IS IN ERASABLE - SEE
 0535   REF   2  LAST  999      6666  6 6254 1           AD      -ENDVAC          IF RELATIVE TO THE WORK AREA.
 0536   REF 325  LAST 1017      6667  10 000 0           CCS     A
 0537   REF  11  LAST 1017      6670  3 0117 0           CA      POLISH           GENERAL ERASABLE.
 0538   REF   1                 6671  1 6700 1           TCF     GOTOGE
```

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0539  REF  45  LAST 1017     6672  3 0120 1             CA      FIXLOC      WORK AREA.
0540  REF  12  LAST 1017     6673  6 0117 0             AD      POLISH
0541  REF 326  LAST 1017     6674  50 000 1             INDEX   A           USE THE GIVEN ADDRESS AS THE ADDRESS OF
0542                         6675  3 0000 1             CA      0           THE BRANCH ADDRESS.
0543  REF  13  LAST 1018     6676  54 117 1             TS      POLISH
0544  REF   1                6677  1 6652 1             TCF     GOTO +1     ALLOWS ARBITRARY INDIRECTNESS LEVELS.

0545  REF  63  LAST 1010     6700  54 003 0  GOTOGE     TS      EBANK
0546  REF  13  LAST 1010     6701  7 4357 0             MASK    LOW8
0547  REF 327  LAST 1018     6702  50 000 1             INDEX   A           USE THE GIVEN ADDRESS AS THE ADDRESS OF
0548                         6703  3 1400 1             CA      1400        THE BRANCH ADDRESS.
0549  REF  14  LAST 1018     6704  54 117 1             TS      POLISH
0550  REF   2  LAST 1018     6705  1 6652 1             TCF     GOTO +1

0551  REF  24  LAST 1017     6706  50 164 1  CGOTO      INDEX   LOC         COMPUTED GO TO. PICK UP ADDRESS OF CADR
0552                         6707  3 0001 0             CA      1           LIST.
0553  REF  40  LAST 1017     6710  50 116 1             INDEX   ADDRWD      ADD MODIFIER.
0554                         6711  6 0000 1             AD      0
0555  REF  19  LAST 1017     6712  54 004 1             TS      FBANK       SELECT GOTO ADDRESS.
0556  REF  19  LAST 1017     6713  7 5012 0             MASK    LOW10
0557  REF 328  LAST 1018     6714  50 000 1             INDEX   A
0558                         6715  3 2000 0             CA      10000
0559  REF  15  LAST 1018     6716  54 117 1             TS      POLISH
0560  REF   3  LAST 1018     6717  1 6652 1             TCF     GOTO +1     WITH ADDRESS IN A.

0561  REF   7  LAST 1017     6720  3 0165 0  SWBRANCH   CA      BANKSET     SWITCH INSTRUCTIONS WHICH ELECT TO
0562  REF  20  LAST 1018     6721  54 004 1             TS      FBANK       BRANCH COME HERE TO DO SO.
0563  REF  25  LAST 1018     6722  50 164 1             INDEX   LOC
0564                         6723  3 0001 0             CA      1
0565  REF  16  LAST 1018     6724  54 117 1             TS      POLISH
0566  REF   4  LAST 1018     6725  1 6652 1             TCF     GOTO +1
```

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P0567               TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0569               L+1  IF MPAC IS GREATER THAN ZERO.
R0570               L+2  IF MPAC IS EQUAL TO +0 OR -0.
R0571               L+3  IF MPAC IS LESS THAN ZERO.


 0572  REF 396  LAST 1015      6726  10 154 0  BRANCH    CCS     MPAC
 0573  REF 255  LAST 1011      6727  0 0002 0            TC      Q
 0574                          6730  1 6732 0            TCF     +2                 ON ZERO.
 0575  REF   1                 6731  1 6744 1            TCF     NEG

 0576  REF 397  LAST 1019      6732  10 155 1            CCS     MPAC +1
 0577  REF 256  LAST 1019      6733  0 0002 0            TC      Q
 0578                          6734  1 6736 1            TCF     +2
 0579  REF   2  LAST 1019      6735  1 6744 1            TCF     NEG

 0580  REF 398  LAST 1019      6736  10 156 1            CCS     MPAC +2
 0581  REF 257  LAST 1019      6737  0 0002 0            TC      Q
 0582                          6740  1 6742 1            TCF     +2
 0583  REF   3  LAST 1019      6741  1 6744 1            TCF     NEG

 0584  REF 258  LAST 1019      6742  50 002 0  Q+1       INDEX   Q
 0585                          6743  0 0001 0            TC      1

 0586  REF 259  LAST 1019      6744  50 002 0  NEG       INDEX   Q                  IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
 0587                          6745  0 0002 0            TC      2


 0588  REF   4  LAST 1019      6744            Q+2       =       NEG

R0589           ITRACE (3) REFERS TO "EXIT".
 0590  REF   8  LAST 1018      6746  3 0165 0  EXIT      CA      BANKSET            RESTORE USER'S BANK SETTING, AND LEAVE
 0591  REF  29  LAST 1017      6747  54 006 0            TS      BBANK              INTERPRETIVE MODE.
 0592  REF  26  LAST 1018      6750  50 164 1            INDEX   LOC
 0593                          6751  0 0001 0            TC      1
```

```
P0594   SECTION 3 - ADD/SUBTRACT PACKAGE.

R0595             THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0597   MPAC:

R0598             1.  DAD                  DOUBLE PRECISION ADD.
R0599             2.  DSU                  DOUBLE PRECISION SUBTRACT.
R0600             3.  BDSU                 DOUBLE PRECISION SUBTRACT FROM.

R0601             4.  TAD                  TRIPLE PRECISION ADD.

R0602             5.  VAD                  VECTOR ADD.
R0603             6.  VSU                  VECTOR SUBTRACT.
R0604             7.  BVSU                 VECTOR SUBTRACT FROM.

R0605   THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.


 0607   REF  37  LAST  996       6752  3 4735 1  VSU       CAF    BIT15          CHANGES 0 TO DCS.
 0608                            6753  1 6755 1            TCF    +2

 0609   REF   9  LAST  825       6754  3 4355 0  VAD       CAF    PRIO30         CHANGES 0 TO DCA.
 0610   REF  41  LAST 1018       6755  26 116 0            ADS    ADDRWD
 0611                            6756  0 0006 1            EXTEND
 0612   REF  42  LAST 1020       6757  5 0116 1            INDEX  ADDRWD
 0613   REF   2  LAST  383       6760  00 003 1            READ   HISCALAR       DCA  2   OR   DCS  2
 0614   REF 399  LAST 1019       6761  20 160 1            DAS    MPAC +3
 0615                            6762  0 0006 1            EXTEND                CHECK OVERFLOW.
 0616                            6763  1 6765 1            BZF    +2
 0617   REF   1                  6764  0 7017 0            TC     OVERFLWY

 0618                            6765  0 0006 1            EXTEND
 0619   REF  43  LAST 1020       6766  5 0116 1            INDEX  ADDRWD
 0620   REF   2  LAST  214       6767  00 005 1            READ   CHAN5          DCA  4  OR  DCS  4
 0621   REF 400  LAST 1020       6770  20 162 0            DAS    MPAC +5
 0622                            6771  0 0006 1            EXTEND
 0623                            6772  1 6774 1            BZF    +2
 0624   REF   1                  6773  0 7014 0            TC     OVERFLWZ

 0625                            6774  0 0006 1            EXTEND
 0626   REF  44  LAST 1020       6775  5 0116 1            INDEX  ADDRWD
 0627   REF  15  LAST  737       6776  00 001 0            READ   LCHAN          DCA  0  OR  DCS  0
 0628   REF   1                  6777  1 7003 1            TCF    ENDVXV

 0629                            7000  0 0006 1  DAD       EXTEND
 0630   REF  45  LAST 1020       7001  5 0116 1            INDEX  ADDRWD
 0631                            7002  3 0001 0            DCA    0
 0632   REF 401  LAST 1020       7003  20 155 1  ENDVXV    DAS    MPAC           VXV FINISHES HERE.
 0633                            7004  0 0006 1            EXTEND
 0634   REF  10  LAST 1016       7005  1 6064 1            BZF    DANZIG
 0635    REF   1                    7006   0 7022 0   SETOVF    TC        OVERFLOW
 0636    REF  11   LAST 1020        7007   1 6064 1             TCF       DANZIG
 0637                            7010  0 0006 1  DSU      EXTEND
 0638   REF  46   LAST 1020      7011  5 0116 1           INDEX   ADDRWD
 0639                            7012  4 0001 1           DCS     0
 0640   REF   2   LAST 1020      7013  1 7003 1           TCF     ENDVXV

 0641   REF 182   LAST  994      7014  54 001 1  OVERFLWZ TS      L                 ENTRY FOR THIRD COMPONENT.
 0642   REF  18   LAST  853      7015  3 4756 1           CAF     FIVE
 0643                            7016  1 7021 1           TCF     +3

 0644   REF 183   LAST 1022      7017  54 001 1  OVERFLWY TS      L                 ENTRY FOR SECOND COMPONENT.
 0645   REF  30   LAST  974      7020  3 6250 0           CAF     THREE
 0646   REF 184   LAST 1022      7021  56 001 0           XCH     L

 0647   REF 329   LAST 1018      7022  50 000 1  OVERFLOW INDEX   A                 ENTRY FOR 1ST COMP OR DP (L=0).
 0648   REF   2   LAST  918      7023  4 4734 1           CS      LIMITS            PICK UP POSMAX OR NEGMAX.
 0649   REF  82   LAST  883      7024  54 130 1           TS      BUF
 0650                            7025  0 0006 1           EXTEND
 0651   REF 330   LAST 1022      7026  24 000 1           AUG     A                 FORCE OVERFLOW.
 0652   REF 185   LAST 1022      7027  50 001 0           INDEX   L
 0653   REF 402   LAST 1020      7030  26 155 1           ADS     MPAC +1
 0654                            7031  54 007 1           TS      7
 0655   REF 186   LAST  996      7032  3 4755 1           CAF     ZERO
 0656   REF  83   LAST 1022      7033  6 0130 0           AD      BUF
 0657   REF 186   LAST 1022      7034  50 001 0           INDEX   L
 0658   REF 403   LAST 1022      7035  26 154 0           ADS     MPAC
 0659                            7036  54 007 1           TS      7
 0660   REF 260   LAST 1019      7037  0 0002 0           TC      Q                 NO OVERFLOW EXIT.
 0661   REF   1                  7040  1 7155 0           TCF     SETOVF2           SET OVFIND AND EXIT.

 0662                            7041  0 0006 1  BVSU     EXTEND
 0663   REF  47   LAST 1022      7042  5 0116 1           INDEX   ADDRWD
 0664                            7043  3 0003 1           DCA     2
 0665   REF 404   LAST 1022      7044  52 160 1           DXCH    MPAC +3
 0666                            7045  0 0006 1           EXTEND
 0667                            7046  4 0001 1           DCOM
 0668   REF 405   LAST 1022      7047  20 160 1           DAS     MPAC +3
 0669                            7050  0 0006 1           EXTEND
 0670                            7051  1 7053 1           BZF     +2
 0671   REF   2   LAST 1020      7052  0 7017 0           TC      OVERFLWY

 0672                            7053  0 0006 1           EXTEND
 0673   REF  48   LAST 1022      7054  5 0116 1           INDEX   ADDRWD
 0674                            7055  3 0005 1           DCA     4
 0675   REF 406   LAST 1022      7056  52 162 0           DXCH    MPAC +5
 0676                            7057  0 0006 1           EXTEND
 0677                            7060  4 0001 1           DCOM
 0678   REF 407   LAST 1022      7061  20 162 0           DAS     MPAC +5
 0679                            7062  0 0006 1           EXTEND
 0680                            7063  1 7065 1           BZF     +2
 0681   REF   2   LAST 1020      7064  0 7014 0           TC      OVERFLWZ
 0682                              7065  0 0006 1  8DSU      EXTEND
 0683   REF  49  LAST 1022         7066  5 0116 1            INDEX   ADDRWD
 0684                              7067  3 0001 0            DCA     0
 0685   REF 408  LAST 1022         7070 - 52 155 1           DXCH    MPAC
 0686                              7071  0 0006 1            EXTEND
 0687                              7072  4 0001 1            DCOM
 0688   REF   3  LAST 1022         7073  1 7003 1            TCF     ENDVXV
```

```
P0689                TRIPLE PRECISION ADD ROUTINE.

 0690                                   7074  0 0006 1  TAD      EXTEND
 0691   REF  50  LAST 1023              7075  5 0116 1           INDEX   ADDRWD
 0692                                   7076  3 0002 0           DCA     1
 0693   REF 409  LAST 1023              7077  20 156 1           DAS     MPAC +1         ADD MINOR PARTS FIRST.
 0694   REF  51  LAST 1024              7100  50 116 1           INDEX   ADDRWD
 0695                                   7101  6 0000 1           AD      0
 0696   REF 410  LAST 1024              7102  6 0154 1           AD      MPAC
 0697   REF 411  LAST 1024              7103  54 154 0           TS      MPAC
 0698   REF  12  LAST 1021              7104  1 6064 1           TCF     DANZIG

 0699   REF   1                         7105  1 7006 1           TCF     SETOVF          SET OVFIND IF SUCH OCCURS.
```

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P0700    ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0701              1.   DMPSUB       DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS
R0703                                IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
R0705              2.   ROUNDSUB     ROUND THE TRIPLE PRECISION CONTENTS OF MPAC TO DOUBLE PRECISION.
R0707              3.   DOTSUB       TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
R0709                                AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
R0710              4.   POLY         USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
R0712                                COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)


 0714   REF 261  LAST 1022      7106  50 002 0  DMP       INDEX   Q                 BASIC SUBROUTINE FOR USE BY PINBALL, ETC
 0715                           7107  3 0000 1            CAF     0                 ADRES OF ARGUMENT FOLLOWS  TC DMP  .
 0716   REF 262  LAST 1025      7110  24 002 0            INCR    Q
 0717   REF  52  LAST 1024      7111  54 116 0   -1       TS      ADDRWD            (PROLOGUE FOR SETTING ADDRWD.)

 0718   REF  53  LAST 1025      7112  50 116 1  DMPSUB    INDEX   ADDRWD            GET MINOR PART OF OPERAND AT C(ADDRWD).
 0719                           7113  3 0001 0            CA      1
 0720   REF 412  LAST 1024      7114  54 156 1            TS      MPAC +2           THIS WORKS FOR SQUARING MPAC AS WELL.
 0721   REF 187  LAST 1022      7115  3 4755 1            CAF     ZERO              SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
 0722   REF 413  LAST 1025      7116  56 155 0            XCH     MPAC +1           THE PARTIAL PRODUCTS WITH DAS
 0723   REF   9  LAST  993      7117  54 135 1            TS      MPTEMP            INSTRUCTIONS.
 0724                           7120  0 0006 1            EXTEND
 0725   REF 414  LAST 1025      7121  7 0156 1            MP      MPAC +2           MINOR OF MPAC  X MINOR OF C(ADDRWD).

 0726   REF 415  LAST 1025      7122  56 156 0            XCH     MPAC +2           DISCARD MINOR PART OF ABOVE RESULT AND
 0727                           7123  0 0006 1            EXTEND                    FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
 0728   REF 416  LAST 1025      7124  7 0154 0            MP      MPAC
 0729   REF 417  LAST 1025      7125  20 156 1            DAS     MPAC +1           GUARANTEED NO OVERFLOW.

 0730   REF  54  LAST 1025      7126  50 116 1            INDEX   ADDRWD            GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
 0731                           7127  3 0000 1            CA      0
 0732   REF  10  LAST 1025      7130  56 135 0            XCH     MPTEMP            SAVE AND BRING OUT MINOR OF MPAC.
 0733                           7131  0 0006 1  DMPSUB2   EXTEND
 0734   REF  11  LAST 1025      7132  7 0135 1            MP      MPTEMP            MAJOR OF C(ADDRWD) X MINOR OF MPAC.
 0735   REF 418  LAST 1025      7133  20 156 1            DAS     MPAC +1           ACCUMULATE, SETTING A TO NET OVERFLOW.

 0736   REF 419  LAST 1025      7134  56 154 1            XCH     MPAC              SETTING MPAC TO 0 OR +-1.
 0737                           7135  0 0006 1            EXTEND
 0738   REF  12  LAST 1025      7136  7 0135 1            MP      MPTEMP            MAJOR OF MPAC  X MAJOR OF C(ADDRWD).
 0739   REF 420  LAST 1025      7137  20 155 1            DAS     MPAC              GUARANTEED NO OVERFLOW.
 0740   REF 263  LAST 1025      7140  0 0002 0            TC      Q                 49 MCT = .573 MS. INCLUDING RETURN.
```

```
P0741             ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

 0743   REF 188  LAST 1025      7141  3 4755 1  ROUNDSUB CAF     ZERO             SET MPAC +2 = 0 FOR SCALARS AND CHANGE
 0744   REF  26  LAST 1015      7142 54 163 1    +1      TS      MODE             MODE TO DP.

 0745   REF 421  LAST 1025      7143 56 156 0  VROUND    XCH     MPAC +2          BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
 0746                           7144  6 0000 1           DOUBLE
 0747   REF 187  LAST 1022      7145 54 001 1            TS      L
 0748   REF 264  LAST 1025      7146  0 0002 0           TC      Q

 0749   REF 422  LAST 1026      7147  6 0155 0           AD      MPAC +1          ADD ROUNDING BIT IF MPAC +2 WAS GREATER
 0750   REF 423  LAST 1026      7150 54 155 1            TS      MPAC +1          THAN .5 IN MAGNITUDE.
 0751   REF 265  LAST 1026      7151  0 0002 0           TC      Q

 0752   REF 424  LAST 1026      7152  6 0154 1           AD      MPAC             PROPAGATE INTERFLOW.
 0753   REF 425  LAST 1026      7153 54 154 0            TS      MPAC
 0754   REF 266  LAST 1026      7154  0 0002 0           TC      Q

 0755   REF   2  LAST  808      7155 54 121 1  SETOVF2   TS      OVFIND           (RARE).
 0756   REF 267  LAST 1026      7156  0 0002 0           TC      Q
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P0757           THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
R0759    REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
R0761    6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.


 0763    REF  64  LAST  991       7157  3 4752 0  PREDOT     CAF     TWO                 PROLOGUE TO SET DOTINC TO 2.
 0764    REF   4  LAST   97       7160  54 136 1             TS      DOTINC

 0765                             7161  0 0006 1  DOTSUB     EXTEND
 0766    REF   5  LAST   97       7162  22 137 1             QXCH    DOTRET              SAVE RETURN.
 0767    REF   1                  7163  0 7112 1             TC      DMPSUB              DOT X COMPONENTS.
 0768    REF 426  LAST 1026       7164  52 160 1             DXCH    MPAC +3             POSITION Y COMPONENT OF MPAC FOR
 0769    REF 427  LAST 1027       7165  52 155 1             DXCH    MPAC                MULTIPLICATION WHILE SAVING RESULT IN
 0770    REF  84  LAST 1022       7166  52 131 0             DXCH    BUF                 THREE WORD BUFFER, BUF.
 0771    REF 428  LAST 1027       7167  3 0156 0             CA      MPAC +2
 0772    REF  85  LAST 1027       7170  54 132 0             TS      BUF +2

 0773    REF   5  LAST 1027       7171  3 0136 0             CA      DOTINC              ADVANCE ADDRWD TO Y COMPONENT OF
 0774    REF  55  LAST 1025       7172  26 116 0             ADS     ADDRWD              OTHER ARGUMENT.
 0775    REF   2  LAST 1027       7173  0 7112 1             TC      DMPSUB
 0776    REF 429  LAST 1027       7174  52 156 1             DXCH    MPAC +1             ACCUMULATE PARTIAL PRODUCTS.
 0777    REF  86  LAST 1027       7175  20 132 0             DAS     BUF +1
 0778    REF 430  LAST 1027       7176  6 0154 1             AD      MPAC
 0779    REF  87  LAST 1027       7177  6 0130 0             AD      BUF
 0780    REF  88  LAST 1027       7200  54 130 1             TS      BUF
 0781                             7201  1 7203 0             TCF     +2
 0782    REF   3  LAST 1026       7202  54 121 1             TS      OVFIND              IF OVERFLOW OCCURS.

 0783    REF 431  LAST 1027       7203  52 162 0             DXCH    MPAC +5             MULTIPLY Z COMPONENTS.
 0784    REF 432  LAST 1027       7204  52 155 1             DXCH    MPAC
 0785    REF   6  LAST 1027       7205  3 0136 0             CA      DOTINC
 0786    REF  56  LAST 1027       7206  26 116 0             ADS     ADDRWD
 0787    REF   3  LAST 1027       7207  0 7112 1             TC      DMPSUB
 0788    REF  89  LAST 1027       7210  52 132 0  ENDDOT     DXCH    BUF +1              LEAVE FINAL ACCUMULATION IN MPAC.
 0789    REF 433  LAST 1027       7211  20 156 1             DAS     MPAC +1
 0790    REF 434  LAST 1027       7212  6 0154 1             AD      MPAC
 0791    REF  90  LAST 1027       7213  6 0130 0             AD      BUF
 0792    REF 435  LAST 1027       7214  54 154 0             TS      MPAC
 0793    REF   6  LAST 1027       7215  0 0137 1             TC      DOTRET

 0794    REF   2  LAST 1021       7216  0 7022 0             TC      OVERFLOW            ON OVERFLOW HERE.
 0795    REF   7  LAST 1027       7217  0 0137 1             TC      DOTRET
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P0796     DOUBLE PRECISION POLYNOMIAL EVALUATOR

R0797                                           N           N-1
R0798                 THIS ROUTINE EVALUATES A X   +  A    X     + ...   + A  X  + A  LEAVING THE DP RESULT IN MPAC ON EXIT.
R0800                                         N        N-1                  1       0

R0801     THE ROUTINE HAS TWO ENTRIES

R0802                 1. ENTRY THRU POWRSERS. THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE, THE CALL IS BY
R0804                    TC POWRSERS, AND THE RETURN IS TO LOC(TC POWRSERS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

A0806                                                        A           SP       LOC-3               ADDRESS FOR REFERENCING COEF TABLE
A0807                                                        L           SP       N-1                 N IS THE DEGREE OF THE POWER SERIES
A0808                                                        MPAC        DP       X                   ARGUMENT

A0809                                                        LOC-2N      DP       A(0)
A0810                                                                    ...
A0811                                                        LOC         DP       A(N)

R0812                 2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

A0814                                                        MPAC        DP       X                   ARGUMENT

A0815                                                        LOC         TC       POLY
A0816                                                        LOC+1       SP       N-1
A0817                                                        LOC+2       DP       A(0)
A0818                                                                    ...
A0819                                                        LOC+2N+2    DP       A(N)                RETURN IS TO LOC+2N+4

 0820                                    7220   0 0006 1     POWRSERS    EXTEND
 0821     REF   1                        7221   22 141 0                 QXCH     POLYRET             RETURN ADDRESS
 0822     REF  17     LAST 1018          7222   54 117 1                 TS       POLISH              POWER SERIES ADDRESS
 0823     REF   1                        7223   22 140 1                 LXCH     POLYCNT             N-1 TO COUNTER
 0824     REF   1                        7224   1 7235 0                 TCF      POLYCOM             SKIP SET UP BY POLY

 0825     REF 268     LAST 1026          7225   50 002 0     POLY        INDEX    Q
 0826                                    7226   3 0000 1                 CAF      0
 0827     REF   2     LAST 1028          7227   54 140 0                 TS       POLYCNT             N-1 TO COUNTER
 0828                                    7230   6 0000 1                 DOUBLE
 0829     REF 269     LAST 1028          7231   6 0002 0                 AD       Q
 0830     REF  18     LAST 1028          7232   54 117 1                 TS       POLISH              L(A(N))-3 TO POLISH
 0831     REF  19     LAST 1022          7233   6 4756 1                 AD       FIVE
 0832     REF   2     LAST 1028          7234   54 141 1                 TS       POLYRET             STORE RETURN ADDRESS

 0833     REF   1                        7235   3 6276 1     POLYCOM     CAF      LVBUF               INCOMING X WILL BE MOVED TO VBUF, SO
 0834     REF  57     LAST 1027          7236   54 116 0                 TS       ADDRWD              SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0835                                    7237   0 0006 1                 EXTEND
 0836     REF  19     LAST 1028          7240   5 0117 0                 INDEX    POLISH
 0837                                    7241   3 0004 0                 DCA      3
 0838   REF 436  LAST 1027     7242  52 155 1             DXCH   MPAC         LOAD A(N) INTO MPAC,
 0839   REF  35  LAST 1004     7243  52 123 0             DXCH   VBUF         SAVING X IN VBUF
 0840   REF   1                7244  1 7250 0             TCF    POLY2

 0841   REF   3  LAST 1028     7245  54 140 0   POLYLOOP  TS     POLYCNT      SAVE DECREMENTED LOOP COUNTER
 0842   REF  65  LAST 1027     7246  4 4752 1             CS     TWO
 0843   REF  20  LAST 1028     7247  26 117 1             ADS    POLISH       REGRESS COEFFICIENT POINTER

 0844   REF   4  LAST 1027     7250  0 7112 1   POLY2     TC     DMPSUB       MULTIPLY BY X
 0845                          7251  0 0006 1             EXTEND
 0846   REF  21  LAST 1029     7252  5 0117 0             INDEX  POLISH
 0847                          7253  3 0002 0             DCA    1            ADD IN NEXT COEFFICIENT
 0848   REF 437  LAST 1029     7254  20 155 1             DAS    MPAC         USERS RESPONSIBILITY TO ASSURE NO OVFLOW

 0849   REF   4  LAST 1029     7255  10 140 0             CCS    POLYCNT
 0850   REF   1                7256  1 7245 1             TCF    POLYLOOP
 0851   REF   3  LAST 1028     7257  0 0141 0             TC     POLYRET      RETURN CALLER
```

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P0852                MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

 085398 REF 189  LAST 1026      7260  3 4755 1  DPAGREE   CAF     ZERO                  DOUBLE PRECISION ENTRY -
 085399 REF 438  LAST 1029      7261  54 156 1            TS      MPAC +2               ZERO LOW-ORDER WORD

 0854   REF 270  LAST 1028      7262  22 002 0  TPAGREE   LXCH    Q                     FORCE SIGN AGREEMENT AMONG THE TRIPLE
 0855   REF   3  LAST  880      7263  0 6726 1            TC      BRANCH                PRECISION CONTENTS OF MPAC.  RETURNING
 0856   REF   1                 7264  1 7270 1            TCF     ARG+                  WITH SIGNUM OF THE INPUT IN A.
 0857   REF   1                 7265  1 7310 0            TCF     ARGZERO

 0858   REF  25  LAST  915      7266  4 4733 0            CS      POSMAX                IF NEGATIVE.
 0859                           7267  1 7271 0            TCF     +2

 0860   REF  26  LAST 1030      7270  3 4733 1  ARG+      CAF     POSMAX
 0861   REF 271  LAST 1030      7271  54 002 1            TS      Q
 0862                           7272  0 0006 1            EXTEND
 0863   REF 331  LAST 1022      7273  24 000 1            AUG     A                     FORMS +-1.0.
 0864   REF 439  LAST 1030      7274  6 0156 0            AD      MPAC +2
 0865   REF 440  LAST 1030      7275  54 156 1            TS      MPAC +2
 0866   REF 190  LAST 1030      7276  3 4755 1            CAF     ZERO
 0867   REF 272  LAST 1030      7277  6 0002 0            AD      Q
 0868   REF 441  LAST 1030      7300  6 0155 0            AD      MPAC +1
 0869   REF 442  LAST 1030      7301  54 155 1            TS      MPAC +1
 0870   REF 191  LAST 1030      7302  3 4755 1            CAF     ZERO
 0871   REF 273  LAST 1030      7303  6 0002 0            AD      Q                     Q STILL HAS POSMAX OR NEGMAX IN IT.
 0872   REF 443  LAST 1030      7304  6 0154 1            AD      MPAC
 0873   REF 444  LAST 1030      7305  54 154 0  ARGZERO2  TS      MPAC                  ALWAYS SKIPPING UNLESS ARGZERO.
 0874   REF 445  LAST 1030      7306  54 155 1            TS      MPAC +1
 0875   REF 188  LAST 1026      7307  0 0001 0            TC      L                     RETURN VIA L.

 0876   REF 446  LAST 1030      7310  54 156 1  ARGZERO   TS      MPAC +2               SET ALL THREE MPAC REGISTERS TO ZERO.
 0877   REF   1                 7311  1 7305 1            TCF     ARGZERO2

R0878                SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

 0880   REF  13  LAST 1025      7312  54 135 1  SHORTMP   TS      MPTEMP
 0881                           7313  0 0006 1            EXTEND
 0882   REF 447  LAST 1030      7314  7 0156 1            MP      MPAC +2
 0883   REF 448  LAST 1030      7315  54 156 1            TS      MPAC +2
 0884   REF 192  LAST 1030      7316  3 4755 1  SHORTMP2  CAF     ZERO                  SO SUBSEQUENT DAS WILL WORK.
 0885   REF 449  LAST 1030      7317  56 155 0            XCH     MPAC +1
 0886   REF   1                 7320  1 7131 1            TCF     DMPSUB2
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R0887          DMPNSUB MULTIPLIES THE DP FRACTION ARRIVING IN MPAC BY THE SP
R0888   INTEGER ARRIVING IN A.  THE DP PRODUCT DEPARTS BOTH IN MPAC AND IN
R0889   A AND L.  NOTE THAT DMPNSUB NORMALLY INCREASES THE MAGNITUDE OF THE
R0890   CONTENTS OF MPAC.  THE CUSTOMER MUST INSURE THAT B(A) X B(MPAC,MPAC+1)
R0891   AND B(A) X B(MPAC) ARE LESS-THAN 1 IN MAGNITUDE, WHERE B, AS IS OBVIOUS,
R0892   INDICATES THE ARRIVING CONTENTS.

 0893   REF   1                     7321  54 135 1  DMPNSUB  TS      DMPNTEMP
 0894                               7322  0 0006 1           EXTEND
 0895   REF 450  LAST 1030          7323  7 0155 1           MP      MPAC +1
 0896   REF 451  LAST 1031          7324  52 155 1           DXCH    MPAC             LOW PRODUCT TO MPAC, HIGH FACTOR TO A
 0897                               7325  0 0006 1           EXTEND
 0898   REF   2  LAST 1031          7326  7 0135 1           MP      DMPNTEMP
 0899   REF 189  LAST 1030          7327  3 0001 0           CA      L
 0900   REF 452  LAST 1031          7330  26 154 0           ADS     MPAC             COMPLETING THE PRODUCT IN MPAC
 0901                               7331  0 0006 1           EXTEND
 0902   REF 453  LAST 1031          7332  3 0155 0           DCA     MPAC             BRINGING THE PRODUCT INTO A AND L
 0903   REF 274  LAST 1030          7333  0 0002 0           TC      Q
```

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L         INTERPRETER                                                                                        USER'S PAGE NO.  37       E3 S3

P0904     MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0905               1.  DOT                   DP VECTOR DOT PRODUCT.
R0906               2.  VXV                   DP VECTOR CROSS PRODUCT.
R0907               3.  VXSC                  DP VECTOR TIMES SCALAR.
R0908               4.  V/SC                  DP VECTOR DIVIDED BY SCALAR.
R0909               5.  VPROJ                 DP VECTOR PROJECTION. ( (MPAC.X)MPAC ).
R0910               6.  VXM                   DP VECTOR POST-MULTIPLIED BY MATRIX.
R0911               7.  MXV                   DP VECTOR PRE-MULTIPLIED BY MATRIX.


 0912     REF   1                    7334  0 7157 0  DOT      TC       PREDOT            DO THE DOT PRODUCT AND EXIT, CHANGING
 0913     REF 193  LAST 1030         7335  3 4755 1  DMODE    CAF      ZERO              THE MODE TO DP SCALAR.
 0914     REF   3  LAST 1013         7336  1 6063 0           TCF      NEWMODE


 0915     REF  66  LAST 1029         7337  3 4752 0  MXV      CAF      TWO               SET UP MATINC AND DOTINC FOR ROW
 0916     REF   6  LAST   98         7340  54 140 0           TS       MATINC            VECTORS.
 0917     REF   1                    7341  1 7345 0           TCF      VXM/MXV           GO TO COMMON PORTION.

 0918     REF   6  LAST  471         7342  4 4363 1  VXM      CS       TEN               SET MATINC AND DOTINC TO REFER TO MATRIX
 0919     REF   7  LAST 1032         7343  54 140 0           TS       MATINC            AS THREE COLUMN VECTORS.
 0920     REF  16  LAST  882         7344  3 6245 1           CAF      SIX
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P0921                 COMMON PORTION OF MXV AND VXM.

 0922   REF    7  LAST 1027       7345  54 136 1  VXM/MXV  TS      DOTINC
R0923             ITRACE (2) REFERS TO "VXM/MXV".
 0924   REF    2  LAST  606       7346  0 7535 0           TC      MPACVBUF          SAVE VECTOR IN MPAC FOR FURTHER USE.

 0925   REF    1                  7347  0 7161 0           TC      DOTSUB            GO DOT TO GET X COMPONENT OF ANSWER.
 0926                             7350  0 0006 1           EXTEND
 0927   REF   36  LAST 1029       7351  3 0123 1           DCA     VBUF              MOVE MPAC VECTOR BACK INTO MPAC, SAVING
 0928   REF  454  LAST 1031       7352  52 155 1           DXCH    MPAC              NEW X COMPONENT IN BUF2.
 0929   REF   13  LAST  993       7353  52 134 0           DXCH    BUF2
 0930                             7354  0 0006 1           EXTEND
 0931   REF   37  LAST 1033       7355  3 0125 1           DCA     VBUF +2
 0932   REF  455  LAST 1033       7356  52 160 1           DXCH    MPAC +3
 0933                             7357  0 0006 1           EXTEND
 0934   REF   38  LAST 1033       7360  3 0127 0           DCA     VBUF +4
 0935   REF  456  LAST 1033       7361  52 162 0           DXCH    MPAC +5
 0936   REF    8  LAST 1032       7362  3 0140 1           CA      MATINC            INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
 0937   REF   58  LAST 1028       7363  26 116 0           ADS     ADDRWD            FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

 0938   REF    2  LAST 1033       7364  0 7161 0           TC      DOTSUB
 0939   REF   39  LAST 1033       7365  52 123 0           DXCH    VBUF              MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
 0940   REF  457  LAST 1033       7366  52 155 1           DXCH    MPAC              COMPONENT OF ANSWER IN VBUF +2.
 0941   REF   40  LAST 1033       7367  52 125 0           DXCH    VBUF +2
 0942   REF  458  LAST 1033       7370  52 160 1           DXCH    MPAC +3
 0943   REF   41  LAST 1033       7371  52 127 1           DXCH    VBUF +4
 0944   REF  459  LAST 1033       7372  52 162 0           DXCH    MPAC +5
 0945   REF    9  LAST 1033       7373  3 0140 1           CA      MATINC            FORM ADDRESS OF LAST COLUMN OR ROW.
 0946   REF   59  LAST 1033       7374  26 116 0           ADS     ADDRWD

 0947   REF    3  LAST 1033       7375  0 7161 0           TC      DOTSUB
 0948   REF   14  LAST 1033       7376  52 134 0           DXCH    BUF2              ANSWER NOW COMPLETE. PUT COMPONENTS INTO
 0949   REF  460  LAST 1033       7377  52 155 1           DXCH    MPAC              PROPER MPAC REGISTERS.
 0950   REF  461  LAST 1033       7400  52 162 0           DXCH    MPAC +5
 0951   REF   42  LAST 1033       7401  52 125 0           DXCH    VBUF +2
 0952   REF  462  LAST 1033       7402  52 160 1           DXCH    MPAC +3
 0953   REF   13  LAST 1024       7403  1 6064 1           TCF     DANZIG            EXIT.
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P0954                  VXSC - VECTOR TIMES SCALAR.

 0955    REF  27  LAST 1026       7404  10 163 1  VXSC      CCS      MODE              TEST PRESENT MODE.
 0956    REF   1                  7405   1 7433 0           TCF      OVXSC             SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
 0957    REF   2  LAST 1034       7406   1 7433 0           TCF      OVXSC

 0958    REF   5  LAST 1029       7407   0 7112 1  VVXSC     TC       DMPSUB            COMPUTE X COMPONENT
 0959    REF   1                  7410   0 7143 0           TC       VROUND            AND ROUND IT.
 0960    REF 463  LAST 1033       7411  52 160 1            DXCH     MPAC +3           PUT Y COMPONENT INTO MPAC SAVING MPAC IN
 0961    REF 464  LAST 1034       7412  52 155 1            DXCH     MPAC              MPAC +3.
 0962    REF 465  LAST 1034       7413  52 160 1            DXCH     MPAC +3

 0963    REF   6  LAST 1034       7414   0 7112 1           TC       DMPSUB            DO SAME FOR Y AND Z COMPONENTS.
 0964    REF   2  LAST 1034       7415   0 7143 0           TC       VROUND
 0965    REF 466  LAST 1034       7416  52 162 0            DXCH     MPAC +5
 0966    REF 467  LAST 1034       7417  52 155 1            DXCH     MPAC
 0967    REF 468  LAST 1034       7420  52 162 0            DXCH     MPAC +5

 0968    REF   7  LAST 1034       7421   0 7112 1           TC       DMPSUB
 0969    REF   3  LAST 1034       7422   0 7143 0           TC       VROUND
 0970    REF 469  LAST 1034       7423  52 155 1  VROTATEX  DXCH     MPAC              EXIT USED TO RESTORE MPAC AFTER THIS
 0971    REF 470  LAST 1034       7424  52 162 0            DXCH     MPAC +5           TYPE OF ROTATION. CALLED BY VECTOR SHIFT
 0972    REF 471  LAST 1034       7425  52 160 1            DXCH     MPAC +3           RIGHT, V/SC, ETC.
 0973    REF 472  LAST 1034       7426  52 155 1            DXCH     MPAC
 0974    REF  14  LAST 1033       7427   1 6064 1           TCF      DANZIG
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P0975              OP VECTOR PROJECTION ROUTINE.

 0976  REF   2  LAST 1032      7430  0 7157 0  VPROJ     TC     PREDOT          (MPAC.X)MPAC IS COMPUTED AND LEFT IN
 0977  REF  21  LAST  915.     7431  4 4751 1            CS     FOUR            MPAC. DO DOT AND FALL INTO DVXSC.
 0978  REF  60  LAST 1033      7432  26 116 0            ADS    ADDRWD

R0979              VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

 0980                          7433  0 0006 1  DVXSC     EXTEND                 SAVE SCALAR IN MPAC +3 AND GET X
 0981  REF 473  LAST 1034      7434  3 0155 0            DCA    MPAC            COMPONENT OF ANSWER.
 0982  REF 474  LAST 1035      7435  52 160 1            DXCH   MPAC +3
 0983  REF   8  LAST 1034      7436  0 7112 1            TC     DMPSUB
 0984  REF   4  LAST 1034      7437  0 7143 0            TC     VROUND

 0985  REF  67  LAST 1032      7440  3 4752 0            CAF    TWO             ADVANCE ADDRWD TO Y COMPONENT OF X.
 0986  REF  61  LAST 1035      7441  26 116 0            ADS    ADDRWD
 0987                          7442  0 0006 1            EXTEND
 0988  REF 475  LAST 1035      7443  3 0160 0            DCA    MPAC +3         PUT SCALAR BACK INTO MPAC AND SAVE
 0989  REF 476  LAST 1035      7444  52 155 1            DXCH   MPAC            X RESULT IN MPAC +5.
 0990  REF 477  LAST 1035      7445  52 162 0            DXCH   MPAC +5
 0991  REF   9  LAST 1035      7446  0 7112 1            TC     DMPSUB
 0992  REF   5  LAST 1035      7447  0 7143 0            TC     VROUND

 0993  REF  68  LAST 1035      7450  3 4752 0            CAF    TWO
 0994  REF  62  LAST 1035      7451  26 116 0            ADS    ADDRWD          TO Z COMPONENT.
 0995  REF 478  LAST 1035      7452  52 160 1            DXCH   MPAC +3         BRING SCALAR BACK, PUTTING Y RESULT IN
 0996  REF 479  LAST 1035      7453  52 155 1            DXCH   MPAC            THE PROPER PLACE.
 0997  REF 480  LAST 1035      7454  52 160 1            DXCH   MPAC +3
 0998  REF  10  LAST 1035      7455  0 7112 1            TC     DMPSUB
 0999  REF   6  LAST 1035      7456  0 7143 0            TC     VROUND

 1000  REF 481  LAST 1035      7457  52 155 1            DXCH   MPAC            PUT Z COMPONENT IN PROPER PLACE, ALSO
 1001  REF 482  LAST 1035      7460  52 162 0            DXCH   MPAC +5         POSITIONING X.
 1002  REF 483  LAST 1035      7461  52 155 1            DXCH   MPAC

 1003  REF   1                 7462  1 6524 0            TCF    VMODE           MODE HAS CHANGED TO VECTOR.
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P1004           THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M ,X M -X M ,X M -X M ) WHERE M IS THE VECTOR IN
R1006                                                          3 2  2 3  1 3  3 1  2 1  1 2
R1008    MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.


 1009                             7463  0 0006 1  VXV     EXTEND
 1010    REF 484  LAST 1035       7464  3 0162 1          DCA      MPAC +5         FORM UP M3X1, LEAVING M1 IN VBUF.
 1011    REF 485  LAST 1036       7465  52 155 1          DXCH     MPAC
 1012    REF  43  LAST 1033       7466  52 123 0          DXCH     VBUF
 1013    REF  11  LAST 1035       7467  0 7112 1          TC       DMPSUB          BY X1.

 1014                             7470  0 0006 1          EXTEND
 1015    REF 486  LAST 1036       7471  4 0160 1          DCS      MPAC +3         CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
 1016    REF 487  LAST 1036       7472  52 155 1          DXCH     MPAC
 1017    REF  44  LAST 1036       7473  52 125 0          DXCH     VBUF +2
 1018    REF  12  LAST 1036       7474  0 7112 1          TC       DMPSUB

 1019    REF  69  LAST 1035       7475  3 4752 0          CAF      TWO             ADVANCE ADDRWD TO X2.
 1020    REF  63  LAST 1035       7476  26 116 0          ADS      ADDRWD
 1021                             7477  0 0006 1          EXTEND
 1022    REF 488  LAST 1036       7500  4 0162 0          DCS      MPAC +5         PREPARE TO GET -X2M3, SAVING -X1M2 IN
 1023    REF 489  LAST 1036       7501  52 155 1          DXCH     MPAC            MPAC +5.
 1024    REF 490  LAST 1036       7502  52 162 0          DXCH     MPAC +5
 1025    REF  13  LAST 1036       7503  0 7112 1          TC       DMPSUB

 1026                             7504  0 0006 1          EXTEND
 1027    REF  45  LAST 1036       7505  3 0123 1          DCA      VBUF            GET X2M1, SAVING -X2M3 IN VBUF +4.
 1028    REF 491  LAST 1036       7506  52 155 1          DXCH     MPAC
 1029    REF  46  LAST 1036       7507  52 127 1          DXCH     VBUF +4
 1030    REF  14  LAST 1036       7510  0 7112 1          TC       DMPSUB

 1031    REF  70  LAST 1036       7511  3 4752 0          CAF      TWO             ADVANCE ADDRWD TO X3.
 1032    REF  64  LAST 1036       7512  26 116 0          ADS      ADDRWD
 1033                             7513  0 0006 1          EXTEND
 1034    REF  47  LAST 1036       7514  4 0123 0          DCS      VBUF            GET -X3M1, ADDING X2M1 TO MPAC +5 TO
 1035    REF 492  LAST 1036       7515  52 155 1          DXCH     MPAC            COMPLETE THE Z COMPONENT OF THE ANSWER.
 1036    REF 493  LAST 1036       7516  20 162 0          DAS      MPAC +5

 1037                             7517  0 0006 1          EXTEND
 1038                             7520  1 7522 1          BZF      +2
 1039    REF   3  LAST 1022       7521  0 7014 0          TC       OVERFLWZ

 1040    REF  15  LAST 1036       7522  0 7112 1          TC       DMPSUB
 1041    REF  48  LAST 1036       7523  52 125 0          DXCH     VBUF +2         MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
 1042    REF 494  LAST 1036       7524  52 160 1          DXCH     MPAC +3         AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
 1043    REF 495  LAST 1036       7525  52 155 1          DXCH     MPAC            Y COMPONENT OF THE RESULT.
 1044    REF 496  LAST 1036       7526  20 160 1          DAS      MPAC +3

 1045                             7527  0 0006 1          EXTEND
 1046                             7530  1 7532 0          BZF      +2
 1047   REF   3  LAST 1022      7531  0 7017 0              TC      OVERFLWY

 1048   REF  16  LAST 1036      7532  0 7112 1              TC      DMPSUB
 1049   REF  49  LAST 1036      7533  52 127 1              DXCH    VBUF +4           GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
 1050   REF   4  LAST 1023      7534  1 7003 1              TCF     ENDVXV            COMPONENT (TAIL END OF DAD).

R1051                THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

 1053                           7535  0 0006 1  MPACVBUF EXTEND                       CALLED BY MXV, VXM, AND UNIT.
 1054   REF 497  LAST 1036      7536  3 0155 0              DCA     MPAC
 1055   REF  50  LAST 1037      7537  52 123 0              DXCH    VBUF
 1056                           7540  0 0006 1              EXTEND
 1057   REF 498  LAST 1037      7541  3 0160 0              DCA     MPAC +3
 1058   REF  51  LAST 1037      7542  52 125 0              DXCH    VBUF +2
 1059                           7543  0 0006 1              EXTEND
 1060   REF 499  LAST 1037      7544  3 0162 1              DCA     MPAC +5
 1061   REF  52  LAST 1037      7545  52 127 1              DXCH    VBUF +4
 1062   REF 275  LAST 1031      7546  0 0002 0              TC      Q                 RETURN TO CALLER.


R1063                DOUBLE PRECISION SIGN AGREE ROUTINE. ARRIVE WITH INPUT IN A+L. OUTPUT IS IN A + L.

 1065   REF 332  LAST 1030      7547  10 000 0  ALSIGNAG CCS    A                 TEST UPPER PART.
 1066   REF   1                 7550  1 7554 0              TCF     UPPOS             IT IS POSITIVE
 1067   REF 276  LAST 1037      7551  0 0002 0              TC      Q                 ZERO
 1068   REF   1                 7552  1 7564 0              TCF     UPNEG             NEGATIVE
 1069   REF 277  LAST 1037      7553  0 0002 0              TC      Q                 ZERO

 1070   REF 190  LAST 1031      7554  56 001 0  UPPOS       XCH     L                 SAVE DECREMENTED UPPER PART.
 1071   REF  12  LAST  917      7555  6 4736 1              AD      HALF
 1072   REF  13  LAST 1037      7556  6 4736 1              AD      HALF
 1073   REF 333  LAST 1037      7557  54 000 0              TS      A                 SKIPS ON OVERFLOW
 1074                           7560  1 7562 0              TCF     +2
 1075   REF 191  LAST 1037      7561  24 001 0              INCR    L                 RESTORE UPPER TO ORIGINAL VALUE
 1076   REF 192  LAST 1037      7562  56 001 0              XCH     L                 SWAP A + L BACK.
 1077   REF 278  LAST 1037      7563  0 0002 0              TC      Q

 1078   REF 193  LAST 1037      7564  56 001 0  UPNEG       XCH     L                 SAVE COMPLEMENTED + DECREMENTED UPPER PT
 1079   REF   6  LAST  917      7565  6 4735 1              AD      NEGMAX
 1080   REF   7  LAST 1008      7566  6 7752 0              AD      NEGONE
 1081   REF 334  LAST 1037      7567  54 000 0              TS      A
 1082                           7570  1 7572 1              TCF     +2                DONT INCREMENT IF NO OVERFLOW.
 1083   REF 194  LAST 1037      7571  24 001 0              INCR    L
 1084   REF 195  LAST 1037      7572  56 001 0              XCH     L
 1085                           7573  4 0000 0              COM                       MAKE NEGATIVE AGAIN.
 1086   REF 279  LAST 1037      7574  0 0002 0              TC      Q
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P1087              INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

 1089   REF  17  LAST 1037     7575  0 7112 1  DMP1      TC      DMPSUB             DMP INSTRUCTION.
 1090   REF  15  LAST 1034     7576  1 6064 1            TCF     DANZIG

 1091   REF  18  LAST 1036     7577  0 7112 1  DMPR      TC      DMPSUB
 1092   REF   1                7600  0 7142 1            TC      ROUNDSUB +1        (C(A) = +0).
 1093   REF  16  LAST 1038     7601  1 6064 1            TCF     DANZIG

 1094                          7602  0 0006 1  DDV       EXTEND
 1095   REF  65  LAST 1036     7603  5 0116 1            INDEX   ADDRWD             MOVE DIVIDEND INTO BUF.
 1096                          7604  3 0001 0            DCA     0
 1097   REF   2  LAST 1005     7605  1 7612 1            TCF     BDDV +4

 1098                          7606  0 0006 1  BDDV      EXTEND                     MOVE DIVISOR INTO MPAC SAVING MPAC, THE
 1099   REF  66  LAST 1036     7607  5 0116 1            INDEX   ADDRWD             DIVIDEND, IN BUF.
 1100                          7610  3 0001 0            DCA     0
 1101   REF 500  LAST 1037     7611  52 155 1            DXCH    MPAC
 1102   REF  91  LAST 1027     7612  52 131 0   +4       DXCH    BUF
 1103   REF 194  LAST 1032     7613  3 4755 1            CAF     ZERO               DIVIDE ROUTINES IN BANK 0.
 1104   REF  21  LAST 1018     7614  54 004 1            TS      FBANK
 1105   REF   2  LAST  819     7615  1 2353 1            TCF     DDV/BDDV

 1106   REF  67  LAST 1038     7616  3 0116 1  SETPD     CA      ADDRWD             MUST SET TO WORK AREA, OR EBANK TROUBLE.
 1107   REF  22  LAST 1015     7617  54 166 1            TS      PUSHLOC
 1108   REF   1                7620  1 6066 0            TCF     NOIBNKSW           NO FBANK SWITCH REQUIRED.

 1109   REF 195  LAST 1038     7621  3 4755 1  TSLC      CAF     ZERO               SHIFTING ROUTINES LOCATED IN BANK 00.
 1110   REF  22  LAST 1038     7622  54 004 1            TS      FBANK
 1111   REF   1                7623  1 2172 0            TCF     TSLC2

 1112   REF   7  LAST  997     7624  3 6077 1  GSHIFT    CAF     LOW7               USED AS MASK AT GENSHIFT. THIS PROCESSES
 1113   REF  23  LAST 1038     7625  54 004 1            TS      FBANK              ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
 1114   REF   1                7626  1 2214 0            TCF     GENSHIFT           AN ADDRESS (ROUTINES IN BANK 0).
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P1115            THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUF
R1117      AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1119      THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.


 1120      REF  28   LAST 1034        7627  10 163 1  V/SC      CCS     MODE
 1121      REF   1                    7630  1 7641 1            TCF     DV/SC             MOVE VECTOR INTO MPAC.
 1122      REF   2   LAST 1039        7631  1 7641 1            TCF     DV/SC

 1123                                 7632  0 0006 1  VV/SC     EXTEND
 1124      REF  68   LAST 1038        7633  5 0116 1            INDEX   ADDRWD
 1125                                 7634  3 0001 0            DCA     0
 1126      REF  92   LAST 1038        7635  52 131 0  V/SC1     DXCH    BUF               IN BOTH CASES, VECTOR IS NOW IN MPAC AND
 1127      REF 196   LAST 1038        7636  3 4755 1            CAF     ZERO              SCALAR IN BUF.
 1128      REF  24   LAST 1038        7637  54 004 1            TS      FBANK
 1129      REF   1                    7640  1 2654 0            TCF     V/SC2

 1130                                 7641  0 0006 1  DV/SC     EXTEND
 1131      REF  69   LAST 1039        7642  5 0116 1            INDEX   ADDRWD
 1132                                 7643  3 0003 1            DCA     2
 1133      REF 501   LAST 1038        7644  52 160 1            DXCH    MPAC +3
 1134                                 7645  0 0006 1            EXTEND
 1135      REF  70   LAST 1039        7646  5 0116 1            INDEX   ADDRWD
 1136                                 7647  3 0005 1            DCA     4
 1137      REF 502   LAST 1039        7650  52 162 0            DXCH    MPAC +5

 1138      REF 107   LAST 1013        7651  4 4753 0            CS      ONE               CHANGE MODE TO VECTOR.
 1139      REF  29   LAST 1039        7652  54 163 1            TS      MODE

 1140                                 7653  0 0006 1            EXTEND
 1141      REF  71   LAST 1039        7654  5 0116 1            INDEX   ADDRWD
 1142                                 7655  3 0001 0            DCA     0
 1143      REF 503   LAST 1039        7656  52 155 1            DXCH    MPAC
 1144      REF   1                    7657  1 7635 1            TCF     V/SC1             FINISH PROLOGUE AT COMMON SECTION.
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P1145              SIGN AND COMPLEMENT INSTRUCTIONS.

 1146    REF  72   LAST 1039      7660  50 116 1  SIGN     INDEX   ADDRWD          CALL CDMP INSTRUCTION IF WORD AT X IS
 1147                             7661  10 000 0           CCS     0               NEGATIVE NON-ZERO.
 1148    REF  17   LAST 1038      7662  1 6064 1           TCF     DANZIG
 1149                             7663  1 7665 1           TCF     +2
 1150    REF   2   LAST 1007      7664  1 7673 0           TCF     COMP            DO THE COMPLEMENT.

 1151    REF  73   LAST 1040      7665  50 116 1           INDEX   ADDRWD
 1152                             7666  10 001 1  CCSL     CCS     1
 1153    REF  18   LAST 1040      7667  1 6064 1           TCF     DANZIG
 1154    REF  19   LAST 1040      7670  1 6064 1           TCF     DANZIG
 1155    REF   3   LAST 1040      7671  1 7673 0           TCF     COMP
 1156    REF  20   LAST 1040      7672  1 6064 1           TCF     DANZIG
 1157                             7673  0 0006 1  CDMP     EXTEND                  COMPLEMENT DP MPAC IN EVERY CASE.
 1158    REF 504   LAST 1039      7674  4 0155 1           DCS     MPAC
 1159    REF 505   LAST 1040      7675  52 155 1           DXCH    MPAC

 1160    REF  30   LAST 1039      7676  10 163 1           CCS     MODE            EITHER COMPLEMENT MPAC +3 OR THE REST OF
 1161    REF   1                  7677  1 7710 1           TCF     DCOMP           THE VECTOR ACCUMULATOR.
 1162    REF   2   LAST 1040      7700  1 7710 1           TCF     DCOMP

 1163                             7701  0 0006 1           EXTEND                  VECTOR COMPLEMENT.
 1164    REF 506   LAST 1040      7702  4 0160 1           DCS     MPAC +3
 1165    REF 507   LAST 1040      7703  52 160 1           DXCH    MPAC +3
 1166                             7704  0 0006 1           EXTEND
 1167    REF 508   LAST 1040      7705  4 0162 0           DCS     MPAC +5
 1168    REF 509   LAST 1040      7706  52 162 0           DXCH    MPAC +5
 1169    REF  21   LAST 1040      7707  1 6064 1           TCF     DANZIG

 1170    REF 510   LAST 1040      7710  4 0156 1  DCOMP    CS      MPAC +2
 1171    REF 511   LAST 1040      7711  54 156 1           TS      MPAC +2
 1172    REF  22   LAST 1040      7712  1 6064 1           TCF     DANZIG
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P1173              THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

R1174              1.  SR1  TO  SR4           SCALAR SHIFT RIGHT.
R1175              2.  SR1R  TO  SR4R         SCALAR SHIFT RIGHT AND ROUND.
R1176              3.  SL1  TO  SL4           SCALAR SHIFT LEFT.
R1177              4.  SL1R  TO  SL4R         SCALAR SHIFT LEFT AND ROUND.

R1178              5.  VSR1  TO  VSR8         VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
R1179              6.  VSL1  TO  VSL8         VECTOR SHIFT LEFT (NEVER ROUNDS).

R1180              THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

R1181              1.  SR                     SCALAR SHIFT RIGHT.
R1182              2.  SRR                    SCALAR SHIFT RIGHT AND ROUND.
R1183              3.  SL                     SCALAR SHIFT LEFT.
R1184              4.  SLR                    SCALAR SHIFT LEFT AND ROUND.

R1185              5.  VSR                    VECTOR SHIFT RIGHT.
R1186              6.  VSL                    VECTOR SHIFT LEFT.

R1187     *  IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
R1189     ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.


 1190                           00,2017                        BANK    00

 1191    REF   1                                               COUNT*  $$/INTER
 1192    REF  17  LAST 1032     00,2017  3 6245 1   SHORTT     CAF     SIX            SCALAR SHORT SHIFTS COME HERE. THE SHIFT
 1193    REF  25  LAST 1012     00,2020  7 0020 1              MASK    CYR            COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
 1194    REF  11  LAST  918     00,2021  54 021 0              TS      SR             ROUNDING BIT IS IN BIT1 AT THIS POINT.

 1195    REF  26  LAST 1041     00,2022  10 020 1              CCS     CYR            SEE IF RIGHT OR LEFT SHIFT DESIRED.
 1196    REF   1                00,2023  1 2101 1              TCF     TSSL           SHIFT LEFT.

 1197                           00,2024   00024 1   SRDDV      DEC     20             MPTEMP SETTING FOR SR BEFORE DDV.

 1198    REF  12  LAST 1041     00,2025  50 021 1   TSSR       INDEX   SR             GET SHIFTING BIT.
 1199    REF  59  LAST  905     00,2026  3 4736 1              CAF     BIT14
 1200    REF  14  LAST 1030     00,2027  54 135 1              TS      MPTEMP

 1201    REF  27  LAST 1041     00,2030  10 020 1              CCS     CYR            SEE IF A ROUND IS DESIRED.
 1202    REF   1                00,2031  0 2050 0   RIGHTP     TC      MPACSRND       YES - SHIFT RIGHT AND ROUND.
 1203    REF   4  LAST 1032     00,2032  1 6063 0              TCF     NEWMODE        SET MODE TO DP (C(A) = 0).
 1204    REF  15  LAST 1041     00,2033  3 0135 0   MPACSHR    CA      MPTEMP         DO A TRIPLE PRECISION SHIFT RIGHT.
 1205                           00,2034  0 0006 1              EXTEND
 1206    REF 512  LAST 1040     00,2035  7 0156 1              MP      MPAC +2
 1207    REF 513  LAST 1041     00,2036  54 156 1    +3        TS      MPAC +2        (EXIT FROM SQRT AND ABVAL).
 1208    REF  16  LAST 1041     00,2037  3 0135 0              CA      MPTEMP
 1209                           00,2040  0 0006 1              EXTEND
 1210    REF 514  LAST 1041     00,2041  7 0154 0              MP      MPAC           SHIFT MAJOR PART INTO A,L AND PLACE IN
 1211   REF 515  LAST 1041   00,2042  52 155 1             DXCH    MPAC           MPAC,+1.
 1212   REF  17  LAST 1041   00,2043  3 0135 0             CA      MPTEMP
 1213                        00,2044  0 0006 1             EXTEND
 1214   REF 196  LAST 1037   00,2045  7 0001 1             MP      L              ORIGINAL C(MPAC +1).
 1215   REF 516  LAST 1042   00,2046  20 156 1             DAS     MPAC +1        GUARANTEED NO OVERFLOW.
 1216   REF  23  LAST 1040   00,2047  1 6064 1             TCF     DANZIG

R1217            MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

 1218   REF 517  LAST 1042   00,2050  3 0156 0  MPACSRND CA      MPAC +2        WE HAVE TO DO ALL THREE MULTIPLIES SINCE
 1219                        00,2051  0 0006 1             EXTEND                 MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
 1220   REF  18  LAST 1042   00,2052  7 0135 1             MP      MPTEMP         DISAGREEMENT WITH A SHIFT RIGHT OF 1.
 1221   REF 518  LAST 1042   00,2053  56 155 0             XCH     MPAC +1
 1222                        00,2054  0 0006 1             EXTEND
 1223   REF  19  LAST 1042   00,2055  7 0135 1             MP      MPTEMP
 1224   REF 519  LAST 1042   00,2056  56 155 0             XCH     MPAC +1        TRIAL MINOR PART.
 1225   REF 197  LAST 1042   00,2057  6 0001 0             AD      L

 1226                        00,2060  6 0000 1  VSHR2      DDUBLE                 (FINISH VECTOR COMPONENT SHIFT RIGHT
 1227   REF 520  LAST 1042   00,2061  54 156 1             TS      MPAC +2        AND ROUND.
 1228                        00,2062  1 2064 0             TCF     +2
 1229   REF 521  LAST 1042   00,2063  26 155 1             AOS     MPAC +1        GUARANTEED NO OVERFLOW.

 1230   REF 197  LAST 1039   00,2064  3 4755 1             CAF     ZERO
 1231   REF 522  LAST 1042   00,2065  54 156 1             TS      MPAC +2
 1232   REF 523  LAST 1042   00,2066  56 154 1             XCH     MPAC           SETTING TO ZERO SO FOLLOWING DAS WORKS.
 1233                        00,2067  0 0006 1             EXTEND
 1234   REF  20  LAST 1042   00,2070  7 0135 1             MP      MPTEMP
 1235   REF 524  LAST 1042   00,2071  20 155 1             DAS     MPAC           AGAIN NO OVERFLOW.
 1236   REF 280  LAST 1037   00,2072  0 0002 0             TC      Q

 1237   REF  21  LAST 1042   00,2073  3 0135 0  VSHRRND    CA      MPTEMP         ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
 1238                        00,2074  0 0006 1             EXTEND                 MPAC CONTAINS A VECTOR COMPONENT.
 1239   REF 525  LAST 1042   00,2075  7 0155 1             MP      MPAC +1
 1240   REF 526  LAST 1042   00,2076  54 155 1             TS      MPAC +1
 1241   REF 198  LAST 1042   00,2077  56 001 0             XCH     L
 1242   REF   1              00,2100  1 2060 1             TCF     VSHR2          GO ADD ONE IF NECESSARY AND FINISH.
```

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P1243             ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

 1244   REF  13   LAST 1041    00,2101   3 0021 1   TSSL       CA       SR                 GET SHIFT COUNT FOR SR.
 1245   REF  22   LAST 1042    00,2102  54 135 1     +1        TS       MPTEMP

 1246                          00,2103   0 0006 1    +2        EXTEND                      ENTRY HERE FROM SL FOR SCALARS.
 1247   REF 527   LAST 1042    00,2104   3 0156 0              DCA      MPAC +1            SHIFTING LEFT ONE PLACE AT A TIME IS
 1248   REF 528   LAST 1043    00,2105  20 156 1               DAS      MPAC +1            FASTER THAN DOING THE WHOLE SHIFT WITH
 1249   REF 529   LAST 1043    00,2106   6 0154 1              AD       MPAC               MULTIPLIES ASSUMING THAT FREQUENCY OF
 1250   REF 530   LAST 1043    00,2107   6 0154 1              AD       MPAC               SHIFT COUNTS GOES DOWN RAPIDLY AS A
 1251   REF 531   LAST 1043    00,2110  54 154 0               TS       MPAC               FUNCTION OF THEIR MAGNITUDE.
 1252                          00,2111   1 2113 1              TCF      +2
 1253   REF   4   LAST 1027    00,2112  54 121 1               TS       OVFIND             OVERFLOW. (LEAVES OVERFLOW-CORRECTED
A1254                                                                                    RESULT ANYWAY).
 1255   REF  23   LAST 1043    00,2113  10 135 1               CCS      MPTEMP             LOOP ON DECREMENTED SHIFT COUNT.
 1256   REF   2   LAST 1041    00,2114   1 2102 1              TCF      TSSL +1

 1257   REF  28   LAST 1041    00,2115  10 020 1               CCS      CYR                SEE IF ROUND WANTED.
 1258   REF   2   LAST 1038    00,2116   0 7141 1   ROUND      TC       ROUNDSUB           YES - ROUND AND EXIT.
 1259   REF  24   LAST 1042    00,2117   1 6064 1              TCF      DANZIG             SL LEAVES A ZERO IN CYR FOR NO ROUND.
 1260   REF  25   LAST 1043    00,2120   1 6064 1              TCF      DANZIG             NO - EXIT IMMEDIATL
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P1261    VECTOR SHIFTING ROUTINES.

 1262    REF   2  LAST  234    00,2121  3 4757 0  SHORTV    CAF     LOW3           SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
 1263    REF  29  LAST 1043    00,2122  7 0020 1            MASK    CYR            EDITING CYR.
 1264    REF  24  LAST 1043    00,2123  54 135 1            TS      MPTEMP
 1265    REF  30  LAST 1044    00,2124  10 020 1            CCS     CYR            SEE IF LEFT OR RIGHT SHIFT.
 1266    REF   1               00,2125  1 2145 1            TCF     VSSL           VECTOR SHIFT LEFT.
 1267                          00,2126   00176 1  OCT176    OCT     176            USED IN PROCESSED SHIFTS WITH - COUNT

 1268    REF  25  LAST 1044    00,2127  50 135 0  VSSR      INDEX   MPTEMP         (ENTRY FROM SR). PICK UP SHIFTING BIT,
 1269    REF  60  LAST 1041    00,2130  3 4736 1            CAF     BIT14          MPTEMP CONTAINS THE SHIFT COUNT - 1.
 1270    REF  26  LAST 1044    00,2131  54 135 1            TS      MPTEMP
 1271    REF   1               00,2132  0 2073 1            TC      VSHRRND        SHIFT X COMPONENT.

 1272    REF 532  LAST 1043    00,2133  52 155 1            DXCH    MPAC           SWAP X AND Y COMPONENTS.
 1273    REF 533  LAST 1044    00,2134  52 160 1            DXCH    MPAC +3
 1274    REF 534  LAST 1044    00,2135  52 155 1            DXCH    MPAC
 1275    REF   2  LAST 1044    00,2136  0 2073 1            TC      VSHRRND        SHIFT Y COMPONENT.

 1276    REF 535  LAST 1044    00,2137  52 155 1            DXCH    MPAC           SWAP Y AND Z COMPONENTS.
 1277    REF 536  LAST 1044    00,2140  52 162 0            DXCH    MPAC +5
 1278    REF 537  LAST 1044    00,2141  52 155 1            DXCH    MPAC
 1279    REF   3  LAST 1044    00,2142  0 2073 1            TC      VSHRRND        SHIFT Z COMPONENT.

 1280    REF   1               00,2143  1 7423 1            TCF     VROTATEX       RESTORE COMPONENTS TO PROPER PLACES.
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P1281   VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

 1282   REF  27  LAST 1044   00,2144  54 135 1   -1       TS      MPTEMP         SHIFTING LOOP.

 1283                        00,2145  0 0006 1  VSSL      EXTEND
 1284   REF 538  LAST 1044   00,2146  3 0155 0            DCA     MPAC
 1285   REF 539  LAST 1045   00,2147  20 155 1            DAS     MPAC
 1286                        00,2150  0 0006 1            EXTEND
 1287                        00,2151  1 2153 0            BZF     +2
 1288   REF   3  LAST 1027   00,2152  0 7022 0            TC      OVERFLOW

 1289                        00,2153  0 0006 1            EXTEND
 1290   REF 540  LAST 1045   00,2154  3 0160 0            DCA     MPAC +3
 1291   REF 541  LAST 1045   00,2155  20 160 1            DAS     MPAC +3
 1292                        00,2156  0 0006 1            EXTEND
 1293                        00,2157  1 2161 1            BZF     +2
 1294   REF   4  LAST 1037   00,2160  0 7017 0            TC      OVERFLWY

 1295                        00,2161  0 0006 1            EXTEND
 1296   REF 542  LAST 1045   00,2162  3 0162 1            DCA     MPAC +5
 1297   REF 543  LAST 1045   00,2163  20 162 0            DAS     MPAC +5
 1298                        00,2164  0 0006 1            EXTEND
 1299                        00,2165  1 2167 1            BZF     +2
 1300   REF   4  LAST 1036   00,2166  0 7014 0            TC      OVERFLWZ

 1301   REF  28  LAST 1045   00,2167  10 135 1            CCS     MPTEMP         LOOP ON DECREMENTED SHIFT COUNTER.
 1302   REF   2  LAST 1044   00,2170  1 2144 0            TCF     VSSL -1
 1303   REF  26  LAST 1043   00,2171  1 6064 1            TCF     DANZIG         EXIT.
```

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P1304          TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1306   THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X,

  1307  REF  29  LAST 1045    00,2172  54 135 1  TSLC2     TS      MPTEMP          START BY ZEROING SHIFT COUNT (IN A NOW).
  1308  REF   4  LAST 1030    00,2173  0 6726 1            TC      BRANCH          EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
  1309                        00,2174  1 2176 1            TCF     +2
  1310  REF   1               00,2175  1 2212 0            TCF     ENDTSLC         STORES ZERO SHIFT COUNT IN THIS CASE.

  1311  REF  12  LAST  845    00,2176  0 7262 0            TC      TPAGREE         MAY CAUSE UPSHIFT OF ONE EXTRA PLACE.

  1312  REF 544  LAST 1045    00,2177  3 0154 1            CA      MPAC            BEGIN NORMALIZATION LOOP.
  1313  REF   1               00,2200  1 2207 1            TCF     TSLCTEST

  1314  REF  30  LAST 1046    00,2201  24 135 0  TSLCLOOP  INCR    MPTEMP          INCREMENT SHIFT COUNTER.
  1315                        00,2202  0 0006 1            EXTEND
  1316  REF 545  LAST 1046    00,2203  3 0156 0            DCA     MPAC +1
  1317  REF 546  LAST 1046    00,2204  20 156 1            DAS     MPAC +1
  1318  REF 547  LAST 1046    00,2205  6 0154 1            AD      MPAC
  1319  REF 548  LAST 1046    00,2206  26 154 0            ADS     MPAC
  1320                        00,2207  6 0000 1  TSLCTEST  DOUBLE                  SEE IF (ANOTHER) SHIFT IS REQUIRED.
  1321                        00,2210  54 000 0            OVSK
  1322  REF   1               00,2211  1 2201 1            TCF     TSLCLOOP        YES - INCREMENT COUNT AND SHIFT AGAIN.

  1323  REF  31  LAST 1046    00,2212  4 0135 1  ENDTSLC   CS      MPTEMP
  1324  REF   1               00,2213  1 6626 1            TCF     STORE1          STORE SHIFT COUNT AND RETURN TO DANZIG.
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R1325            THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1327     THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1328            BITS 1-7      SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1329            BIT 8         PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1331            BIT 9         0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1332            BIT 10        1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1333            BITS 11-13    0.
R1334            BIT 14        1.
R1335            BIT 15        0.

R1336     THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.

 1337     REF  74  LAST 1040   00,2214  7 0116 0  GENSHIFT MASK   ADDRWD          GET SHIFT COUNT, TESTING FOR ZERO.
 1338     REF 335  LAST 1037   00,2215  10 000 0           CCS    A               (ARRIVES WITH C(A) = LOW7).
 1339     REF   1              00,2216  1 2224 0           TCF    GENSHFT2        IF NON-ZERO, PROCEED WITH DECREMENTED CT

 1340     REF  33  LAST  995   00,2217  3 4742 1           CAF    BIT10           ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
 1341     REF  75  LAST 1047   00,2220  7 0116 0           MASK   ADDRWD          WE MIGHT HAVE TO ROUND MPAC ON SLR AND
 1342     REF 336  LAST 1047   00,2221  10 000 0           CCS    A               SRR (SCALAR ONLY).
 1343     REF   3  LAST 1043   00,2222  0 7141 1           TC     RDLNOSUB
 1344     REF  27  LAST 1045   00,2223  1 6064 1           TCF    DANZIG

 1345     REF  32  LAST 1046   00,2224  54 135 1  GENSHFT2 TS     MPTEMP          DECREMENTED SHIFT COUNT TO MPTEMP.
 1346     REF  35  LAST  994   00,2225  3 4744 1           CAF    BIT8            TEST MEANING OF LOW SEVEN BIT COUNT IN
 1347                          00,2226  0 0006 1           EXTEND                 MPTEMP NOW.
 1348     REF  76  LAST 1047   00,2227  7 0116 0           MP     ADDRWD
 1349     REF   1              00,2230  7 6250 1           MASK   LOW2            JUMPS ON SHIFT DIRECTION (BIT8) AND
 1350     REF 337  LAST 1047   00,2231  50 000 1           INDEX  A
 1351                          00,2232  1 2233 0           TCF    +1              ORIGINAL SHIFT DIRECTION (BIT 9).
 1352     REF   1              00,2233  1 2332 0           TCF    RIGHT-          NEGATIVE SHIFT COUNT FOR SL OR SLR.
 1353     REF   1              00,2234  1 2342 1           TCF    LEFT            SL OR SLR.
 1354     REF   1              00,2235  1 2336 1           TCF    LEFT-           NEGATIVE SHIFT COUNT WITH SR OR SRR.
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P1355               GENERAL SHIFT RIGHT.

 1356   REF  31  LAST 1040   00,2236  10 163 1  RIGHT     CCS      MODE               SEE IF VECTOR OR SCALAR.
 1357   REF   1              00,2237  1 2277 0            TCF      GENSCR
 1358   REF   2  LAST 1048   00,2240  1 2277 0            TCF      GENSCR

 1359   REF  33  LAST 1047   00,2241  3 0135 0            CA       MPTEMP             SEE IF SHIFT COUNT LESS THAN 140.
 1360   REF   1              00,2242  6 3733 0  VRIGHT2   AD       NEG12
 1361                        00,2243  0 0006 1            EXTEND
 1362   REF   1              00,2244  6 2127 1            BZMF     VSSR               IF SO, BRANCH AND SHIFT IMMEDIATELY.

 1363   REF   8  LAST 1037   00,2245  6 7752 0            AD       NEGONE             IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
 1364   REF  34  LAST 1048   00,2246  54 135 1            TS       MPTEMP             AND DO A SHIFT RIGHT AND ROUND BY 14.
 1365   REF 198  LAST 1042   00,2247  3 4755 1            CAF      ZERO               THE ROUND AT THIS STAGE MAY INTRODUCE A
 1366   REF 199  LAST 1042   00,2250  54 001 1            TS       L                  ONE BIT ERROR IN A SHIFT RIGHT 150.
 1367   REF 549  LAST 1046   00,2251  56 154 1            XCH      MPAC
 1368   REF 550  LAST 1048   00,2252  56 155 0            XCH      MPAC +1
 1369   REF   1              00,2253  0 2272 1            TC       SETROUND           X COMPONENT NOW SHIFTED, SO MAKE UP THE
 1370   REF 551  LAST 1048   00,2254  20 155 1            DAS      MPAC               ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1371                                                                                 IN L).
 1372   REF 552  LAST 1048   00,2255  56 157 1            XCH      MPAC +3            REPEAT THE ABOVE PROCESS FOR Y AND Z.
 1373   REF 553  LAST 1048   00,2256  56 160 0            XCH      MPAC +4
 1374   REF   2  LAST 1048   00,2257  0 2272 1            TC       SETROUND
 1375   REF 554  LAST 1048   00,2260  20 160 1            DAS      MPAC +3            NO OVERFLOW ON THESE ADDS.

 1376   REF 555  LAST 1048   00,2261  56 161 1            XCH      MPAC +5
 1377   REF 556  LAST 1048   00,2262  56 162 1            XCH      MPAC +6
 1378   REF   3  LAST 1048   00,2263  0 2272 1            TC       SETROUND
 1379   REF 557  LAST 1048   00,2264  20 162 0            DAS      MPAC +5

 1380   REF  35  LAST 1048   00,2265  10 135 1            CCS      MPTEMP             SEE IF DONE, DOING FINAL DECREMENT.
 1381   REF  36  LAST 1048   00,2266  54 135 1            TS       MPTEMP
 1382   REF   1              00,2267  1 2242 0            TCF      VRIGHT2
 1383                        00,2270   04604 1  BIASLO    DEC      .2974 B-1          SQRT CONSTANT

 1384   REF  28  LAST 1047   00,2271  1 6064 1            TCF      DANZIG


 1385                        00,2272  6 0000 1  SETROUND  DOUBLE                      MAKES UP ROUNDING QUANTITY FROM ARRIVING
 1386   REF 558  LAST 1048   00,2273  54 156 1            TS       MPAC +2            C(A). L IS ZERO INITIALLY.
 1387   REF 199  LAST 1048   00,2274  3 4755 1            CAF      ZERO
 1388   REF 200  LAST 1048   00,2275  56 001 0            XCH      L
 1389   REF 281  LAST 1042   00,2276  0 0002 0            TC       Q                  RETURN AND DO THE DAS, RESETTING L TO 0.
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P1390               PROCESS SR AND SRR FOR SCALARS.

 1391   REF  37  LAST 1048   00,2277  3 0135 0  GENSCR   CA      MPTEMP          SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
 1392   REF   2  LAST 1048   00,2300  6 3733 0   +1      AD      NEG12           THAN 14D.
 1393                        00,2301  0 0006 1           EXTEND
 1394   REF   1              00,2302  6 2322 0           BZMF    DOSSHFT         DO THE SHIFT IMMEDIATELY IF SO.

 1395   REF   9  LAST 1048   00,2303  6 7752 0   +4      AD      NEGONE          IF NOT, DECREMENT SHIFT COUNT BY 14D AND
 1396   REF  38  LAST 1049   00,2304  54 135 1           TS      MPTEMP          SHIFT MPAC RIGHT 14 PLACES.
 1397   REF 200  LAST 1048   00,2305  3 4755 1           CAF     ZERO
 1398   REF 559  LAST 1048   00,2306  56 154 1           XCH     MPAC
 1399   REF 560  LAST 1049   00,2307  56 155 0           XCH     MPAC +1
 1400   REF 561  LAST 1049   00,2310  54 156 1           TS      MPAC +2
 1401   REF  39  LAST 1049   00,2311  10 135 1           CCS     MPTEMP          SEE IF FINISHED, OR FINAL DECREMENT.
 1402   REF  40  LAST 1049   00,2312  54 135 1           TS      MPTEMP
 1403   REF   3  LAST 1048   00,2313  0 2300 0           TC      GENSCR +1
 1404                        00,2314   22650 1  SLOPEHI  DEC     .5884           SQRT CONSTANT.
 1405   REF  34  LAST 1047   00,2315  3 4742 1           CAF     BIT10           FINISHED WITH SHIFT. SEE IF ROUND
 1406   REF  77  LAST 1047   00,2316  7 0116 0           MASK    ADDRWD          WANTED.
 1407   REF 338  LAST 1047   00,2317  10 000 0           CCS     A
 1408   REF   4  LAST 1047   00,2320  0 7141 1           TC      ROUNDSUP
 1409   REF  29  LAST 1048   00,2321  1 6064 1           TCF     DANZIG          DO SO AND/OR EXIT.

 1410   REF  41  LAST 1049   00,2322  50 135 0  DOSSHFT  INDEX   MPTEMP          PICK UP SHIFTING BIT.
 1411   REF  61  LAST 1044   00,2323  3 4736 1           CAF     BIT14
 1412   REF  42  LAST 1049   00,2324  54 135 1           TS      MPTEMP
 1413   REF  35  LAST 1049   00,2325  3 4742 1           CAF     BIT10           SEE IF TERMINAL ROUND DESIRED.
 1414   REF  78  LAST 1049   00,2326  7 0116 0           MASK    ADDRWD
 1415   REF 339  LAST 1049   00,2327  10 000 0           CCS     A
 1416   REF   1              00,2330  1 2031 0           TCF     RIGHTR          YES.
 1417   REF   1              00,2331  1 2033 1           TCF     MPACSHR         JUST SHIFT RIGHT.
```

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P1418            PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

 1420   REF  43  LAST 1049   00,2332  4 0135 1  RIGHT-    CS       MPTEMP             GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
 1421   REF   1              00,2333  6 2126 0            AD       OCT176             UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
 1422   REF  44  LAST 1050   00,2334  54 135 1            TS       MPTEMP             WAS 1 INITIALLY.
 1423   REF   1              00,2335  1 2236 0            TCF      RIGHT              DO NORMAL SHIFT RIGHT.

 1424   REF   2  LAST 1050   00,2336  4 2126 1  LEFT-     CS       OCT176             SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
 1425   REF  45  LAST 1050   00,2337  6 0135 0            AD       MPTEMP             SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
 1426                        00,2340  4 0000 0            COM
 1427   REF  46  LAST 1050   00,2341  54 135 1            TS       MPTEMP

 1428   REF  32  LAST 1048   00,2342  10 163 1  LEFT      CCS      MODE               SINCE LEFT SHIFTING IS DONE ONE PLACE AT
 1429   REF   1              00,2343  1 2346 0            TCF      GENSCL             A TIME, NO COMPARISON WITH 14 NEED BE
 1430   REF   2  LAST 1050   00,2344  1 2346 0            TCF      GENSCL             DONE. FOR SCALARS, SEE IF TERMINAL ROUND
 1431   REF   3  LAST 1045   00,2345  1 2145 1            TCF      VSSL               DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

 1432   REF  79  LAST 1049   00,2346  4 0116 0  GENSCL    CS       ADDRWD             PUT ROUNDING BIT (BIT 10 OF ADDRWD)INTO
 1433                        00,2347  0 0006 1            EXTEND                      BIT 15 OF CYR WHERE THE ROUNDING BIT OF
 1434   REF  47  LAST  893   00,2350  7 4746 1            MP       BIT6               A SHORT SHIFT LEFT WOULD BE
 1435   REF  31  LAST 1044   00,2351  54 020 1            TS       CYR
 1436   REF   3  LAST 1043   00,2352  1 2103 0            TCF      TSSL +2            DO THE SHIFT.
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P1437              SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1439       AND THE DIVISOR IN BUF.

 1440       REF 108   LAST 1039    00,2353   4 4753 0   DDV/BDDV CS      ONE             INITIALIZATION.
 1441       REF   1                00,2354  54 136 1             TS      DVSIGN          +1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
 1442       REF   1                00,2355  54 137 0             TS      DVNORMCT        DIVIDEND NORMALIZATION COUNT.
 1443       REF   1                00,2356  54 140 0             TS      MAXDVSW         NEAR-ONE DIVIDE FLAG.

 1444       REF  93   LAST 1039    00,2357  10 130 1             CCS     BUF             FORCE BUF POSITIVE WITH THE MAJOR PART
 1445       REF   1                00,2360   1 2516 0            TCF     BUFPOS          NON-ZERO.
 1446                              00,2361   1 2363 1            TCF     +2
 1447       REF   1                00,2362   1 2531 0            TCF     BUFNEG

 1448       REF 562   LAST 1049    00,2363  54 156 1   BUFZERO   TS      MPAC +2         ZERO THIS.
 1449       REF  13   LAST 1046    00,2364   0 7262 0            TC      TPAGREE         FORCE SIGN AGREEMENT BEFORE OVERFLOW

 1450       REF 563   LAST 1051    00,2365  10 154 0             CCS     MPAC            TEST TO SEE IF MPAC NON-ZERO.  (TOO BIG)
 1451       REF   1                00,2366   1 2414 0            TCF     DVF+            MAJOR PART OF DIVIDEND IS POSITIVE NON-0
 1452                              00,2367   1 2371 1            TCF     +2
 1453       REF   2   LAST 1051    00,2370   1 2413 1            TCF     DVF+  -1        MAJOR PART OF DIVIDEND IS NEG. NON-ZERO

 1454       REF  94   LAST 1051    00,2371  56 131 1             XCH     BUF +1          SHIFT DIVIDEND AND DIVISOR LEFT 14.
 1455       REF  95   LAST 1051    00,2372  56 130 0             XCH     BUF
 1456       REF 564   LAST 1051    00,2373  56 155 0             XCH     MPAC +1
 1457       REF 565   LAST 1051    00,2374  56 154 1             XCH     MPAC
 1458       REF  96   LAST 1051    00,2375  10 130 1             CCS     BUF             TRY AGAIN ON FORMER MINOR PART.
 1459       REF   1                00,2376   1 2422 0            TCF     BUF+
 1460                              00,2377   1 2401 1            TCF     +2              OVERFLOW ON ZERO DIVISOR.
 1461       REF   1                00,2400   1 2416 1            TCF     BUF-

 1462       REF 566   LAST 1051    00,2401   4 0154 0            CS      MPAC            SIGN OF MPAC DETERMINES SIGN OF RESULT.
 1463                              00,2402   0 0006 1  SGNDVOVF  EXTEND
 1464                              00,2403   6 2405 1            BZMF    +2
 1465       REF   2   LAST 1051    00,2404  24 136 0             INCR    DVSIGN          NEGMAX IN MPAC PERHAPS.
 1466       REF  27   LAST 1030    00,2405   3 4733 1  DVOVF     CAF     POSMAX          ON DIVISION OVERFLOW OF ANY SORT, SET
 1467       REF 567   LAST 1051    00,2406  54 154 0             TS      MPAC            SET UP MPAC TO +-POSMAX.
 1468       REF   1                00,2407   0 2630 0            TC      FINALDV +3
 1469       REF 109   LAST 1051    00,2410   3 4753 1            CAF     ONE             SET OVERFLOW INDICATOR AND EXIT.
 1470       REF   5   LAST 1043    00,2411  54 121 1             TS      OVFIND
 1471       REF  30   LAST 1049    00,2412   0 6064 0            TC      DANZIG


 1472       REF   3   LAST 1051    00,2413  24 136 0   -1        INCR    DVSIGN
 1473       REF  97   LAST 1051    00,2414   4 0131 0  DVF+      CS      BUF +1          LOAD LOWER ORDER PART OF DIVISOR.
 1474       REF   1                00,2415   1 2402 1            TCF     SGNDVOVF        GET SIGN OF RESULT.

 1475                              00,2416   0 0006 1  BUF-      EXTEND                  IF BUF IS NEGATIVE, COMPLEMENT IT AND
 1476       REF  98   LAST 1051    00,2417   4 0131 0            DCS     BUF             MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
 1477       REF  99   LAST 1051    00,2420  52 131 0             DXCH    BUF
 1478       REF   4   LAST 1051    00,2421  24 136 0             INCR    DVSIGN          NOW -0.
 1479   REF 568  LAST 1051   00,2422  10 154 0  BUF+      CCS     MPAC           FORCE MPAC POSITIVE, CHECKING FOR ZERO
 1480   REF   1              00,2423  1 2437 1            TCF     MPAC+          DIVIDEND IN THE PROCESS.
 1481                        00,2424  1 2426 1            TCF     +2
 1482   REF   1              00,2425  1 2433 0            TCF     MPAC-
 1483   REF 569  LAST 1052   00,2426  10 155 1            CCS     MPAC +1
 1484   REF   2  LAST 1052   00,2427  1 2437 1            TCF     MPAC+
 1485   REF  31  LAST 1051   00,2430  1 6064 1            TCF     DANZIG         EXIT IMMEDIATELY ON ZERO DIVIDEND.
 1486   REF   2  LAST 1052   00,2431  1 2433 0            TCF     MPAC-
 1487   REF  32  LAST 1052   00,2432  1 6064 1            TCF     DANZIG

 1488                        00,2433  0 0006 1  MPAC-     EXTEND                 FORCE MPAC POSITIVE AS BUF IN BUF-.
 1489   REF 570  LAST 1052   00,2434  4 0155 1            DCS     MPAC
 1490   REF 571  LAST 1052   00,2435  52 155 1            DXCH    MPAC
 1491   REF   5  LAST 1051   00,2436  24 136 0            INCR    OVSIGN         NOW +1 OR -0.
 1492   REF 572  LAST 1052    00,2437   4 0154 0   MPAC+      CS       MPAC                    CHECK FOR DIVISION OVERFLOW. IF THE
 1493   REF  10  LAST 1049    00,2440   6 7752 0              AD       NEGONE                  MAJOR PART OF THE DIVIDEND IS LESS THAN
 1494   REF 100  LAST 1051    00,2441   6 0130 0              AD       BUF                     THE MAJOR PART OF THE DIVISOR BY AT
 1495   REF 340  LAST 1049    00,2442   10 000 0              CCS      A                       LEAST TWO, WE CAN PROCEED IMMEDIATELY
 1496   REF   1               00,2443   1 2505 1              TCF      DVNORM                  WITHOUT NORMALIZATION PRODUCING A OVMAX,
 1497                         00,2444    60001 0   -1/2+2     OCT      60001                   USED IN SQRTSUB.

 1498                         00,2445   1 2446 1              TCF      +1                      IF THE ABOVE DOES NOT HOLD, FORCE SIGN
 1499   REF  14  LAST 1037    00,2446   3 4736 1              CAF      HALF                    AGREEMENT IN NUMERATOR AND DENOMINATOR
 1500                         00,2447   6 0000 1              DOUBLE                           TO FACILITATE OVERFLOW AND NEAR-ONE
 1501   REF 573  LAST 1053    00,2450   6 0155 0              AD       MPAC +1                 CHECKING.
 1502   REF 574  LAST 1053    00,2451   54 155 1              TS       MPAC +1
 1503   REF 201  LAST 1049    00,2452   3 4755 1              CAF      ZERO
 1504   REF  28  LAST 1051    00,2453   6 4733 1              AD       POSMAX
 1505   REF 575  LAST 1053    00,2454   26 154 0              ADS      MPAC

 1506   REF  15  LAST 1053    00,2455   3 4736 1              CAF      HALF                    SAME FOR BUF.
 1507                         00,2456   6 0000 1              DOUBLE
 1508   REF 101  LAST 1053    00,2457   6 0131 1              AD       BUF +1
 1509   REF 102  LAST 1053    00,2460   54 131 0              TS       BUF +1
 1510   REF 202  LAST 1053    00,2461   3 4755 1              CAF      ZERO
 1511   REF  29  LAST 1053    00,2462   6 4733 1              AD       POSMAX
 1512   REF 103  LAST 1053    00,2463   26 130 1              ADS      BUF

 1513   REF 576  LAST 1053    00,2464   4 0154 0              CS       MPAC                    CHECK MAGNITUDE OF SIGN-CORRECTED
 1514   REF 104  LAST 1053    00,2465   6 0130 0              AD       BUF                     OPERANDS.
 1515   REF 341  LAST 1053    00,2466   10 000 0              CCS      A
 1516   REF   2  LAST 1053    00,2467   1 2505 1              TCF      DVNORM                  DIVIDE OK - WILL NOT BECOME MAXDV CASE.
 1517   REF  15  LAST 1033    00,2470    00133 0   LBUF2      ADRES    BUF2
 1518   REF   1               00,2471   1 2405 0              TCF      DVOVF                   DIVISOR NOT LESS THAN DIVIDEND - OVF.

 1519   REF   2  LAST 1051    00,2472   54 140 0              TS       MAXDVSW                 IF THE MAJOR PARTS OF THE DIVIDEND AND
 1520   REF 577  LAST 1053    00,2473   4 0155 1              CS       MPAC +1                 DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
 1521   REF 105  LAST 1053    00,2474   6 0131 1              AD       BUF +1                  TION IS USED (PROVIDED THE DIVISION IS
 1522                         00,2475   0 0006 1              EXTEND                           POSSIBLE, OF COURSE).
 1523   REF   2  LAST 1053    00,2476   6 2405 1              BZMF     DVOVF
 1524   REF   3  LAST 1053    00,2477   1 2505 1              TCF      DVNORM                  IF NO OVERFLOW.
 1525                          00,2500   0 0006 1  BUFNORM   EXTEND                     ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
 1526   REF   2  LAST 1051     00,2501  24 137 1            AUG      DVNORMCT          LEFT ONE PLACE.
 1527                          00,2502   0 0006 1            EXTEND
 1528   REF 106  LAST 1053     00,2503   3 0131 1            DCA      BUF
 1529   REF 107  LAST 1054     00,2504  20 131 0            DAS      BUF

 1530   REF 108  LAST 1054     00,2505   3 0130 0  DVNORM    CA       BUF               SEE IF DIVISOR NORMALIZED YET.
 1531                          00,2506   6 0000 1            DOUBLE
 1532                          00,2507  54 000 0            OVSK
 1533   REF   1                00,2510   1 2500 1            TCF      BUFNORM           NO - SHIFT LEFT ONE AND TRY AGAIN.

 1534   REF 578  LAST 1053     00,2511  52 155 1            DXCH     MPAC              CALL DIVIDEND NORMALIZATION SEQUENCE
 1535   REF   3  LAST 1054     00,2512  50 137 1            INDEX    DVNORMCT          PRIOR TO DOING THE DIVIDE
 1536   REF   1                00,2513   0 2565 0            TC       MAXTEST

 1537   REF 579  LAST 1054     00,2514  54 156 1            TS       MPAC +2           RETURNS WITH DIVISION DONE AND C(A) = 0.
 1538   REF  33  LAST 1052     00,2515   1 6064 1            TCF      DANZIG

 1539   REF 342  LAST 1053     00,2516  10 000 0  BUFPOS    CCS      A
 1540   REF   2  LAST 1051     00,2517   1 2422 0            TCF      BUF+              TO BUF+ IF BUF IS GREATER THAN +1.

 1541   REF 109  LAST 1054     00,2520   4 0131 0            CS       BUF +1            IF BUF IS +1, FORCING SIGN AGREEMENT
 1542                          00,2521   0 0006 1            EXTEND                     MAY CAUSE BUF TO BECOME ZERO.
 1543   REF   3  LAST 1054     00,2522   6 2422 1            BZMF     BUF+              BRANCH IF SIGNS AGREE.

 1544   REF  16  LAST 1053     00,2523   3 4736 1            CA       HALF              SIGNS DISAGREE.  FORCE AGREEMENT.
 1545                          00,2524   6 0000 1   +6       DOUBLE
 1546   REF 110  LAST 1054     00,2525  26 131 0            ADS      BUF +1
 1547   REF 203  LAST 1053     00,2526   3 4755 1            CA       ZERO
 1548   REF 111  LAST 1054     00,2527  54 130 1            TS       BUF
 1549   REF   1                00,2530   1 2363 1            TCF      BUFZERO


 1550   REF 343  LAST 1054     00,2531  10 000 0  BUFNEG    CCS      A
 1551   REF   2  LAST 1051     00,2532   1 2416 1            TCF      BUF-              TO BUF- IF BUF IS LESS THAN -1.

 1552   REF 112  LAST 1054     00,2533   3 0131 1            CA       BUF +1            IF BUF IS -1, FORCING SIGN AGREEMENT
 1553                          00,2534   0 0006 1            EXTEND                     MAY CAUSE BUF TO BECOME ZERO.
 1554   REF   3  LAST 1054     00,2535   6 2416 0            BZMF     BUF-              BRANCH IF SIGNS AGREE.

 1555   REF  17  LAST 1054     00,2536   4 4736 0            CS       HALF              SIGNS DISAGREE.  FORCE AGREEMENT.
 1556   REF   2  LAST 1051     00,2537   1 2524 1            TCF      BUFPOS +6
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P1557             THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

 1559   REF  14  LAST 1043   00,2540  22 021 1   -21D     LXCH    SR              SPECIAL PROLOGUE FOR UNIT WHEN THE
 1560                        00,2541  0 0006 1            EXTEND                  LENGTH OF THE ARGUMENT WAS NOT LESS THAN
 1561   REF  18  LAST 1054   00,2542  7 4736 0            MP      HALF            .5. IN THIS CASE, EACH COMPONENT MUST BE
 1562   REF 201  LAST 1048   00,2543  56 001 0            XCH     L               SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
 1563   REF  15  LAST 1055   00,2544  6 0021 1            AD      SR              VECTOR.
 1564   REF 202  LAST 1055   00,2545  56 001 0            XCH     L
 1565   REF   1              00,2546  1 2571 1            TCF     GENDOV +1       WITH OP DIVIDEND IN A,L.

 1566                        00,2547  20 001 1            DDOUBL                  PROLOGUE WHICH NORMALIZES THE DIVIDEND
 1567                        00,2550  20 001 1            DDOUBL                  WHEN IT IS KNOWN THAT NO DIVISION
 1568                        00,2551  20 001 1            DDOUBL                  OVERFLOW WILL OCCUR.
 1569                        00,2552  20 001 1            DDOUBL
 1570                        00,2553  20 001 1            DDOUBL
 1571                        00,2554  20 001 1            DDOUBL
 1572                        00,2555  20 001 1            DDOUBL
 1573                        00,2556  20 001 1            DDOUBL
 1574                        00,2557  20 001 1            DDOUBL
 1575                        00,2560  20 001 1            DDOUBL
 1576                        00,2561  20 001 1            DDOUBL
 1577                        00,2562  20 001 1            DDOUBL
 1578                        00,2563  20 001 1            DDOUBL
 1579   REF 580  LAST 1054   00,2564  52 155 1            DXCH    MPAC

 1580   REF   3  LAST 1053   00,2565  10 140 0  MAXTEST   CCS     MAXDVSW         0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
 1581                        00,2566   06552 0  BIASHI    DEC     .4192 B-1       SQRT CONSTANTS

 1582   REF   1              00,2567  1 2642 1            TCF     MAXDV           CHECK TO SEE IF THEY ARE NOW EQUAL.
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P1583          THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R1585     THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R1586          1. THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1587          2. THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R1589     (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1591          UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R1593     TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R1595     ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1597          A + SB .     (R - QD)                                                A + SB
R1599          ------ = Q + S(------) WHERE Q AND R ARE QUOTIENT AND REMAINDER OF ------ RESPECTIVELY.
R1601          C + SC        (  C   )                                                 C


 1603   REF 581  LAST 1055   00,2570  52 155 1  GENDDV    DXCH   MPAC            WE NEED A AND B ONLY FOR FIRST DV.
 1604                        00,2571  0 0006 1   +1       EXTEND                 (SPECIAL UNIT PROLOGUE ENTERS HERE).
 1605   REF 113  LAST 1054   00,2572  10 130 1            DV     BUF             A NOW CONTAINS Q AND L, R.
 1606   REF 582  LAST 1056   00,2573  52 155 1            DXCH   MPAC

 1607   REF 583  LAST 1056   00,2574  4 0154 0            CS     MPAC            FORM DIVIDEND FOR MINOR PART OF RESULT.
 1608                        00,2575  0 0006 1            EXTEND
 1609   REF 114  LAST 1056   00,2576  7 0131 0            MP     BUF +1
 1610   REF 584  LAST 1056   00,2577  6 0155 0            AD     MPAC +1         OVERFLOW AT THIS POINT IS POSITIVE SINCE
 1611                        00,2600  54 000 0            OVSK                   R IS POSITIVE IN EVERY CASE.
 1612                        00,2601  1 2606 1            TCF    +5

 1613                        00,2602  0 0006 1            EXTEND                 OVERFLOW CAN BE REMOVED BY SUBTRACTING C
 1614   REF 115  LAST 1056   00,2603  60 130 0            SU     BUF             (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
 1615   REF 585  LAST 1056   00,2604  24 154 1            INCR   MPAC            IN THIS CASE. INCR COMPENSATES SUBTRACT.
 1616   REF   1              00,2605  1 2610 0            TCF    +DOWN           (SINCE C(A) IS STILL POSITIVE).

 1617                        00,2606  0 0006 1   +5       EXTEND                 C(A) CAN BE MADE LESS THAN C IN MAGNI-
 1618   REF   1              00,2607  6 2620 1            BZMF   -UP             TUDE BY DIMINISHING IT BY C (SINCE C IS
A1619                                                                            NOT LESS THAN .5) UNLESS C(A) = 0.
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 1620                        00,2610  0 0006 1   +DOWN      EXTEND                              IF POSITIVE, REDUCE ONLY IF NECESSARY
 1621   REF 116  LAST 1056   00,2611  60 130 0              SU        BUF
 1622                        00,2612  0 0006 1              EXTEND                              SINCE THE COMPENSATING INCR MIGHT CAUSE
 1623                        00,2613  1 2616 0              BZF       +3                        OVERFLOW.
 1624                        00,2614  0 0006 1              EXTEND                              DONT SUBTRACT UNLESS RESULT IS POSITIVE
 1625   REF   1              00,2615  6 2624 0              BZMF      ENDMAXDV                  OR ZERO.

 1626   REF 586  LAST 1056   00,2616  24 154 1    +3        INCR      MPAC                      KEEP SUBTRACT HERE AND COMPENSATE.
 1627   REF   2  LAST 1051   00,2617  1 2625 0              TCF       FINALDV

 1628                        00,2620  0 0006 1   -UP        EXTEND                              IF ZERO, SET MINOR PART OF RESULT TO
 1629   REF   3  LAST 1057   00,2621  1 2630 1              BZF       FINALDV +3                ZERO.

 1630                        00,2622  0 0006 1              EXTEND                              IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
 1631   REF 587  LAST 1057   00,2623  26 154 0              DIM       MPAC                      TO COMPENSATE. DIM IS OK HERE SINCE THE
 1632   REF 117  LAST 1057   00,2624  6 0130 0   ENDMAXDV   AD        BUF                       MAJOR PART NEVER GOES NEGATIVE.
 1633                          00,2625  22 007 0  FINALOV  ZL                     DC OV TO OBTAIN MINOR PART OF RESULT.
 1634                          00,2626  0 0006 1           EXTEND
 1635   REF 118  LAST 1057     00,2627  10 130 1           DV      BUF
 1636   REF 588  LAST 1057     00,2630  54 155 1   +3      TS      MPAC +1

 1637   REF   6  LAST 1052     00,2631  10 136 1           CCS     DVSIGN         LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
 1638   REF 282  LAST 1048     00,2632  0 0002 0           TC      Q              -0.
 1639   REF 283  LAST 1058     00,2633  0 0002 0           TC      Q
 1640   REF 284  LAST 1058     00,2634  0 0002 0           TC      Q

 1641                          00,2635  0 0006 1           EXTEND
 1642   REF 589  LAST 1058     00,2636  4 0155 1           DCS     MPAC
 1643   REF 590  LAST 1058     00,2637  52 155 1           DXCH    MPAC
 1644   REF 204  LAST 1054     00,2640  3 4755 1           CAF     ZERO           SO WE ALWAYS RETURN WITH C(A) = 0.
 1645   REF 285  LAST 1058     00,2641  0 0002 0           TC      Q
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R1646              IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1648    DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1650    ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

R1652                        C + SB .         (C + B - D)
R1653                        ------ = 37777 + S(---------)
R1654                        C + SD           (     C    )

R1655              THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.

 1657    REF 591  LAST 1058    00,2642  4 0154 0  MAXDV    CS     MPAC               SEE IF MAXDV CASE STILL HOLDS AFTER
 1658    REF 119  LAST 1058    00,2643  6 0130 0           AD     BUF                NORMALIZATION.
 1659                          00,2644  0 0006 1           EXTEND
 1660                          00,2645  1 2647 1           BZF    +2
 1661    REF   2  LAST 1055    00,2646  1 2570 0           TCF    GENDDV             MPAC NOW LESS THAN BUF - DIVIDE AS USUAL

 1662    REF  30  LAST 1053    00,2647  3 4733 1   +2      CAF    POSMAX             SET MAJOR PART OF RESULT.
 1663    REF 592  LAST 1059    00,2650  54 154 0           TS     MPAC

 1664    REF 120  LAST 1059    00,2651  4 0131 0           CS     BUF +1             FORM DIVIDEND OF MINOR PART OF RESULT.
 1665    REF 593  LAST 1059    00,2652  6 0155 0           AD     MPAC +1
 1666    REF   2  LAST 1057    00,2653  1 2624 1           TCF    ENDMAXDV           GO ADD C AND DO DIVIDE, ATTACHING SIGN
A1667                                                                                BEFORE EXITING.
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P1668              VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

 1670   REF 110  LAST 1051   00,2654  4 4753 0  V/SC2     CS      ONE             INITIALIZE DIVIDEND NORMALIZATION COUNT
 1671   REF   4  LAST 1054   00,2655  54 137 0            TS      DVNORMCT        AND DIVISION SIGN REGISTER.
 1672   REF  53  LAST 1037   00,2656  54 127 1            TS      VBUF +5

 1673   REF   1              00,2657  0 3010 0            TC      VECAGREE        FORCE SIGN AGREEMENT IN VECTOR

 1674   REF 121  LAST 1059   00,2660  52 131 0            DXCH    BUF
 1675   REF   2  LAST  878   00,2661  0 7547 0            TC      ALSIGNAG        SIGN AGREE BUF
 1676   REF 122  LAST 1060   00,2662  52 131 0            DXCH    BUF
 1677   REF 123  LAST 1060   00,2663  10 130 1            CCS     BUF             FORCE DIVISOR POSITIVE WITH MAJOR PART
 1678   REF   1              00,2664  1 2721 0            TCF     /BUF+           NON-ZERO (IF POSSIBLE).
 1679                        00,2665  1 2667 0            TCF     +2
 1680   REF   1              00,2666  1 2715 1            TCF     /BUF-

 1681   REF 124  LAST 1060   00,2667  56 131 1            XCH     BUF +1          SHIFT VECTOR AND SCALAR LEFT 14.
 1682   REF 125  LAST 1060   00,2670  56 130 0            XCH     BUF
 1683   REF 594  LAST 1059   00,2671  56 155 0            XCH     MPAC +1
 1684   REF 595  LAST 1060   00,2672  56 154 1            XCH     MPAC
 1685                        00,2673  0 0006 1            EXTEND                  CHECK FOR OVERFLOW IN EACH CASE.
 1686                        00,2674  1 2676 0            BZF     +2
 1687   REF   3  LAST 1053   00,2675  1 2405 0            TCF     DVOVF

 1688   REF 596  LAST 1060   00,2676  56 160 0            XCH     MPAC +4
 1689   REF 597  LAST 1060   00,2677  56 157 1            XCH     MPAC +3
 1690                        00,2700  0 0006 1            EXTEND
 1691                        00,2701  1 2703 0            BZF     +2
 1692   REF   4  LAST 1060   00,2702  1 2405 0            TCF     DVOVF

 1693   REF 598  LAST 1060   00,2703  56 162 1            XCH     MPAC +6
 1694   REF 599  LAST 1060   00,2704  56 161 1            XCH     MPAC +5
 1695                        00,2705  0 0006 1            EXTEND
 1696                        00,2706  1 2710 1            BZF     +2
 1697   REF   5  LAST 1060   00,2707  1 2405 0            TCF     DVOVF

 1698   REF 126  LAST 1060   00,2710  10 130 1            CCS     BUF
 1699   REF   2  LAST 1060   00,2711  1 2721 0            TCF     /BUF+
 1700   REF   6  LAST 1060   00,2712  1 2405 0            TCF     DVOVF           ZERO DIVISOR - OVERFLOW.
 1701   REF   2  LAST 1060   00,2713  1 2715 1            TCF     /BUF-
 1702   REF   7  LAST 1060   00,2714  1 2405 0            TCF     DVOVF

 1703                        00,2715  0 0006 1  /BUF-     EXTEND                  ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
 1704   REF 127  LAST 1060   00,2716  4 0131 0            DCS     BUF             DVSIGN IN VBUF +5.
 1705   REF 128  LAST 1060   00,2717  52 131 0            DXCH    BUF
 1706   REF  54  LAST 1060   00,2720  24 127 0            INCR    VBUF +5
 1707                              00,2721  0 0006 1  /BUF+     EXTEND
 1708   REF 129  LAST 1060        00,2722  3 0131 1            DCA      BUF                 LEAVE ABS(ORIG DIVISOR) IN BUF2
 1709   REF  16  LAST 1053        00,2723  52 134 0            DXCH     BUF2                FOR OVERFLOW TESTING
 1710   REF   1                   00,2724  1 2732 1            TCF      /NORM               NORMALIZE DIVISOR IN BUF.

 1711                              00,2725  0 0006 1  /NORM2    EXTEND                       IF LESS THAN .5, AUGMENT OVNORMCT AND
 1712   REF   5  LAST 1060        00,2726  24 137 1            AUG      OVNORMCT            DOUBLE DIVISOR.
 1713                              00,2727  0 0006 1            EXTEND
 1714   REF 130  LAST 1061        00,2730  3 0131 1            DCA      BUF
 1715   REF 131  LAST 1061        00,2731  20 131 0            DAS      BUF

 1716   REF 132  LAST 1061        00,2732  3 0130 0  /NORM     CA       BUF                 SEE IF DIVISOR NORMALIZED.
 1717                              00,2733  6 0000 1            DOUBLE
 1718                              00,2734  54 000 0            OVSK
 1719   REF   1                   00,2735  1 2725 1            TCF      /NORM2              DOUBLE AND TRY AGAIN IF NOT.

 1720   REF   1                   00,2736  0 2750 1            TC       V/SCDV              DO X COMPONENT DIVIDE.
 1721   REF 600  LAST 1060        00,2737  52 160 1            DXCH     MPAC +3             SUPPLY ARGUMENTS IN USUAL SEQUENCE.
 1722   REF 601  LAST 1061        00,2740  52 155 1            DXCH     MPAC
 1723   REF 602  LAST 1061        00,2741  52 160 1            DXCH     MPAC +3

 1724   REF   2  LAST 1061        00,2742  0 2750 1            TC       V/SCDV              Y COMPONENT.
 1725   REF 603  LAST 1061        00,2743  52 162 0            DXCH     MPAC +5
 1726   REF 604  LAST 1061        00,2744  52 155 1            DXCH     MPAC
 1727   REF 605  LAST 1061        00,2745  52 162 0            DXCH     MPAC +5

 1728   REF   3  LAST 1061        00,2746  0 2750 1            TC       V/SCDV              Z COMPONENT.
 1729   REF   2  LAST 1044        00,2747  1 7423 1            TCF      VROTATEX            GO RE-ARRANGE COMPONENTS BEFORE EXIT.
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P1730           SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC,+1 BY THE SCALAR GIVEN IN BUF.

 1732   REF  55  LAST 1060   00,2750  3 0127 0  V/SCDV   CA     VBUF +5          REFLECTS SIGN OF SCALAR.
 1733   REF   7  LAST 1058   00,2751  54 136 1           TS     DVSIGN

 1734   REF 606  LAST 1061   00,2752  10 154 0           CCS    MPAC             FORCE MPAC POSITIVE, EXITING ON ZERO.
 1735   REF   1              00,2753  1 2767 1           TCF    /MPAC+
 1736                        00,2754  1 2756 0           TCF    +2
 1737   REF   1              00,2755  1 2763 0           TCF    /MPAC-

 1738   REF 607  LAST 1062   00,2756  10 155 1           CCS    MPAC +1
 1739   REF   2  LAST 1062   00,2757  1 2767 1           TCF    /MPAC+
 1740   REF 286  LAST 1058   00,2760  0 0002 0           TC     Q
 1741   REF   2  LAST 1062   00,2761  1 2763 0           TCF    /MPAC-
 1742   REF 287  LAST 1062   00,2762  0 0002 0           TC     Q

 1743                        00,2763  0 0006 1  /MPAC-   EXTEND                  USUAL COMPLEMENTING AND SETTING OF SIGN.
 1744   REF 608  LAST 1062   00,2764  4 0155 1           DCS    MPAC
 1745   REF 609  LAST 1062   00,2765  52 155 1           DXCH   MPAC
 1746   REF   8  LAST 1062   00,2766  24 136 0           INCR   DVSIGN

 1747   REF 111  LAST 1060   00,2767  4 4753 0  /MPAC+   CS     ONE              INITIALIZE NEAR-ONE SWITCH.
 1748   REF   4  LAST 1055   00,2770  54 140 0           TS     MAXDVSW

 1749   REF 610  LAST 1062   00,2771  4 0154 0           CS     MPAC             CHECK POSSIBLE OVERFLOW.
 1750   REF  17  LAST 1061   00,2772  6 0133 0           AD     BUF2             UNNORMALIZED INPUT DIVISOR.
 1751   REF 344  LAST 1054   00,2773  10 000 0           CCS    A
 1752   REF   1              00,2774  1 3004 1           TCF    DDVCALL          NOT NEAR-ONE
 1753                        00,2775  1 2777 0           TCF    +2               +0 IS JUST POSSIBLE
 1754   REF   8  LAST 1060   00,2776  1 2405 0           TCF    DVOVF            NO HOPE
 1755   REF   5  LAST 1062   00,2777  54 140 0           TS     MAXDVSW          SIGNAL POSSIBLE NEAR-ONE CASE
 1756   REF 611  LAST 1062   00,3000  4 0155 1           CS     MPAC +1          SEE IF DIVISION CAN BE DONE
 1757   REF  18  LAST 1062   00,3001  6 0134 1           AD     BUF2 +1
 1758                        00,3002  0 0006 1           EXTEND
 1759   REF   9  LAST 1062   00,3003  6 2405 1           BZMF   DVOVF

 1760   REF 612  LAST 1062   00,3004  52 155 1  DDVCALL  DXCH   MPAC             CALL PRE-DIVIDE NORMALIZATION.
 1761   REF   6  LAST 1061   00,3005  50 137 1           INDEX  DVNORMCT
 1762   REF   2  LAST 1054   00,3006  1 2565 1           TCF    MAXTEST
 1763                              00,3607   32506 0  SLOPELO  DEC      .8324

 1764    REF 288  LAST 1062        00,3010   56 002 0  VECAGREE XCH      Q               SAVE Q IN A
 1765    REF 613  LAST 1062        00,3011   52 155 1           DXCH     MPAC
 1766    REF   3  LAST 1060        00,3012   0 7547 0           TC       ALSIGNAG         SIGNAGREE MPAC
 1767    REF 614  LAST 1063        00,3013   52 155 1           DXCH     MPAC
 1768    REF 615  LAST 1063        00,3014   52 160 1           DXCH     MPAC +3
 1769    REF   4  LAST 1063        00,3015   0 7547 0           TC       ALSIGNAG         SIGN AGREE MPAC +3
 1770    REF 616  LAST 1063        00,3016   52 160 1           DXCH     MPAC +3
 1771    REF 617  LAST 1063        00,3017   52 162 0           DXCH     MPAC +5
 1772    REF   5  LAST 1063        00,3020   0 7547 0           TC       ALSIGNAG         SIGNAGREE MPAC +5
 1773    REF 618  LAST 1063        00,3021   52 162 0           DXCH     MPAC +5
 1774    REF 345  LAST 1062        00,3022   0 0000 1           TC       A
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P1775              THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

 1777   REF   2  LAST 1060   00,3023  0 3010 0  UNIT     TC      VECAGREE        FORCE SIGN AGREEMENT IN VECTOR
 1778   REF   3  LAST 1033   00,3024  0 7535 0           TC      MPACVBUF        SAVE ARGUMENT IN VBUF
 1779   REF 205  LAST 1058   00,3025  3 4755 1           CAF     ZERO            MUST SENSE OVERFLOW IN FOLLOWING DOT.
 1780   REF   6  LAST 1051   00,3026 56 121 0            XCH     OVFIND
 1781   REF  20  LAST  919   00,3027 54 141 1            TS      TEM1
 1782   REF   1              00,3030  0 3317 1           TC      VSQSUB          DOT MPAC WITH ITSELF.
 1783   REF  21  LAST 1064   00,3031  3 0141 0           CA      TEM1
 1784   REF   7  LAST 1064   00,3032 56 121 0            XCH     OVFIND
 1785                        00,3033  0 0006 1           EXTEND
 1786                        00,3034  1 3036 0           BZF     +2
 1787   REF  10  LAST 1062   00,3035  1 2405 0           TCF     DVOVF
 1788                        00,3036  0 0006 1           EXTEND
 1789   REF 619  LAST 1063   00,3037  3 0155 0           DCA     MPAC            LEAVE THE SQUARE OF THE LENGTH OF THE
 1790   REF  46  LAST 1018   00,3040 50 120 1            INDEX   FIXLOC          ARGUMENT IN LVSQUARE.
 1791   REF   1              00,3041 52 043 1            DXCH    LVSQUARE

 1792   REF   1              00,3042  0 3343 0           TC      SQRTSUB         GO TAKE THE NORMALIZED SQUARE ROOT.

 1793   REF 620  LAST 1064   00,3043 10 154 0            CCS     MPAC            CHECK FOR UNIT OVERFLOW.
 1794                        00,3044  1 3051 1           TCF     +5              MPAC IS NOT LESS THAN .5 UNLESS
 1795   REF 203  LAST 1055   00,3045 54 001 1            TS      L
 1796   REF  47  LAST 1064   00,3046 50 120 1            INDEX   FIXLOC
 1797   REF   1              00,3047 52 045 1            DXCH    LV
 1798   REF  11  LAST 1064   00,3050  1 2405 0           TCF     DVOVF           INPUT TO SQRTSUB WAS 0.

 1799   REF   2  LAST  568   00,3051  4 4317 1           CS      FOURTEEN        SEE IF THE INPUT WAS SO SMALL THE THE
 1800   REF  47  LAST 1050   00,3052  6 0135 0           AD      MPTEMP          FIRST TWO REGISTERS OF THE SQUARE WERE 0
 1801   REF 346  LAST 1063   00,3053 10 000 0            CCS     A
 1802                        00,3054  4 0000 0           COM                     IF SO, SAVE THE NEGATIVE OF THE SHIFT
 1803   REF   1              00,3055  1 3133 1           TCF     SMALL           COUNT -15D.

 1804   REF   1              00,3056  1 3065 0           TCF     LARGE           (THIS IS USUALLY THE CASE.)

 1805   REF   1              00,3057  4 4761 1           CS      THIRTEEN        IF THE SHIFT COUNT WAS EXACTLY 14, SET
 1806   REF  48  LAST 1064   00,3060 54 135 1            TS      MPTEMP          THE PRE-DIVIDE NORM COUNT TO -13D.

 1807   REF 621  LAST 1064   00,3061  3 0154 1           CA      MPAC            SHIFT THE LENGTH RIGHT 14 BEFORE STORING
 1808   REF 204  LAST 1064   00,3062 54 001 1  SMALL2    TS      L               (SMALL EXITS TO THIS POINT).
 1809   REF 206  LAST 1064   00,3063  3 4755 1           CAF     ZERO
 1810   REF   1              00,3064  1 3112 1           TCF     LARGE2          GO TO STORE LENGTH AND PROCEED.

 1811   REF  49  LAST 1064   00,3065 10 135 1  LARGE     CCS     MPTEMP          MOST ALL CASES COME HERE.
 1812   REF   1              00,3066  1 3074 0           TCF     LARGE3          SEE IF NO NORMALIZATION WAS REQUIRED BY

 1813   REF   1              00,3067  4 2024 1           CS      SRDDV           SQRT, AND IF SO, SET UP FOR A SHIFT
 1814   REF  50  LAST 1064   00,3070 54 135 1            TS      MPTEMP          RIGHT 1 BEFORE DIVIDING TO PRODUCE
 1815                        00,3071  0 0006 1           EXTEND                  THE DESIRED HALF UNIT VECTOR.
 1816   REF 622  LAST 1064   00,3072  3 0155 0           DCA     MPAC
 1817   REF   2  LAST 1064   30,3073  1 3112 1           TCF     LARGE2
 1818                          00,3074  4 0000 0  LARGE3    COM                 LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
 1819    REF  51   LAST 1064   00,3075  54 135 1            TS       MPTEMP     PREDIVIDE LEFT SHIFT.

 1820                          00,3076  4 0000 0            COM                 PICK UP REQUIRED SHIFTING BIT TO UNNORM-
 1821    REF 347   LAST 1064   00,3077  50 000 1            INDEX    A          ALIZE THE SQRT RESULT.
 1822    REF  62   LAST 1049   00,3100  3 4736 1            CAF      BIT14
 1823    REF 133   LAST 1061   00,3101  54 130 1            TS       BUF
 1824                          00,3102  0 0006 1            EXTEND
 1825    REF 623   LAST 1064   00,3103  7 0155 1            MP       MPAC +1
 1826    REF 134   LAST 1066   00,3104  56 130 0            XCH      BUF
 1827                          00,3105  0 0006 1            EXTEND              (UNNORMALIZE THE SQRT FOR LV).
 1828    REF 624   LAST 1066   00,3106  7 0154 0            MP       MPAC
 1829    REF 205   LAST 1064   00,3107  56 001 0            XCH      L
 1830    REF 135   LAST 1066   00,3110  6 0130 0            AD       BUF
 1831    REF 206   LAST 1066   00,3111  56 001 0            XCH      L

 1832    REF  48   LAST 1064   00,3112  50 120 1  LARGE2    INDEX    FIXLOC
 1833    REF   2   LAST 1064   00,3113  52 045 1            DXCH     LV         LENGTH NOW STORED IN WORK AREA.

 1834    REF 112   LAST 1062   00,3114  4 4753 0            CS       ONE
 1835    REF   6   LAST 1062   00,3115  54 140 0            TS       MAXDVSW    NO MAXDV CASES IN UNIT.

 1836    REF  56   LAST 1062   00,3116  52 123 0            DXCH     VBUF       PREPARE X COMPONENT FOR DIVIDE, SETTING
 1837    REF 625   LAST 1066   00,3117  52 155 1            DXCH     MPAC       LENGTH OF VECTOR AS DIVISOR IN BUF.
 1838    REF 136   LAST 1066   00,3120  52 131 0            DXCH     BUF
 1839    REF   1               00,3121  0 3151 1            TC       UNITDV

 1840    REF  57   LAST 1066   00,3122  52 125 0            DXCH     VBUF +2    DO Y AND Z IN USUAL FASHION SO WE CAN
 1841    REF 626   LAST 1066   00,3123  52 155 1            DXCH     MPAC       EXIT THROUGH VROTATEX.
 1842    REF 627   LAST 1066   00,3124  52 160 1            DXCH     MPAC +3
 1843    REF   2   LAST 1066   00,3125  0 3151 1            TC       UNITDV

 1844    REF  58   LAST 1066   00,3126  52 127 1            DXCH     VBUF +4
 1845    REF 628   LAST 1066   00,3127  52 155 1            DXCH     MPAC
 1846    REF 629   LAST 1066   00,3130  52 162 0            DXCH     MPAC +5
 1847    REF   3   LAST 1066   00,3131  0 3151 1            TC       UNITDV
 1848    REF   3   LAST 1061   00,3132  1 7423 1            TCF      VROTATEX   AND EXIT.
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P1849              IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1851     14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

 1853     REF  52  LAST 1066   00,3133  54 135 1  SMALL     TS       MPTEMP          NEGATIVE OF PRE-DIVIDE SHIFT COUNT.

 1854     REF 207  LAST 1064   00,3134  3 4755 1            CAF      ZERO            SHIFT EACH COMPONENT LEFT 14.
 1855     REF  59  LAST 1066   00,3135  56 123 1            XCH      VBUF +1
 1856     REF  60  LAST 1067   00,3136  56 122 0            XCH      VBUF
 1857     REF  61  LAST 1067   00,3137  56 125 1            XCH      VBUF +3
 1858     REF  62  LAST 1067   00,3140  56 124 0            XCH      VBUF +2
 1859     REF  63  LAST 1067   00,3141  56 127 0            XCH      VBUF +5
 1860     REF  64  LAST 1067   00,3142  56 126 1            XCH      VBUF +4

 1861     REF  53  LAST 1067   00,3143  4 0135 1            CS       MPTEMP
 1862     REF 348  LAST 1066   00,3144  50 000 1            INDEX    A
 1863     REF  63  LAST 1066   00,3145  3 4736 1            CAF      BIT14
 1864                          00,3146  0 0006 1            EXTEND
 1865     REF 630  LAST 1066   00,3147  7 0154 0            MP       MPAC
 1866     REF   1              00,3150  1 3062 1            TCF      SMALL2

 1867     REF   4  LAST  945      4761            THIRTEEN =        OCT15
 1868     REF   1                 4317            FOURTEEN =        OCT16
 1869     REF  13  LAST  461      4317            OCT16    =        R101
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P1870              THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

 1871  REF 631  LAST 1067  00,3151  10 154 0  UNITDV  CCS     MPAC         FORCE MPAC POSITIVE IF POSSIBLE, SETTING
 1872  REF   1             00,3152  1 3170 0          TCF     UMPAC+       DVSIGN ACCORDING TO THE SIGN OF MPAC
 1873                      00,3153  1 3155 1          TCF     +2           SINCE THE DIVISOR IS ALWAYS POSITIVE
 1874  REF   1             00,3154  1 3162 0          TCF     UMPAC-       HERE.

 1875  REF 632  LAST 1068  00,3155  10 155 1          CCS     MPAC +1
 1876  REF   2  LAST 1068  00,3156  1 3170 0          TCF     UMPAC+
 1877  REF 289  LAST 1063  00,3157  0 0002 0          TC      Q            EXIT IMMEDIATELY ON ZERO.
 1878  REF   2  LAST 1068  00,3160  1 3162 0          TCF     UMPAC-
 1879  REF 290  LAST 1068  00,3161  0 0002 0          TC      Q

 1880  REF 208  LAST 1067  00,3162  4 4755 0  UMPAC-  CS      ZERO         IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
 1881  REF   9  LAST 1062  00,3163  54 136 1          TS      DVSIGN       COMPLEMENT.
 1882                      00,3164  0 0006 1          EXTEND
 1883  REF 633  LAST 1068  00,3165  4 0155 1          DCS     MPAC         PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
 1884  REF  54  LAST 1067  00,3166  50 135 0          INDEX   MPTEMP
 1885  REF   3  LAST 1062  00,3167  1 2564 0          TCF     MAXTEST -1

 1886  REF  10  LAST 1068  00,3170  54 136 1  UMPAC+  TS      DVSIGN       SET DVSIGN FOR POSITIVE QUOTIENT.
 1887  REF 634  LAST 1068  00,3171  52 155 1          DXCH    MPAC
 1888  REF  55  LAST 1068  00,3172  50 135 0          INDEX   MPTEMP
 1889  REF   4  LAST 1068  00,3173  1 2564 0          TCF     MAXTEST -1
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P1890             MISCELLANEOUS UNARY OPERATIONS.

 1891    REF    1                00,3174  0 3300 1  DSQ        TC       DSQSUB           SQUARE THE DP CONTENTS OF MPAC.
 1892    REF   34   LAST 1054    00,3175  1 6064 1             TCF      DANZIG

 1893    REF   33   LAST 1050    00,3176  10 163 1  ABVALABS   CCS      MODE             ABVAL OR ABS INSTRUCTION.
 1894    REF    3   LAST  819    00,3177  1 3226 0             TCF      ABS              DO ABS ON SCALAR.
 1895    REF    4   LAST 1069    00,3200  1 3226 0             TCF      ABS

 1896    REF    2   LAST 1064    00,3201  0 3317 1  ABVAL      TC       VSQSUB           DOT MPAC WITH ITSELF.
 1897    REF   34   LAST 1069    00,3202  22 163 0             LXCH     MODE             MODE IS NOW DP (L ZERO AFTER DAS).

 1898                            00,3203  0 0006 1             EXTEND                    STORE SQUARE OF LENGTH IN WORK AREA.
 1899    REF  635   LAST 1068    00,3204  3 0155 0             DCA      MPAC
 1900    REF   49   LAST 1066    00,3205  50 120 1             INDEX    FIXLOC
 1901    REF    2   LAST 1064    00,3206  52 043 1             DXCH     LVSQUARE
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P1902   PROGRAM DESCRIPTION- SUBROUTINE SQRT
R1903   FUNCTIONAL DESCRIPTION-DOUBLE PRECISION SQUARE ROOT ROUTINE
R1904       THIS PROGRAM TAKES THE SQUARE ROOT OF THE 27 OR 28 MOST SIGNIFICANT BITS IN THE TRIPLE PRECISION SET OF
R1906       NUMBERS-MPAC,MPAC+1,AND MPAC+2.  THE ROOT IS RETURNED DOUBLE         PRECISION IN MPAC AND MPAC+1.
R1908   WARNING- THIS SUBROUTINE USES A TRIPLE PRECISION INPUT. THE PROGRAMMER  MUST ASSURE THE CONTENTS OF MPAC+2
R1910       ESPECIALLY IF THE CONTENTS OF MPAC IS SMALL OR ZERO.  FOR DETAILS SEE STG MEMO NO.949.
R1912   CALLING SEQUENCE- IN INTERPRETIVE MODE I.E., FOLLOWING TC  INTPRET,SQRT   NO ADDRESS IS ALLOWED
R1914   INPUT SCALING  THE BINARY POINT IS ASSUMED TO THE RIGHT OF BIT 15. THE  ANSWER IS RETURNED WITH THE SAME SCALING
R1916   SUBROUTINES- GENSCR,MPACSHR, SQRTSUB,ABORT
R1917   ABORT EXIT MODE- ABORTS ON NEGATIVE INPUT -1.2X10E-4 (77775  OCTAL)      OR LESS.
R1919       DISPLAYS ERROR CODE 1302 .
R1920                   TC    ABORT
R1921                   OCT  1302
R1922   DEBRIS -  LOCATIONS BUF,MPTEMP,ADDRWD ARE USED
 1923   REF   2  LAST 1064   00,3207  0 3343 0  SQRT      TC      SQRTSUB         TAKE THE SQUARE ROOT OF MPAC.
 1924   REF  56  LAST 1068   00,3210  10 135 1            CCS     MPTEMP          RETURNED NORMALIZED SQUARE ROOT. SEE IF
 1925                        00,3211  1 3213 0            TCF     +2              ANY UN-NORMALIZATION REQUIRED AND EXIT
 1926   REF  35  LAST 1069   00,3212  1 6064 1            TCF     DANZIG          IF NOT.

 1927   REF   3  LAST 1049   00,3213  6 3733 0            AD      NEG12           A RIGHT SHIFT OF MORE THAN 13 COULD BE
 1928                        00,3214  0 0006 1            EXTEND                  REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
 1929   REF   1              00,3215  6 3221 0            BZMF    SQRTSHFT        GOES HERE IN MOST CASES.
 1930                        00,3216  22 007 0            ZL                      IF A LONG SHIFT IS REQUIRED, GO TO
 1931   REF  80  LAST 1050   00,3217  22 116 1            LXCH    ADDRWD          GENERAL RIGHT SHIFT ROUTINES.
 1932   REF   4  LAST 1049   00,3220  1 2303 1            TCF     GENSCR +4       ADDRWD WAS ZERO TO PREVENT ROUND.

 1933   REF  57  LAST 1070   00,3221  50 135 0  SQRTSHFT  INDEX   MPTEMP          SELECT SHIFTING BIT AND EXIT THROUGH
 1934   REF  38  LAST 1020   00,3222  3 4735 1            CAF     BIT15           SHIFT ROUTINES.
 1935   REF  58  LAST 1070   00,3223  54 135 1            TS      MPTEMP
 1936   REF 209  LAST 1068   00,3224  3 4755 1            CAF     ZERO            TO ZERO MPAC +2 IN THE PROCESS.
 1937   REF   2  LAST 1049   00,3225  1 2036 1            TCF     MPACSHR +3

 1938   REF   5  LAST 1046   00,3226  0 6726 1  ABS       TC      BRANCH          TEST SIGN OF MPAC  AND COMPLEMENT IF
 1939   REF  36  LAST 1070   00,3227  1 6064 1            TCF     DANZIG
 1940   REF  37  LAST 1070   00,3230  1 6064 1            TCF     DANZIG
 1941   REF   4  LAST 1040   00,3231  1 7673 0            TCF     COMP
 1942    REF  22  LAST 1035    00,3232  4 4751 1  VDEF      CS      FOUR            VECTOR DEFINE - ESSENTIALLY TREATS
 1943    REF  23  LAST 1038    00,3233  26 166 1            ADS     PUSHLOC         SCALAR IN MPAC AS X COMPONENT, PUSHES UP
 1944                          00,3234  0 0006 1            EXTEND                  FOR Y AND THEN AGAIN FOR Z.
 1945    REF 349  LAST 1067    00,3235  5 0000 1            INDEX   A
 1946                          00,3236  3 0003 1            DCA     2
 1947    REF 636  LAST 1069    00,3237  52 160 1            DXCH    MPAC +3
 1948                          00,3240  0 0006 1            EXTEND
 1949    REF  24  LAST 1071    00,3241  5 0166 0            INDEX   PUSHLOC
 1950                          00,3242  3 0001 0            DCA     0
 1951    REF 637  LAST 1071    00,3243  52 162 0            DXCH    MPAC +5
 1952    REF   2  LAST 1035    00,3244  1 6524 0            TCF     VMODE           MODE IS NOW VECTOR.

 1953    REF   3  LAST 1069    00,3245  0 3317 1  VSQ       TC      VSQSUB          DOT MPAC WITH ITSELF.
 1954    REF   1               00,3246  1 7335 1            TCF     DMODE           MODE IS NOW DP.

 1955                          00,3247  0 0006 1  PUSH      EXTEND                  PUSH DOWN MPAC LEAVING IT LOADED.
 1956    REF 638  LAST 1071    00,3250  3 0155 0            DCA     MPAC
 1957    REF  25  LAST 1071    00,3251  50 166 0            INDEX   PUSHLOC         PUSH DOWN FIRST TWO REGISTERS IN EACH
 1958                          00,3252  52 001 1            DXCH    0

 1959    REF  35  LAST 1069    00,3253  50 163 0            INDEX   MODE            INCREMENT PUSHDOWN POINTER.
 1960    REF   5  LAST 1015    00,3254  3 6247 0            CAF     NO.WDS
 1961    REF  26  LAST 1071    00,3255  26 166 1            ADS     PUSHLOC

 1962    REF  36  LAST 1071    00,3256  10 163 1            CCS     MODE
 1963    REF   1               00,3257  1 3272 1            TCF     TPUSH           PUSH DOWN MPAC +2.
 1964    REF  38  LAST 1070    00,3260  1 6064 1            TCF     DANZIG          DONE FOR DP.

 1965                          00,3261  0 0006 1            EXTEND                  ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
 1966    REF 639  LAST 1071    00,3262  3 0160 0            DCA     MPAC +3
 1967    REF  27  LAST 1071    00,3263  50 166 0            INDEX   PUSHLOC
 1968                          00,3264  51'775 0            DXCH    0 -4
 1969                          00,3265  0 0006 1            EXTEND
 1970    REF 640  LAST 1071    00,3266  3 0162 1            DCA     MPAC +5
 1971    REF  28  LAST 1071    00,3267  50 166 0            INDEX   PUSHLOC
 1972                          00,3270  51'777 1            DXCH    0 -2
 1973    REF  39  LAST 1071    00,3271  1 6064 1            TCF     DANZIG

 1974    REF 641  LAST 1071    00,3272  3 0156 0  TPUSH     CA      MPAC +2
 1975    REF   2  LAST 1014    00,3273  1 6557 1            TCF     ENDTPUSH +2

 1976    REF  50  LAST 1069    00,3274  50 120 1  RVQ       INDEX   FIXLOC          RVQ - RETURN VIA QPRET.
 1977    REF   9  LAST 1017    00,3275  3 0052 0            CA      QPRET
 1978    REF  22  LAST 1029    00,3276  54 117 1            TS      POLISH
 1979    REF   5  LAST 1018    00,3277  1 6655 0            TCF     GOTO +4         (ASSUME QPRET POINTS TO FIXED ONLY.)
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P1980              THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1982    SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

 1983    REF 642  LAST 1071    00,3300  3 0155 0  DSQSUB   CA       MPAC +1          SQUARES THE SCALAR CONTENTS OF MPAC.
 1984                          00,3301  0 0006 1           EXTEND
 1985                          00,3302  7 0000 0           SQUARE
 1986    REF 643  LAST 1072    00,3303  54 156 1           TS       MPAC +2
 1987    REF 210  LAST 1070    00,3304  3 4755 1           CAF      ZERO             FORM 2(CROSS TERM).
 1988    REF 644  LAST 1072    00,3305  56 155 0           XCH      MPAC +1
 1989                          00,3306  0 0006 1           EXTEND
 1990    REF 645  LAST 1072    00,3307  7 0154 0           MP       MPAC
 1991                          00,3310  20 001 1           DDOUBL                    AND MAYBE OVERFLOW,
 1992    REF 646  LAST 1072    00,3311  20 156 1           DAS      MPAC +1          AND SET A TO NET OVERFLOW
 1993    REF 647  LAST 1072    00,3312  56 154 1           XCH      MPAC
 1994                          00,3313  0 0006 1           EXTEND
 1995                          00,3314  7 0000 0           SQUARE
 1996    REF 648  LAST 1072    00,3315  20 155 1           DAS      MPAC
 1997    REF 291  LAST 1068    00,3316  0 0002 0           TC       Q

 1998                          00,3317  0 0006 1  VSQSUB   EXTEND                    DOTS THE VECTOR IN MPAC WITH ITSELF.
 1999    REF   8  LAST 1027    00,3320  22 137 1           QXCH     DOTRET
 2000    REF   2  LAST 1069    00,3321  0 3300 1           TC       DSQSUB           SQUARE THE X COMPONENT.
 2001    REF 649  LAST 1072    00,3322  52 160 1           DXCH     MPAC +3
 2002    REF 650  LAST 1072    00,3323  52 155 1           DXCH     MPAC
 2003    REF 137  LAST 1066    00,3324  52 131 0           DXCH     BUF              SO WE CAN END IN DOTSUB.
 2004    REF 651  LAST 1072    00,3325  3 0156 0           CA       MPAC +2
 2005    REF 138  LAST 1072    00,3326  54 132 0           TS       BUF +2

 2006    REF   3  LAST 1072    00,3327  0 3300 1           TC       DSQSUB           SQUARE Y COMPONENT.
 2007    REF 652  LAST 1072    00,3330  52 156 1           DXCH     MPAC +1
 2008    REF 139  LAST 1072    00,3331  20 132 0           DAS      BUF +1
 2009    REF 653  LAST 1072    00,3332  6 0154 1           AD       MPAC
 2010    REF 140  LAST 1072    00,3333  6 0130 0           AD       BUF
 2011    REF 141  LAST 1072    00,3334  54 130 1           TS       BUF
 2012                          00,3335  1 3337 1           TCF      +2
 2013    REF   8  LAST 1064    00,3336  54 121 1           TS       OVFIND           IF OVERFLOW.

 2014    REF 654  LAST 1072    00,3337  52 162 0           DXCH     MPAC +5
 2015    REF 655  LAST 1072    00,3340  52 155 1           DXCH     MPAC
 2016    REF   4  LAST 1072    00,3341  0 3300 1           TC       DSQSUB           SQUARE Z COMPONENT.
 2017    REF   1               00,3342  1 7210 1           TCF      ENDDOT           END AS IN DOTSUB.
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P2018            DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R2020      IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R2022      .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.


 2023      REF 211   LAST 1074     00,3343   3 4755 1   SQRTSUB   CAF     ZERO               START BY ZEROING RIGHT SHIFT COUNT.
 2024      REF  59   LAST 1070     00,3344  54 135 1               TS      MPTEMP

 2025      REF 656   LAST 1072     00,3345  10 154 0               CCS     MPAC               CHECK FOR POSITIVE ARGUMENT, SHIFTING
 2026      REF   1                 00,3346   1 3405 1               TCF     SMPAC+             FIRST SIGNIFICANT MPAC REGISTER INTO
 2027                              00,3347   1 3351 1               TCF     +2                 MPAC ITSELF.
 2028      REF   1                 00,3350   1 3373 1               TCF     SQRTNEG            SEE IF MAG OF ARGUMENT LESS THAN 10(-4).

 2029      REF 657   LAST 1073     00,3351  56 156 0               XCH     MPAC +2            MPAC IS ZERO - SHIFT LEFT 14.
 2030      REF 658   LAST 1073     00,3352  56 155 0               XCH     MPAC +1
 2031      REF 659   LAST 1073     00,3353  54 154 0               TS      MPAC
 2032      REF  14   LAST  955     00,3354   3 4757 0               CAF     SEVEN              AUGMENT RIGHT SHIFT COUNTER.
 2033      REF  60   LAST 1073     00,3355  54 135 1               TS      MPTEMP

 2034      REF 660   LAST 1073     00,3356  10 154 0               CCS     MPAC               SEE IF MPAC NOW PNZ.
 2035      REF   2   LAST 1073     00,3357   1 3405 1               TCF     SMPAC+
 2036                              00,3360   1 3362 1               TCF     +2
 2037      REF   1                 00,3361   1 3376 1               TCF     ZEROANS            NEGATIVE BUT LESS THAN 10(-4) IN MAG.

 2038      REF 661   LAST 1073     00,3362  56 155 0               XCH     MPAC +1            ZERO - SHIFT LEFT 14 AGAIN.
 2039      REF 662   LAST 1073     00,3363  54 154 0               TS      MPAC
 2040      REF  15   LAST 1073     00,3364   3 4757 0               CAF     SEVEN              AUGMENT RIGHT SHIFT COUNTER.
 2041      REF  61   LAST 1073     00,3365  26 135 1               AOS     MPTEMP

 2042      REF 663   LAST 1073     00,3366  10 154 0               CCS     MPAC
 2043      REF   3   LAST 1073     00,3367   1 3405 1               TCF     SMPAC+
 2044      REF 292   LAST 1072     00,3370   0 0002 0               TC      Q                  SQRT(0) = 0.
 2045      REF   2   LAST 1073     00,3371   1 3376 1               TCF     ZEROANS
 2046      REF   1                 00,3372   1 3453 1               TCF     FIXROOT            DO NOT LEAVE SQRTSUB WITH -0 IN MPAC.


 2047      REF 350   LAST 1071     00,3373  10 000 0   SQRTNEG   CCS     A                  ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
 2048      REF   1                 00,3374   1 3402 0               TCF     SQRTABRT           CORRECTED ARGUMENT IS LESS THAN 10(-4)

 2049      REF 664   LAST 1073     00,3375  10 155 1               CCS     MPAC +1            IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
 2050      REF 212   LAST 1073     00,3376   3 4755 1   ZEROANS   CAF     ZERO               FORCE ANSWER TO ZERO HERE.
 2051      REF   2   LAST 1073     00,3377   1 3453 1               TCF     FIXROOT
 2052      REF   2   LAST 1073     00,3400   1 3402 0               TCF     SQRTABRT
 2053      REF   3   LAST 1073     00,3401   1 3453 1               TCF     FIXROOT

 2054      REF  27   LAST 1019     00,3402  52 165 1   SQRTABRT  DXCH    LOC
 20541     REF   1                 00,3403   0 5716 1               TC      P000001
 2055                              00,3404    21302 0               OCT     21302

 2056      REF   1                 00,3405   6 2444 1   SMPAC+    AD      -1/2+2             SEE IF ARGUMENT GREATER THAN OR EQUAL TO
 2057                             00,3406  0 0006 1              EXTEND              .5.
 2058    REF   1                  00,3407  6 3456 0              BZMF    SRTEST      IF SO, SEE IF LESS THAN .25.

 2059    REF 665   LAST 1073      00,3410  52 155 1              DXCH    MPAC        WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
 2060    REF  16   LAST 1055      00,3411  22 021 1              LXCH    SR          SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
 2061                             00,3412  0 0006 1              EXTEND
 2062    REF  19   LAST 1055      00,3413  7 4736 0              MP      HALF
 2063    REF 666   LAST 1074      00,3414  52 155 1              DXCH    MPAC
 2064    REF  17   LAST 1074      00,3415  56 021 1              XCH     SR
 2065    REF 667   LAST 1074      00,3416  26 155 1              ADS     MPAC +1     GUARANTEED NO OVERFLOW.

 2066    REF   1                  00,3417  3 2314 0   ARGHI      CAF     SLOPEHI     ARGUMENT BETWEEN .25 AND .5. GET A
 2067                             00,3420  0 0006 1              EXTEND              LINEAR APPROXIMATION FOR THIS RANGE.
 2068    REF 668   LAST 1074      00,3421  7 0154 0              MP      MPAC
 2069    REF   1                  00,3422  6 2566 0              AD      BIASHI      X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.

 2070    REF 142   LAST 1072      00,3423  54 130 1     +4       TS      BUF         X0/2 (ARGLO ENTERS HERE).
 2071    REF 669   LAST 1074      00,3424  3 0154 1              CA      MPAC        SINGLE-PRECISION THROUGHOUT.
 2072                             00,3425  22 007 0              ZL
 2073                             00,3426  0 0006 1              EXTEND
 2074    REF 143   LAST 1074      00,3427  10 130 1              DV      BUF         (MPAC/2)/(X0/2)
 2075                             00,3430  0 0006 1              EXTEND
 2076    REF  20   LAST 1074      00,3431  7 4736 0              MP      HALF
 2077    REF 144   LAST 1074      00,3432  26 130 1              ADS     BUF         X1 = X0/2 + .5(MPAC/2)/(X0/2).

 2078                             00,3433  0 0006 1              EXTEND
 2079    REF  21   LAST 1074      00,3434  7 4736 0              MP      HALF        FORM UP X1/2.
 2080    REF 670   LAST 1074      00,3435  52 155 1              DXCH    MPAC        SAVE AND BRING OUT ARGUMENT.
 2081                             00,3436  0 0006 1              EXTEND              TAKE DP QUOTIENT WITH X1.
 2082    REF 145   LAST 1074      00,3437  10 130 1              DV      BUF
 2083    REF 146   LAST 1074      00,3440  54 131 0              TS      BUF +1      SAVE MAJOR PART OF QUOTIENT.
 2084    REF 213   LAST 1073      00,3441  3 4755 1              CAF     ZERO        FORM MINOR PART OF QUOTIENT USING
 2085    REF 207   LAST 1066      00,3442  56 001 0              XCH     L           (REMAINDER,0).
 2086                             00,3443  0 0006 1              EXTEND
 2087    REF 147   LAST 1074      00,3444  10 130 1              DV      BUF
 2088    REF 208   LAST 1074      00,3445  54 001 1              TS      L           IN PREPARATION FOR DAS.
 2089    REF 148   LAST 1074      00,3446  3 0131 1              CA      BUF +1
 2090    REF 671   LAST 1074      00,3447  20 155 1              DAS     MPAC        X2 = X1/2 + (MPAC/2)X1

 2091                             00,3450  0 0006 1              EXTEND              OVERFLOWS IF ARG. NEAR POSMAX.
 2092    REF   1                  00,3451  1 3455 1              BZF     TCQBNK00
 2093    REF  31   LAST 1059      00,3452  3 4733 1              CAF     POSMAX
 2094    REF 672   LAST 1074      00,3453  54 154 0   FIXRCCT    TS      MPAC
 2095    REF 673   LAST 1074      00,3454  54 155 1              TS      MPAC +1
 2096    REF 293   LAST 1073      00,3455  0 0002 0   TCQBNK00   TC      Q           RETURN TO CALLER TO UNNORMALIZE, ETC.
 2097   REF    1              00,3456   6 4737 0  SRTEST    AD      QUARTER       ARGUMENT WAS LESS THAN .5, SEE IF LESS
 2098                         00,3457   0 0006 1            EXTEND                THAN .25.
 2099   REF    1              00,3460   6 3502 0            BZMF    SQRTNORM      IF SO, BEGIN NORMALIZATION.

 2100   REF 674  LAST 1074    00,3461  52 155 1             DXCH    MPAC          IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
 2101   REF  18  LAST 1074    00,3462  22 021 1             LXCH    SR            START AT ARGLO.
 2102                         00,3463   0 0006 1            EXTEND
 2103   REF  22  LAST 1074    00,3464   7 4736 0            MP      HALF
 2104   REF 675  LAST 1075    00,3465  52 155 1             DXCH    MPAC
 2105   REF  19  LAST 1075    00,3466  56 021 1             XCH     SR
 2106   REF 676  LAST 1075    00,3467  26 155 1             ADS     MPAC +1       NO OVERFLOW.

 2107   REF    1              00,3470   3 3007 0  ARGLO     CAF     SLOPELO       (NORMALIZED) ARGUMENT BETWEEN .125 AND
 2108                         00,3471   0 0006 1            EXTEND                .25
 2109   REF 677  LAST 1075    00,3472   7 0154 0            MP      MPAC
 2110   REF    1              00,3473   6 2270 0            AD      BIASLO
 2111   REF    1              00,3474   1 3423 0            TCF     ARGHI +4      BEGIN SQUARE ROOT.

 2112                         00,3475   0 0006 1  SQRTNM2   EXTEND                SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
 2113   REF 678  LAST 1075    00,3476   3 0156 0            DCA     MPAC +1       COUNT (FOR TERMINAL UNNORMALIZATION).
 2114   REF 679  LAST 1075    00,3477  20 156 1             DAS     MPAC +1
 2115   REF 680  LAST 1075    00,3500   6 0154 1            AD      MPAC
 2116   REF 681  LAST 1075    00,3501  26 154 0             ADS     MPAC          (NO OVERFLOW).

 2117   REF  62  LAST 1073    00,3502  24 135 0   SQRTNORM  INCR    MPTEMP        FIRST TIME THROUGH, JUST SHIFT LEFT 1
 2118                         00,3503   0 0006 1            EXTEND                (PUTS IN EFFECTIVE RIGHT SHIFT SINCE
 2119   REF 682  LAST 1075    00,3504   3 0156 0            DCA     MPAC +1       WE WANT MPAC/2).
 2120   REF 683  LAST 1075    00,3505  20 156 1             DAS     MPAC +1
 2121   REF 684  LAST 1075    00,3506   6 0154 1            AD      MPAC
 2122   REF 685  LAST 1075    00,3507  26 154 0             ADS     MPAC          (AGAIN NO OVERFLOW).
 2123                         00,3510   6 0000 1            DOUBLE
 2124   REF  18  LAST  465    00,3511  54 022 0             TS      CYL

 2125   REF  19  LAST 1075    00,3512  10 022 0   NORMTEST  CCS     CYL           SEE IF ARGUMENT NOW NORMALIZED AT
 2126   REF  20  LAST 1075    00,3513  10 022 0             CCS     CYL           GREATER THAN .125.
 2127   REF   1               00,3514   1 3475 0            TCF     SQRTNM2       NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
 2128   REF   2  LAST 1075    00,3515   1 3417 1            TCF     ARGHI         YES - NOW BETWEEN .5 AND .25.
 2129   REF   1               00,3516   1 3470 0            TCF     ARGLO         ARGUMENT NOW BETWEEN .25 AND .125.
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P2130    TRIGONOMETRIC FUNCTION PACKAGE.

R2131              THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2133              1.  SIN                     COMPUTES (1/2)SINE(2 PI MPAC).
R2134              2.  COS                     COMPUTES (1/2)COSINE(2 PI MPAC).

R2135              3.  ASIN                    COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2136              4.  ACOS                    COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2137    SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE SIN(ASIN(X)) = X.

  2138   REF   6  LAST 1070   00,3517  0 6726 1  COSINE   TC     BRANCH         FINDS COSINE USING THE IDENTITY
  2139                        00,3520  1 3523 1           TCF    +3             COS(X) = SIN(PI/2 - ABS(X)).
  2140   REF   1              00,3521  1 3526 1           TCF    PRESINE
  2141   REF   2  LAST 1076   00,3522  1 3526 1           TCF    PRESINE

  2142                        00,3523  0 0006 1   +3      EXTEND
  2143   REF 686  LAST 1075   00,3524  4 0155 1           DCS    MPAC
  2144   REF 687  LAST 1076   00,3525  52 155 1           DXCH   MPAC

  2145   REF   2  LAST 1075   00,3526  3 4737 0  PRESINE  CAE    QUARTER        PI/2 SCALED.
  2146   REF 688  LAST 1076   00,3527  26 154 0           ADS    MPAC


  2147   REF 689  LAST 1076   00,3530  52 155 1  SINE     DXCH   MPAC           DOUBLE ARGUMENT.
  2148                        00,3531  20 001 1           DDOUBL
  2149                        00,3532  54 000 0           OVSK                  SEE IF OVERFLOW PRESENT.
  2150                        00,3533  1 3536 0           TCF    +3             IF NOT, ARGUMENT OK AS IS.

  2151                        00,3534  0 0006 1           EXTEND                IF SO, WE LOST (OR GAINED) PI, SO
  2152                        00,3535  4 0001 1           DCOM                  COMPLEMENT MPAC USING THE IDENTITY
 A2153                                                                          SIN(X-(+)PI) = SIN(-X).
  2154   REF 690  LAST 1076   00,3536  52 155 1   +3      DXCH   MPAC
  2155   REF 691  LAST 1076   00,3537  3 0154 1           CA     MPAC           SEE IF ARGUMENT GREATER THAN .5 IN
  2156                        00,3540  6 0000 1           DOUBLE                MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
  2157   REF 209  LAST 1074   00,3541  54 001 1           TS     L              .5 (+-PI/2 SCALED) AS FOLLOWS:
  2158   REF   1              00,3542  1 3553 0           TCF    SN1

  2159   REF 351  LAST 1073   00,3543  50 000 1           INDEX  A              IF POSITIVE, FORM PI - X, IF NEGATIVE
  2160   REF   4  LAST  853   00,3544  3 4735 1           CAF    NEG1/2 +1      USE -PI - X.
  2161                        00,3545  6 0000 1           DOUBLE
  2162                        00,3546  0 0006 1           EXTEND
  2163   REF 692  LAST 1076   00,3547  60 154 1           SU     MPAC           GUARANTEED NO OVERFLOW.
  2164   REF 693  LAST 1076   00,3550  54 154 0           TS     MPAC
  2165   REF 694  LAST 1076   00,3551  4 0155 1           CS     MPAC +1
  2166   REF 695  LAST 1076   00,3552  54 155 1           TS     MPAC +1
 2167                            00,3553  0 0006 1  SN1      EXTEND              SET UP TO EVALUATE HASTINGS POLYNOMIAL
 2168    REF 696  LAST 1076      00,3554  3 0155 0           DCA     MPAC
 2169    REF  19  LAST 1062      00,3555 52 134 0            DXCH    BUF2
 2170    REF   5  LAST 1072      00,3556  0 3300 1           TC      DSQSUB              SQUARE MPAC.

 2171    REF   2  LAST  851      00,3557  0 7225 0           TC      POLY                EVALUATE FOURTH ORDER POLYNOMIAL.
 2172                            00,3560   00003 1           DEC     3
 2173                            00,3561   14441 0           2DEC    +.3926990796
 2173                            00,3562   37325 1
 2174                            00,3563   53250 0           2DEC    -.6459637111
 2174                            00,3564   60764 1
 2175                            00,3565   12146 1           2DEC    +.318758717
 2175                            00,3566   21276 1
 2176                            00,3567   75466 1           2DEC    -.074780249
 2176                            00,3570   71471 0
 2177                            00,3571   00236 0           2DEC    +.009694988
 2177                            00,3572   32757 0

 2178    REF   1                 00,3573  3 2470 0           CAF     LBUF2               MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
 2179    REF  19  LAST 1038      00,3574  0 7111 1           TC      DMPSUB -1

 2180                            00,3575  0 0006 1           EXTEND
 2181    REF 697  LAST 1077      00,3576  3 0156 0           DCA     MPAC +1
 2182    REF 698  LAST 1077      00,3577 20 156 1            DAS     MPAC +1
 2183    REF 699  LAST 1077      00,3600  6 0154 1           AD      MPAC
 2184    REF 700  LAST 1077      00,3601 26 154 0            ADS     MPAC                NEITHER SHIFT OVERFLOWS.
 2185                            00,3602  0 0006 1           EXTEND
 2186    REF 701  LAST 1077      00,3603  3 0156 0           DCA     MPAC +1
 2187    REF 702  LAST 1077      00,3604 20 156 1            DAS     MPAC +1
 2188    REF 703  LAST 1077      00,3605  6 0154 1           AD      MPAC
 2189    REF 704  LAST 1077      00,3606 26 154 0            ADS     MPAC
 2190    REF  40  LAST 1071      00,3607  1 6064 1           TCF     DANZIG
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P2191             ARCSIN/ARCCOS ROUTINE.

 2192   REF   1             00,3610  3 3631 0  ARCSIN    CAF    LASINEX        COMPUTE ARCSIN BY USING THE IDENTITY
 2193                       00,3611  1 3613 1            TCF    +2             ARCSIN(X) = PI/2 - ARCCOS(X).

 2194   REF   1             00,3612  3 3713 1  ARCCOS    CAF    LDANZIG        (EXITS IMMEDIATELY).
 2195   REF   1             00,3613  54 136 1            TS     ESCAPE
 2196   REF   7  LAST 1076  00,3614  0 0726 1            TC     BRANCH         TEST SIGN OF INPUT.
 2197   REF   1             00,3615  1 3625 1            TCF    ACOSST         START IMMEDIATELY IF POSITIVE.
 2198   REF   1             00,3616  1 3731 0            TCF    ACOSZERO       ARCCOS(0) = PI/2 = .25.
 2199                       00,3617  0 0006 1            EXTEND                 IF NEGATIVE, USE THE IDENTITY
 2200   REF 705  LAST 1077  00,3620  4 0155 1            DCS    MPAC           ARCCOS(X) = PI - ARCCOS(-X), FORCING
 2201   REF 706  LAST 1078  00,3621  52 155 1            DXCH   MPAC           ARGUMENT POSITIVE.
 2202   REF   1             00,3622  3 3734 1            CAF    TCSUBTR        SET EXIT  TO DO ABOVE BEFORE
 2203   REF   2  LAST 1078  00,3623  56 136 0            XCH    ESCAPE         ARCSIN/ARCCOS CONSIDERATIONS.
 2204   REF   1             00,3624  54 137 0            TS     ESCAPE2

 2205   REF  23  LAST 1075  00,3625  4 4736 0  ACOSST    CS     HALF           TEST MAGNITUDE OF INPUT.
 2206   REF 707  LAST 1078  00,3626  6 0154 1            AD     MPAC
 2207   REF 352  LAST 1076  00,3627  10 000 0            CCS    A
 2208   REF   1             00,3630  1 3721 1            TCF    ACOSOVF        THIS IS PROBABLY AN OVERFLOW CASE.

 2209   REF   1             00,3631  1 3707 0  LASINEX   TCF    ASINEX

 2210   REF   1             00,3632  1 3642 0            TCF    ACOSST2        NO OVERFLOW - PROCEED.

 2211   REF 708  LAST 1078  00,3633  10 155 1            CCS    MPAC +1        IF MAJOR PART IS .5, CALL ANSWER 0
 2212   REF 214  LAST 1074  00,3634  3 4755 1            CAF    ZERO           UNLESS MINOR PART NEGATIVE.
 2213   REF   1             00,3635  1 3637 1            TCF    ACCS=0

 2214   REF   2  LAST 1078  00,3636  1 3642 0            TCF    ACOSST2

 2215   REF 709  LAST 1078  00,3637  54 155 1  ACCS=0    TS     MPAC +1
 2216   REF 710  LAST 1078  00,3640  54 154 0            TS     MPAC
 2217   REF   3  LAST 1078  00,3641  0 0136 0            TC     ESCAPE

 2218                       00,3642  0 0006 1  ACOSST2   EXTEND                 NOW THAT ARGUMENT IS IN PROPER RANGE,
 2219   REF 711  LAST 1078  00,3643  4 0155 1            DCS    MPAC           BEGIN COMPUTATION. USE HASTINGS
 2220   REF  24  LAST 1078  00,3644  6 4736 1            AD     HALF           APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
 2221   REF 712  LAST 1078  00,3645  52 155 1            DXCH   MPAC           IN A SCALED VERSION WHERE P(X) IS A
 2222   REF  20  LAST 1077  00,3646  52 134 0            DXCH   BUF2           SEVENTH ORDER POLYNOMIAL.

 2223   REF   3  LAST 1070  00,3647  0 3343 0            TC     SQRTSUB        RETURNS WITH NORMALIZED SQUARE ROOT.

 2224   REF  63  LAST 1075  00,3650  10 135 1            CCS    MPTEMP         SEE IF UN-NORMALIZATION REQUIRED.
 2225   REF   1             00,3651  1 3714 1            TCF    ACOSSHR        IF SO.
 2226   REF 713  LAST 1078   00,3652  52 155 1  ACOS3    DXCH   MPAC             SET UP FOR POLYNOMIAL EVALUATION.
 2227   REF  21  LAST 1078   00,3653  52 134 0           DXCH   BUF2
 2228   REF 714  LAST 1079   00,3654  52 155 1           DXCH   MPAC

 2229   REF   3  LAST 1077   00,3655  0 7225 0           TC     POLY
 2230                        00,3656   00006 1           DEC    6
 2231                        00,3657   13240 0           2DEC   +.353553385      COEFFICIENTS ARE C 2(+I)/PISQRT(2) WHERE
 2231                        00,3660   23630 0
 2232                        00,3661   74721 0           2DEC*  -.0483017006 B+1*                   I
 2232                        00,3662   47775 1
 2233                        00,3663   02440 0           2DEC*  +.0200273085 B+2*    WHERE C STANDS FOR ORIGINAL COEFFS.
 2233                        00,3664   20237 0
 2234                        00,3665   75067 1           2DEC*  -.0112931863 B+3*
 2234                        00,3666   70742 1
 2235                        00,3667   03436 0           2DEC*  +.00695311612 B+4*
 2235                        00,3670   26756 1
 2236                        00,3671   74037 0           2DEC*  -.00384617957 B+5*
 2236                        00,3672   57640 1
 2237                        00,3673   03046 0           2DEC*  +.001501297736 B+6*
 2237                        00,3674   07143 0
 2238                        00,3675   76654 1           2DEC*  -.000284160334 B+7*
 2238                        00,3676   42244 0

 2239   REF   2  LAST 1077   00,3677  3 2470 0           CAF    LBUF2            DO FINAL MULTIPLY AND GO TO ANY
 2240   REF  20  LAST 1077   00,3700  0 7111 1           TC     DMPSUB -1        EPILOGUE SEQUENCES.
 2241   REF   4  LAST 1078   00,3701  0 0136 0           TC     ESCAPE

 2242                        00,3702  0 0006 1  SUBTR    EXTEND                  EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
 2243   REF 715  LAST 1079   00,3703  4 0155 1           DCS    MPAC
 2244   REF  25  LAST 1078   00,3704  6 4736 1           AD     HALF             FORMS PI - ARCCOS(-X) = ARCCOS(X).
 2245   REF 716  LAST 1079   00,3705  52 155 1           DXCH   MPAC
 2246   REF   2  LAST 1078   00,3706  0 0137 1           TC     ESCAPE2          GO TO POSSIBLE ARCSIN EPILOGUE.

 2247                        00,3707  0 0006 1  ASINEX   EXTEND
 2248   REF 717  LAST 1079   00,3710  4 0155 1           DCS    MPAC             ARCSIN EPILOGUE - GET ARCSIN(X)
 2249   REF   3  LAST 1076   00,3711  6 4737 0           AD     QUARTER          = PI/2 - ARCCOS(X).
 2250   REF 718  LAST 1079   00,3712  52 155 1           DXCH   MPAC
 2251   REF  41  LAST 1077   00,3713  1 6064 1  LDANZIG  TCF    DANZIG
 2252    REF 353  LAST 1078   00,3714  50 000 1  ACOSSHR  INDEX   A                 THE SHIFT RIGHT IS LESS THAN 14 SINCE
 2253    REF  64  LAST 1067   00,3715  3 4736 1           CAF     BIT14             THE INPUT WAS NON-ZERO OP
 2254    REF  64  LAST 1078   00,3716  54 135 1           TS      MPTEMP
 2255    REF   4  LAST 1044   00,3717  0 2073 1           TC      VSHRRNO           OP SHIFT RIGHT ANO ROUND.
 2256    REF   1              00,3720  1 3652 1           TCF     ACOS3             PROCEEO.

 2257                         00,3721  0 0006 1  ACOSOVF  EXTEND                    IF MAJOR PART WAS ONLY 1 MORE THAN .5,
 2258    REF   2  LAST 1078   00,3722  1 3637 1           BZF     ACOS=0            CALL ANSWER ZERO.

 2259                         00,3723 .0 0006 1  ACOSABRT EXTENO                    IF OVERFLOW, CALL ANSWER ZERO BUT
 22591   REF  28  LAST 1073   00,3724  3 0165 0           OCA     LOC               SOUNO AN ALARM.
 22592   REF   1              00,3725  0 5722 0           TC      ALARM1
 22593                        00,3726   01301 1           OCT     1301

 2260    REF 215  LAST 1078   00,3727  3 4755 1           CAF     ZERO
 22601   REF   3  LAST 1080   00,3730  1 3637 1           TCF     ACOS=0

 2261    REF   4  LAST 1079   00,3731  3 4737 0  ACOSZERO CAF     QUARTER           ACOS(0) = PI/2.
 2262    REF   4  LAST 1080   00,3732  1 3640 1           TCF     ACOS=0 +1         SET MPAC ANO EXIT VIA ESCAPE.

 2263                         00,3733   77763 0  NEG12    OEC     -12
 2264    REF   1              00,3734  1 3702 0  TCSUBTR  TCF     SUBTR
```

```
P2265            THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2267            1.  AXT                 ADDRESS TO INDEX TRUE.
R2268            1.  AXC                 ADDRESS TO INDEX COMPLEMENTED.
R2269            3.  LXA                 LOAD INDEX FROM ERASABLE.
R2270            4.  LXC                 LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2271            5.  SXA                 STORE INDEX IN ERASABLE.
R2272            6.  XCHX                EXCHANGE INDEX REIGSTER WITH ERASABLE.

R2273            7.  INCR                INCREMENT INDEX REGISTER.
R2274            8.  XAD                 ERASABLE ADD TO INDEX REGISTER.
R2275            9.  XSU                 ERASABLE SUBTRACT FROM INDEX REGISTER.

R2276           10.  TIX                 BRANCH ON INDEX REGISTER AND DECREMENT.


 2277                        01,2345                          BANK    01

 2278   REF   1                                               COUNT*  $$/INTER
 2279   REF   1              01,2345  0 2442 1  AXT           TC      TAGSUB          SELECT APPROPRIATE INDEX REGISTER.
 2280   REF  23  LAST 1071   01,2346  3 0117 0                CA      POLISH
 2281   REF   4  LAST 1000   01,2347  50 130 0  XSTORE        INDEX   INDEXLOC        CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
 2282   REF  29  LAST 1010   01,2350  54 046 1                TS      X1
 2283   REF  42  LAST 1079   01,2351  1 6064 1                TCF     DANZIG

 2284   REF   2  LAST 1081   01,2352  0 2442 1  AXC           TC      TAGSUB
 2285   REF  24  LAST 1081   01,2353  4 0117 1                CS      POLISH
 2286   REF.  1              01,2354  0 2347 0                TC      XSTORE

 2287   REF   1              01,2355  0 2430 1  LXA           TC      15ADRERS        LOAD INDEX REGISTER FROM ERASABLE.
 2288   REF  25  LAST 1081   01,2356  50 117 0                INDEX   POLISH
 2289                        01,2357  3 0000 1                CA      0
 2290   REF   2  LAST 1081   01,2360  1 2347 1                TCF     XSTORE

 2291   REF   2  LAST 1081   01,2361  0 2430 1  LXC           TC      15ADRERS        LOAD NDX REG FROM ERASABLE COMPLEMENTED.
 2292   REF  26  LAST 1081   01,2362  50 117 0                INDEX   POLISH
 2293                        01,2363  4 0000 0                CS      0
 2294   REF   3  LAST 1081   01,2364  1 2347 1                TCF     XSTORE

 2295   REF   3  LAST 1081   01,2365  0 2430 1  SXA           TC      15ADRERS        STORE INDEX REGISTER IN ERASABLE.
 2296   REF   5  LAST 1081   01,2366  50 130 0                INDEX   INDEXLOC
 2297   REF  30  LAST 1081   01,2367  3 0046 0                CA      X1
 2298   REF  27  LAST 1081   01,2370  50 117 0  XSTORE1       INDEX   POLISH
 2299                        01,2371  54 000 0                TS      0
 2300   REF  43  LAST 1081   01,2372  1 6064 1                TCF     DANZIG
 2301    REF   4  LAST 1081    01,2373  0 2430 1  XCHX     TC      15ADRERS        EXCHANGE INDEX REGISTER WITH ERASABLE.
 2302    REF  28  LAST 1081    01,2374  50 117 0           INDEX   POLISH
 2303                          01,2375  3 0000 1           CA      0
 2304    REF   6  LAST 1081    01,2376  50 130 0           INDEX   INDEXLOC
 2305    REF  31  LAST 1081    01,2377  56 046 0           XCH     X1
 2306    REF   1               01,2400  1 2370 0           TCF     MSTORE1

 2307    REF   5  LAST 1082    01,2401  0 2430 1  XAD      TC      15ADRERS        ADD ERASABLE TO INDEX REGISTER.
 2308    REF  29  LAST 1082    01,2402  50 117 0           INDEX   POLISH
 2309                          01,2403  3 0000 1           CA      0
 2310    REF   7  LAST 1082    01,2404  50 130 0  XAD2     INDEX   INDEXLOC
 2311    REF  32  LAST 1082    01,2405  26 046 1           ADS     X1              IGNORING OVERFLOWS.
 2312    REF  44  LAST 1081    01,2406  1 6064 1           TCF     DANZIG

 2313    REF   3  LAST 1081    01,2407  0 2442 1  INCR     TC      TAGSUB          INCREMENT INDEX REGISTER.
 2314    REF  30  LAST 1082    01,2410  3 0117 0           CA      POLISH
 2315    REF   1               01,2411  1 2404 1           TCF     XAD2

 2316    REF   6  LAST 1082    01,2412  0 2430 1  XSU      TC      15ADRERS        SUBTRACT ERASABLE FROM INDEX REGISTER.
 2317    REF  31  LAST 1082    01,2413  50 117 0           INDEX   POLISH
 2318                          01,2414  4 0000 0           CS      0
 2319    REF   2  LAST 1082    01,2415  1 2404 1           TCF     XAD2


 2320    REF   4  LAST 1082    01,2416  0 2442 1  TIX      TC      TAGSUB          BRANCH AND DECREMENT ON INDEX.
 2321    REF   8  LAST 1082    01,2417  50 130 0           INDEX   INDEXLOC
 2322    REF  12  LAST  959    01,2420  4 0050 0           CS      S1
 2323    REF   9  LAST 1082    01,2421  50 130 0           INDEX   INDEXLOC
 2324    REF  33  LAST 1082    01,2422  6 0046 0           AD      X1
 2325                          01,2423  0 0006 1           EXTEND                  NO OPERATION IF DECREMENTED INDEX IS
 2326    REF  45  LAST 1082    01,2424  6 6064 0           BZMF    DANZIG          NEGATIVE OR ZERO.

 2327    REF  10  LAST 1082    01,2425  50 130 0  DOTIXBR  INDEX   INDEXLOC
 2328    REF  34  LAST 1082    01,2426  56 046 0           XCH     X1              IGNORING OVERFLOWS.

 2329    REF   6  LAST 1071    01,2427  1 6651 1           TCF     GOTO            DO THE BRANCH USING THE CADR IN POLISH.
```

```
P2330              SUBROUTINE TO CONVERT AN ERASABLE ADDRESS (11 BITS) TO AN EBANK SETTING AND SUBADDRESS.

 2332   REF  32  LAST 1082   01,2430  4 0117 1  15ADRERS CS     POLISH
 2333   REF   2  LAST 1010   01,2431  6 4772 1           AD     DEC45
 2334   REF 354  LAST 1080   01,2432  10 000 0           CCS    A                 DOES THE ADDRESS POINT TO THE WORK AREA?
 2335   REF  51  LAST 1071   01,2433  3 0120 1           CA     FIXLOC            YES.  ADD FIXLOC.  EBANK OK AS IS.
 2336                        01,2434  1 2441 0           TCF    +5

 2337   REF   6  LAST 1010   01,2435  3 5007 0           CA     OCT1400           NO.  SET EBANK & MAKE UP SUBADDRESS,
 2338   REF  33  LAST 1083   01,2436  56 117 0           XCH    POLISH
 2339   REF  64  LAST 1018   01,2437  54 003 0           TS     EBANK
 2340   REF  14  LAST 1018   01,2440  7 4357 0           MASK   LOW8
 2341   REF  34  LAST 1083   01,2441  26 117 1   +5      AOS    POLISH            FALL INTO TAGSUB, AND RETURN VIA Q.

R2342              SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

 2344   REF  52  LAST 1083   01,2442  3 0120 1  TAGSUB   CA     FIXLOC
 2345   REF  11  LAST 1082   01,2443  54 130 1           TS     INDEXLOC

 2346   REF  32  LAST 1050   01,2444  10 020 1           CCS    CYR               BIT 15 SPECIFIES INDEX.
 2347   REF  12  LAST 1083   01,2445  24 130 0           INCR   INDEXLOC          0 MEANS USE X2.
 2348   REF 294  LAST 1074   01,2446  0 0002 0           TC     Q
 2349   REF 295  LAST 1083   01,2447  0 0002 0           TC     Q                 1 FOR X1.
```

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L        INTERPRETER                                                                          USER'S PAGE NO.  89        E3 S3

P2350              MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2352              1.  ITA                   STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2354              2.  CALL                  CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2356              3.  RTB                   RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2358              4.  BHIZ                  BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2360              5.  BOV                   BRANCH ON OVERFLOW.
R2361              6.  GOTO                  SIMPLE SEQUENCE CHANGE.

 2362   REF  33  LAST 1083   01,2450  10 020 1  RTB/BHIZ CCS    CYR
 2363   REF  35  LAST 1083   01,2451  3 0117 0  RTB      CA     POLISH
 2364   REF   5  LAST  935   01,2452  0 4621 0           TC     SWCALL    -1      SO A "TC Q" FROM ROUTINE LEADS TO DANZIG

 2365   REF 719  LAST 1079   01,2453  10 154 0  BHIZ     CCS    MPAC
 2366   REF  46  LAST 1082   01,2454  1 6064 1           TCF    DANZIG
 2367   REF   7  LAST 1082   01,2455  1 6651 1           TCF    GOTO
 2368   REF  47  LAST 1084   01,2456  1 6064 1           TCF    DANZIG
 2369   REF   8  LAST 1084   01,2457  1 6651 1           TCF    GOTO

 2370   REF   9  LAST 1072   01,2460  10 121 1  BOV(B)   CCS    OVFIND            BRANCH ON OVERFLOW TO BASIC OR INTERP.
 2371                        01,2461  1 2463 0           TCF    +2
 2372   REF  48  LAST 1084   01,2462  1 6064 1           TCF    DANZIG
 2373   REF  10  LAST 1084   01,2463  54 121 1           TS     OVFIND
 2374   REF  34  LAST 1084   01,2464  10 020 1           CCS    CYR
 2375   REF   1              01,2465  1 2451 1           TCF    RTB               IF BASIC.
 2376                        01,2466   00360 1  85TOB8   OCT    360
 2377   REF   9  LAST 1084   01,2467  1 6651 1           TCF    GOTO
 2378   REF  35  LAST 1084   01,2470  10 020 1  BZE/GOTO CCS    CYR        SEE WHICH OP-CODE IS DESIRED.
 2379   REF   8  LAST 1078   01,2471  0 6726 1           TC     BRANCH     DO BZE.
 2380   REF  49  LAST 1084   01,2472  1 6064 1           TCF    DANZIG
 2381   REF  10  LAST 1084   01,2473  1 6651 1           TCF    GOTO       DO GOTO.
 2382   REF  50  LAST 1085   01,2474  1 6064 1           TCF    DANZIG

 2383   REF  36  LAST 1085   01,2475  10 020 1  BPL/BMN  CCS    CYR
 2384   REF   1              01,2476  1 2504 0           TCF    BPL
 2385                        01,2477   12000 1  5B10     DEC    5 B+10     SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

 2386   REF   9  LAST 1085   01,2500  0 6726 1           TC     BRANCH     DO BMN.
 2387   REF  51  LAST 1085   01,2501  1 6064 1           TCF    DANZIG
 2388   REF  52  LAST 1085   01,2502  1 6064 1           TCF    DANZIG
 2389   REF  11  LAST 1085   01,2503  1 6651 1           TCF    GOTO       ONLY IF NNZ.

 2390   REF  10  LAST 1085   01,2504  0 6726 1  BPL      TC     BRANCH
 2391   REF  12  LAST 1085   01,2505  1 6651 1           TCF    GOTO       IF POSITIVE OR ZERO.
 2392   REF  13  LAST 1085   01,2506  1 6651 1           TCF    GOTO
 2393   REF  53  LAST 1085   01,2507  1 6064 1           TCF    DANZIG

 2394   REF  37  LAST 1085   01,2510  10 020 1  CALL/ITA CCS    CYR
 2395   REF   1              01,2511  1 6643 1           TCF    CALL

 2396   REF   7  LAST  448   01,2512  0 5675 0           TC     CCSHOLE
 2397   REF   7  LAST 1082   01,2513  0 2430 1           TC     15ADRERS   STORE QPRET. (TAGSUB AFTER 15ADRERS IS
 2398   REF  53  LAST 1083   01,2514  50 120 1           INDEX  FIXLOC     SLOW IN THIS CASE, BUT SAVES STORAGE.)
 2399   REF  10  LAST 1071   01,2515  3 0052 0           CA     QPRET
 2400   REF   2  LAST 1082   01,2516  1 2370 0           TCF    MSTORE1
```

```
P2401              THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2403     00        BONSET                    SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2404     01        SETGO                     SET A SWITCH AND DO A GOTO.
R2405     02        BOFSET                    SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2406     03        SET                       SET A SWITCH.

R2407     04        BONINV                    INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2408     05        INVGO                     INVERT A SWITCH AND DO A GOTO.
R2409     06        BOFINV                    INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2410     07        INVERT                    INVERT A SWITCH.

R2411     10        BONCLR                    CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2412     11        CLRGO                     CLEAR A SWITCH AND DO A GOTO.
R2413     12        BOFCLR                    CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2414     13        CLEAR                     CLEAR A SWITCH.

R2415     14        BON                       BRANCH IF A SWITCH WAS ON.
R2416     16        BOFF                      BRANCH IF A SWITCH WAS OFF.


R2417              THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2419              BITS 1-4    SWITCH BIT NUMBER (1-15).
R2420              BITS 5-8    SWITCH OPERATION NUMBER.
R2421              BITS 9-     SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2422              THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2424     ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.


  2426    REF   2  LAST  739   01,2517   3 4762 0  SWITCHES CAF     LOW4            LEAVE THE SWITCH BIT IN  SWBIT  .
  2427    REF  36  LAST 1084   01,2520   7 0117 1           MASK     POLISH
  2428    REF 355  LAST 1083   01,2521  50 000 1            INDEX    A
  2429    REF  39  LAST 1070   01,2522   3 4735 1           CAF      BIT15           (NUMBER FROM LEFT TO RIGHT.)
  2430    REF   1              01,2523  54 131 0            TS       SWBIT

  2431    REF  39  LAST  987   01,2524   3 4745 0           CAF      BIT7            LEAVE THE SWITCH NUMBER IN SWWORD.
  2432                         01,2525   0 0006 1           EXTEND
  2433    REF  37  LAST 1086   01,2526   7 0117 1           MP       POLISH
  2434    REF   1              01,2527  54 130 1            TS       SWWORD

  2435                         01,2530   0 0004 0           INHINT                   DURING SWITCH CHANGE SO RUPT CAN USE TOO
  2436    REF 356  LAST 1086   01,2531  50 000 1            INDEX    A               LEAVE THE SWITCH WORD ITSELF IN L.
  2437    REF  43  LAST  603   01,2532   3 0074 1           CA       STATE
  2438    REF 296  LAST 1083   01,2533  54 002 1            TS       Q               Q WILL BE USED AS A CHANNEL.
```

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 2439   REF   23  LAST  913    01,2534  3 4741 1              CAF     BIT11
 2440                          01,2535  0 0006 1              EXTEND                DISPATCH SWITCH BIT OPERATION AS IN BITS
 2441   REF   38  LAST 1086    01,2536  7 0117 1              MP      POLISH        7-8 OF POLISH.
 2442   REF    1               01,2537  7 2577 1              MASK    B3TCB4        GETS 4X2-BIT CODE.
 2443   REF  357  LAST 1086    01,2540  50 000 1              INDEX   A
 2444                          01,2541  1 2542 1              TCF     +1

 2445   REF    2  LAST 1086    01,2542  3 0131 1    +1        CA      SWBIT         00 - SET SWITCH IN QUESTION.
 2446                          01,2543  0 0006 1              EXTEND
 2447   REF    1               01,2544  04 002 1              ROR     QCHAN
 2448   REF    1               01,2545  1 2554 0              TCF     SWSTORE

 2449   REF    3  LAST 1087    01,2546  3 0131 1    +5        CA      SWBIT         01 - INVERT SWITCH.
 2450                          01,2547  0 0006 1              EXTEND
 2451   REF    2  LAST 1087    01,2550  06 002 0              RXOR    QCHAN
 2452   REF    2  LAST 1087    01,2551  1 2554 0              TCF     SWSTORE

 2453   REF    4  LAST 1087    01,2552  4 0131 0    +90       CS      SWBIT         10 - CLEAR.
 2454   REF  297  LAST 1086    01,2553  7 0002 1              MASK    Q
 2455   REF    2  LAST 1086    01,2554  50 130 0  SWSTORE     INDEX   SWWORD
 2456   REF   44  LAST 1086    01,2555  54 074 0              TS      STATE         NEW SWITCH WORD.
 2457                               01,2556  0 0003 1   +13D     RELINT               11 - NOOP.
 2458    REF  39  LAST  991         01,2557  3 4737 0            CAF      BIT13
 2459                               01,2560  0 0006 1            EXTEND               DISPATCH SEQUCE CHANGING OR BRANCHING
 2460    REF  39  LAST 1087         01,2561  7 0117 1            MR       POLISH      CODE.
 2461    REF   2  LAST 1087         01,2562  7 2577 1            MASK     B3TOB4
 2462    REF 358  LAST 1087         01,2563  50 000 1            INDEX    A
 2463                               01,2564  1 2565 1            TCF      +1          ORIGINALLY STORED IN BITS 5-6.

 2464    REF 298  LAST 1087         01,2565  4 0002 1    +1      CS       Q           00 - BRANCH IF ON.
 2465    REF   5  LAST 1087         01,2566  7 0131 0   TEST     MASK     SWBIT
 2466    REF 359  LAST 1088         01,2567  10 000 0            CCS      A
 2467    REF   1                    01,2570  1 2600 1            TCF      SWSKIP

 2468    REF   1                    01,2571  1 6720 0    +5      TCF      SWBRANCH    01 - GO TO.

 2469    REF   2  LAST 1088         01,2572  1 2600 1            TCF      SWSKIP      HERE ONLY ON BIT 15.

 2470    REF   8  LAST 1085         01,2573  0 5675 0            TC       CCSHOLE
 2471    REF   9  LAST 1088         01,2574  0 5675 0            TC       CCSHOLE

 2472    REF 299  LAST 1088         01,2575  3 0002 0   +9D      CA       Q           10 - BRANCH IF OFF.
 2473    REF   1                    01,2576  1 2566 1            TCF      TEST

 2474                               01,2577   00014 1   B3TOB4   OCT      0014
 2475    REF  29  LAST 1080         01,2600  24 164 1   SWSKIP   INCR     LOC

 2476    REF   1                    01,2517             SW/      EQUALS SWITCHES

 2477    REF  54  LAST 1085         01,2601  1 6064 1   +130     TCF      DANZIG      11 - NOOP.
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L       FIXED-FIXED CONSTANT POOL                                                             USER'S PAGE NO.   1       EO S3

 0001                                   4732                     BLOCK  02

 00015  REF    1                                                 COUNT* $$/FCONS
R00016   THE FOLLOWING TABLE OF 18 VALUES IS INDEXED. DO NOT INSERT OR REMOVE ANY QUANTITIES.

 0002                                   4732    37777 1  OPCSMAX  OCT     37777            MUST PRECEDE POSMAX
 0003                                   4733    37777 1  POSMAX   OCT     37777

 0004   REF    5  LAST 1076             4734             LIMITS   =       NEG1/2

 0007                                   4734    57777 1  NEG1/2   OCT     -20000           USED BY SIN ROUTINE (MUST BE TWO
A0008                                                                                      LOCATIONS IN FRONT OF BIT14)
R0009             BIT TABLE

 0010                                   4735    40000 0  BIT15    OCT     40000
 0011                                   4736    20000 0  BIT14    OCT     20000
 0012                                   4737    10000 0  BIT13    OCT     10000
 0013                                   4740    04000 0  BIT12    OCT     04000
 0014                                   4741    02000 0  BIT11    OCT     02000
 0015                                   4742    01000 0  BIT10    OCT     01000
 0016                                   4743    00400 0  BIT9     OCT     00400
 0017                                   4744    00200 0  BIT8     OCT     00200
 0018                                   4745    00100 0  BIT7     OCT     00100
 0019                                   4746    00040 0  BIT6     OCT     00040
 0020                                   4747    00020 0  BIT5     OCT     00020
 0021                                   4750    00010 0  BIT4     OCT     00010
 0022                                   4751    00004 0  BIT3     OCT     00004
 0023                                   4752    00002 0  BIT2     OCT     00002
 0024                                   4753    00001 0  BIT1     OCT     00001


R0025   DO NOT DESTROY THIS COMBINATION, SINCE IT IS USED IN DOUBLE PRECISION INSTRUCTIONS.
 0027                                   4754    77777 0  NEG0     OCT     -0               MUST PRECEDE ZERO
 0028                                   4755    00000 1  ZERO     OCT     0                MUST FOLLOW NEG0
A0029                                                    BIT1     OCT     00001
A0030                                                    NO.WDS   OCT     2                INTERPRETER
A0031                                                    OCTAL3   OCT     3                INTERPRETER
A0032                                                    R3D1     OCT     4                PINBALL
 0033                                   4756    00005 1  FIVE     OCT     5
A0034                                                    REVCNT   OCT     6                INTERPRETER
 0035                                   4757    00007 0  SEVEN    OCT     7
A0036                                                    BIT4     OCT     00010
A0037                                                    R2D1     OCT     11               PINBALL
 00375  REF    6  LAST  461             4320             OCT11    =       P201             P20S
A0038                                                    BINCON   DEC     10               PINBALL             (OCTAL 12)
 0039                                   4760    00013 0  ELEVEN   DEC     11
A0040                                                    OCT14    OCT     14               ALARM AND ABORT (FILLER)
 00401                                  4761    00015 0  OCT15    OCT     15
A0041                                                    R1D1     OCT     16               PINBALL
 0043                                   4762    00017 1  LOW4     OCT     17
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A0044                                         BIT5     OCT    00020
A0045                                         ND1      OCT    21              PINBALL
A0046                                         VD1      OCT    23              PINBALL
A0047                                         OCT24    OCT    24              SERVICE ROUTINES
A0048                                         MD1      OCT    25              PINBALL
 00485                      4763  00030 1     BITS4&5  OCT    30
A0049                                         OCT31    OCT    31              SERVICE ROUTINES
 00491                      4764  00033 1     OCT33    OCT    33
 00492  REF   3  LAST  860  4764              DEC27    =      OCT33
 00493                      4765  00035 1     OCT35    OCT    35
 00494  REF   2  LAST  739  4765              DEC29    =      OCT35
 0050                       4766  00032 0     CALLCODE OCT    00032
A0051                                         LOW5     OCT    37              PINBALL
A0052                                         33DEC    DEC    33              PINBALL          (OCTAL 41)
A0053                                         34DEC    DEC    34              PINBALL          (OCTAL 42)
 0054                       4767  00045 0     TBUILDFX DEC    37              BUILDUP FOR CONVIENCE IN DAPTESTING
 0055                       4770  00046 0     TDECAYFX DEC    38              CONVENIENCE FOR DAPTESTING
A0056                                         BIT6     OCT    00040
 0057                       4771  00050 1     OCT50    OCT    50
 0058                       4772  00055 1     DEC45    DEC    45
 0059                       4773  00060 1     SUPER011 OCT    60              BITS FOR SUPERBNK SETTING 011
 0060                       4774  00062 0     .5SEC    DEC    50
A0061                                         BIT7     OCT    00100

 0062   REF  40  LAST 1086  4745              SUPER100 =      BIT7            BITS FOR SUPERBNK SETTING 100
A0063                                                                         (LAST 4K OF ROPE)
 0064                       4775  00120 1     SUPER101 OCT    120             BITS FOR SUPERBNK SETTING 101
A0065                                         OCT121   OCT    121             SERVICE ROUTINES
A0066                                                                         (FIRST 8K OF ACM)
 0067                       4776  00140 1     SUPER110 OCT    140             BITS FOR SUPERBNK SETTING 110.
A0068                                                                         (LAST 8K OF ACM)
 0069                       4777  00144 0     1SEC     DEC    100
A0070                                         LOW7     OCT    177             INTERPRETER
A0071                                         BIT8     OCT    00200
A0072                                         OCT215   OCT    215             ALARM AND ABORT
A0073                                         B,5      OCT    00220           P20-P25 SUNDANCE
 0074                       5000  00310 0     2SECS    DEC    200
A0075                                         LOW8     OCT    377             PINBALL
A0076                                         BIT9     OCT    00400
 0077                       5001  00401 1     GN/CCODE OCT    00401           SET S/C CONTROL SWITCH TO G/N
 0079                       5002  00454 1     3SECS    DEC    300
 0080                       5003  00620 0     4SECS    DEC    400
 00801                      5004  00777 0     LOW9     OCT    777
A0081                                         BIT10    OCT    01000
A0082                                         5.5DEGS  DEC    .03056          P20-P25 SUNDANCE   (OCTAL 00765)
A0083                                         OCT1103  OCT    1103            ALARM AND ABORT
 0084                       5005  01124 1     C5/2     DEC    .0363551                           (OCTAL 01124)
 0085                       5006  01211 1     V05N09   VN     0509            (SAME AS OCTAL 1211)
 0086                       5007  01400 1     OCT1400  OCT    01400
 00865                      5010  01426 0     V06N22   VN     0622
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L       FIXED-FIXED CONSTANT POOL                                                          USER'S PAGE NO.   3       FO S3

A0087                                        MID5     OCT     1740              PINBALL
 00875                 5011   01776 0  BITS2-10 OCT     1776
 0088                  5012   01777 1  LOW10    OCT     1777
A0089                                        BIT11    OCT     02000
A0090                                        2K+3     OCT     2003              PINBALL
 0091                  5013   02177 1  LOW7+2K  OCT     2177              OP CODE MASK + BANK 1 FBANK SETTING.
 0092                  5014   02400 1  EBANK5   OCT     02400
 0093                  5015   03000 1  PRIO3    OCT     03000
 0094                  5016   03400 0  EBANK7   OCT     03400
A0095                                        LOW11    OCT     3777              PINBALL
A0096                                        BIT12    OCT     04000
A0097                                        RELTAB   OCT     04025             T4RUPT
 0098                  5017   05000 1  PRIO5    OCT     05000
 0099                  5020   06000 1  PRIO6    OCT     06000
 0100                  5021   07000 0  PRIO7    OCT     07000

A0102                                        BIT13    OCT     10000
A0103                                                 OCT     10003             T4RUPT     RELTAB +10
A0104                                        13,7,2   OCT     10102             P20-P25 SUNDANCE
 0105                  5022   11000 1  PRIO11   OCT     11000
A0106                                        PRIO12   OCT     12000             BANKCALL
 0107                  5023   13000 0  PRIO13   OCT     13000
 0108                  5024   14000 1  PRIO14   OCT     14000
A0109                                                 OCT     14031             T4RUPT     RELTAB +20
 0110                  5025   15000 0  PRIO15   OCT     15000
 0111                  5026   16000 0  PRIO16   OCT     16000
A0112                                        B50EGS   DEC     .45556            P20-P25 SUNDANCE   (OCTAL 16450)
 0113                  5027   17000 1  PRIO17   OCT     17000
 0114                  5030   17770 1  OCT17770 OCT     17770
A0115                                        BIT14    OCT     20000
A0116                                                 OCT     20033             T4RUPT     RELTAB +30
 0117                  5031   21000 1  PRIO21   OCT     21000
 01175                 7713                           BLOCK   03
 01176  REF    1                                      COUNT*  $$/FCONS
 0118                  7713   22000 1  PRIO22   OCT     22000             SERVICE ROUTINES
 0119                  7714   23000 0  PRIO23   OCT     23000
 0120                  7715   24000 1  PRIO24   OCT     24000
A0121                                        5/8+1    OCT     24001             SINGLE PRECISION SUBROUTINES
A0122                                                 OCT     24017             T4RUPT     RELTAB +4D
 0123                  7716   25000 0  PRIO25   OCT     25000
 0124                  7717   26000 0  PRIO26   OCT     26000
 0125                  7720   27000 1  PRIO27   OCT     27000
A0126                                        CHRPRIO  OCT     30000             PINBALL
A0127                                                 OCT     30036             T4RUPT     RELTAB +5D
 0128                  7721   31000 0  PRIO31   OCT     31000
 0129                  7722   31103 1  C1/2     DEC     .7853134                             (OCTAL 31103)
 0130                  7723   32000 0  PRIO32   OCT     32000
 0131                  7724   33000 1  PRIO33   OCT     33000
 0132                  7725   34000 0  PRIO34   OCT     34000
A0133                                                 OCT     34034             T4RUPT     RELTAB +60
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 0134                         7726   35000 1  PRIO35    OCT     35000
 0135                         7727   36000 1  PRIO36    OCT     36000
 0136                         7730   37000 0  PRIO37    OCT     37000
 0137                         7731   37401 0  63/64+1   OCT     37401
A0138                                         MID7      OCT     37600            PINBALL
 0139                         7732   37766 1  OCT37766  OCT     37766
 0140                         7733   37774 1  OCT37774  OCT     37774
 0141                         7734   37776 0  OCT37776  OCT     37776
A01411                                        DPOSMAX   OCT     37777
A0142                                         BIT15     OCT     40000
A0143                                         OCT40001  OCT     40001            INTERPRETER  ( CS   1   INSTRUCTION)
 0144                         7735   40014 0  DLOADCOD  OCT     40014
 0145                         7736   40015 1  DLOAD*    OCT     40015
A0146                                                   OCT     40023            T4RUPT      RELTAB +7D
 01465                        7737   40040 1  BIT15+6   OCT     40040
 01466                        7740   40200 1  OCT40200  OCT     40200
A0147                                                   OCT     44035            T4RUPT     RELTAB +8D
A0148                                                   OCT     50037            T4RUPT      RELTAB +9D
A0149                                                   OCT     54000            T4RUPT      RELTAB +10D
 01495                        7741   57777 1  -BIT14    OCT     57777
A0150                                         RELTAB11  OCT     60000            T4RUPT
 0151                         7742   65552 0  C3/2      DEC     -.3216147                          (OCTAL 65552)
 0152                         7743   70000 0  13,14,15  OCT     70000
 0153                         7744   73777 1  -1/8      OCT     73777
 0154                         7745   74000 1  HIGH4     OCT     74000
 0155                         7746   74056 1  -ENDERAS  DEC     -2001                              (OCTAL 74056)
A0156                                         HI5       OCT     76000            PINBALL
 0157                         7747   77700 0  HIGH9     OCT     77700
A0158                                         -ENDVAC   DEC     -45              INTERPRETER       (OCTAL 77722)
A0159                                         -OCT10    OCT     -10                                 (OCT 77767)
A0161                                         NEG4      DEC     -4                                 (OCTAL 77773)
 0162                         7750   77774 0  NEG3      DEC     -3
 0163                         7751   77775 1  NEG2      OCT     77775
 0164                         7752   77776 1  NEGONE    DEC     -1
```

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L        FIXED-FIXED CONSTANT POOL                                                  USER'S PAGE NO.   5       EO S3

P0165    DEFINED BY EQUALS

R0166    IT WOULD BE TO THE USERS ADVANTAGE TO OCCASIONALLY CHECK ANY OF THESE SYMBOLS IN ORDER TO PREVENT ANY
R0168    ACCIDENTAL DEFINITION CHANGES.

 0169    REF   5  LAST  862       7752               MINUS1    =      NEG1
 0170    REF  11  LAST 1053       7752               NEG1      =      NEGONE
 0171    REF  49  LAST  998       4753               ONE       =      BIT1
 0172    REF  47  LAST  970       4752               TWO       =      BIT2
 0173    REF   1                  6250               THREE     =      OCTAL3
 0174    REF  31  LAST 1022       6250               LOW2      =      THREE
 0175    REF  33  LAST  895       4751               FOUR      =      BIT3
 0176    REF   5  LAST 1002       6245               SIX       =      REVCNT
 0177    REF  16  LAST 1073       4757               LOW3      =      SEVEN
 0178    REF  41  LAST  970       4750               EIGHT     =      BIT4
 0179    REF   7  LAST 1089       4320               NINE      =      R2D1
 0180    REF   4  LAST  503       4363               TEN       =      BINCON
 0181    REF   3  LAST  739       4760               NOUTCON   =      ELEVEN
 0182    REF  15  LAST  460       4360               OCT23     =      V01
 01825   REF   3  LAST  784       4362               OCT25     =      M01
 0183    REF  36  LAST 1049       4742               PRIO1     =      BIT10
 0184    REF   7  LAST 1083       5007               EBANK3    =      OCT1400
 0185    REF  24  LAST 1087       4741               PRIO2     =      BIT11
 0186    REF   1                  4775               OCT120    =      SUPER101
 0187    REF   3  LAST  609       4776               OCT140    =      SUPER110
 0188    REF  25  LAST 1093       4741               2K        =      BIT11
 0189    REF  26  LAST 1093       4741               EBANK4    =      BIT11
 0190    REF  30  LAST  821       4740               PRIO4     =      BIT12
 0191    REF  13  LAST  888       5015               EBANK6    =      PRIO3
 0192    REF  40  LAST 1088       4737               QUARTER   =      BIT13
 0193    REF  41  LAST 1093       4737               PRIO10    =      BIT13
 01935   REF   1                  7666               OCT10001  =      CCSL
 0194    REF  26  LAST 1079       4736               POS1/2    =      HALF
 0195    REF  65  LAST 1080       4736               PRIO20    =      BIT14
 0196    REF  66  LAST 1093       4736               HALF      =      BIT14
 0197    REF   5  LAST  472       4355               PRIO30    =      CHRPRIO
 0198    REF  10  LAST 1020       4355               BIT13-14  =      PRIO30            INTERPRETER USES IN PROCESSING STORECODE
 01985   REF   3  LAST 1005       6474               OCT30002  =      TLOAD +1
 0199    REF   1                  7725               B12T14    =      PRIO34
 0200    REF  40  LAST 1086       4735               NEGMAX    =      BIT15
 0201    REF  41  LAST 1093       4735               VLOADCOD  =      BIT15
 0202    REF   1                  6112               VLOAD*    =      OCT40001
 0203    REF   2  LAST  158       4101               OCT60000  =      RELTA811
 0204    REF   6  LAST  908       4350               BANKMASK  =      HI5
```

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L         INTERPRETIVE CONSTANTS                                                                   USER'S PAGE NO.  1      ED S3

 0001   REF   1                 23,2000                          SETLOC  INTPRET1
 0002                           23,2513                          BANK

 0003   REF   1                                                  COUNT*  $$/ICONS
 0004                           23,2513    10000 0   OP1/4TH     2DEC    .25
 0004                           23,2514    00000 1
 0005                           23,2515    00000 1   UNITZ       2DEC    0
 0005                           23,2516    00000 1
 0006                           23,2517    00000 1   UNITY       2DEC    0
 0006                           23,2520    00000 1
 0007                           23,2521    20000 0   UNITX       2DEC    .5
 0007                           23,2522    00000 1
 0008                           23,2523    00000 1   ZEROVECS    2DEC    0
 0008                           23,2524    00000 1
 0009                           23,2525    00000 1               2DEC    0
 0009                           23,2526    00000 1
 0010                           23,2527    00000 1               2DEC    0
 0010                           23,2530    00000 1
 0011   REF  13  LAST  904      23,2521              OPHALF      =       UNITX
 0012                           23,2531    37777 1   DPPOSMAX    OCT     37777
 0013                           23,2532    37777 1               OCT     37777
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P0014    INTERPRETIVE CONSTANTS IN THE OTHER HALF-MEMORY

 0015    REF    1                12,2000                            SETLOC  INTPRET2
 0016                            12,2000                            BANK

 0017    REF    1                                                   COUNT*  $$/ICONS
 0018                            12,2000   00000 1  ZUNIT     2DEC    0
 0018                            12,2001   00000 1
 0019                            12,2002   00000 1  YUNIT     2DEC    0
 0019                            12,2003   00000 1
 0020                            12,2004   20000 0  XUNIT     2DEC    .5
 0020                            12,2005   00000 1
 0021                            12,2006   00000 1  ZEROVEC   2DEC    0
 0021                            12,2007   00000 1
 0022                            12,2010   00000 1            2DEC    0
 0022                            12,2011   00000 1
 0023                            12,2012   00000 1            2DEC    0
 0023                            12,2013   00000 1
 0024                            12,2014   77777 0            OCT     77777          -0,-6,-12 MUST REMAIN IN THIS ORDER
 0025                            12,2015   77771 0  DEC-6     DEC     -6
 0026                            12,2016   77763 0  DEC-12    DEC     -12
 0027                            12,2017   37777 1  LOOPMAX   2OCT    3777737777     THESE TWO CONSTANTS MUST REMAIN
 0027                            12,2020   37777 1
 0028                            12,2021   37777 1  LODPMAX1  2OCT    3777737777     ADJACENT AND THE SAME FOR INTEGRATION
 0028                            12,2022   37777 1
 0029    REF    5  LAST   960    12,2006            ZERODP    =       ZEROVEC
 0030    REF    7  LAST   962    12,2004            HALFDP    =       XUNIT
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L          SINGLE PRECISION SUBROUTINES                                                              USER'S PAGE NO.   1        EO S3

 0001                                    5032                    BLOCK  02
R0002      SINGLE PRECISION SINE AND COSINE

 00025  REF    1                                                  COUNT*  $$/INTER
 0003   REF   27   LAST 1093        5032   6 4736 1   SPCOS      AD      HALF               ARGUMENTS SCALED AT PI
 0004   REF    1                    5033  55'075 0    SPSIN      TS      TEMK
 0005   REF    1                    5034   1 5036 0              TCF     SPT
 0006   REF    2   LAST 1096        5035   4 1075 0              CS      TEMK
 0007                               5036   6 0000 1   SPT        DOUBLE
 0008   REF    3   LAST 1096        5037  55'075 0               TS      TEMK
 0009   REF    1                    5040   1 5051 1              TCF     POLLEY
 0010   REF    4   LAST 1096        5041  57'075 1               XCH     TEMK
 0011   REF    5   LAST 1096        5042  51'075 1               INDEX   TEMK
 0012   REF    3   LAST 1022        5043   6 4734 0              AD      LIMITS
 0013                               5044   4 0000 0              COM
 0014   REF    6   LAST 1096        5045   6 1075 1              AD      TEMK
 0015   REF    7   LAST 1096        5046  55'075 0               TS      TEMK
 0016   REF    2   LAST 1096        5047   1 5051 1              TCF     POLLEY
 0017   REF    1                    5050   1 5067 1              TCF     ARG90
 0018                               5051   0 0006 1   POLLEY     EXTEND
 0019   REF    8   LAST 1096        5052   7 1075 0              MP      TEMK
 0020   REF    1                    5053  55'076 0               TS      SQ
 0021                               5054   0 0006 1              EXTEND
 0022   REF    1                    5055   7 5005 0              MP      C5/2
 0023   REF    1                    5056   6 7742 1              AD      C3/2
 0024                               5057   0 0006 1              EXTEND
 0025   REF    2   LAST 1096        5060   7 1076 0              MP      SQ
 0026   REF    1                    5061   6 7722 1              AD      C1/2
 0027                               5062   0 0006 1              EXTEND
 0028   REF    9   LAST 1096        5063   7 1075 0              MP      TEMK
 0029                               5064  20 001 1               DDOUBL
 0030   REF   10   LAST 1096        5065  55'075 0               TS      TEMK
 0031   REF  300   LAST 1088        5066   0 0002 0              TC      Q
 0032   REF  360   LAST 1088        5067  50 000 1    ARG90      INDEX   A
 0033   REF    4   LAST 1096        5070   4 4734 1              CS      LIMITS
 0034   REF  301   LAST 1096        5071   0 0002 0              TC      Q                  RESULT SCALED AT 1
 0001                                     5072                        BLOCK   02
R0002                 TO ENTER A JOB REQUEST REQUIRING NO VAC AREA:

 00025  REF    1                                                      COUNT*  $$/EXEC
 00029                                    5072   0 0004 0  NOVAC      INHINT
 0003   REF    1                          5073   6 5164 1             AD      FAKEPRET        LOC(MPAC +6) - LOC(QPRET)
 00031  REF    3  LAST  371               5074  54 063 0              TS      NEWPRIO         PRIORITY OF NEW JOB + NOVAC C(FIXLOC)

 0004                                     5075   0 0006 1             EXTEND
 0005   REF 302   LAST 1096               5076   5 0002 0             INDEX   Q               Q WILL BE UNDISTURBED THROUGHOUT.
 0006                                     5077   3 0001 0             DCA     0               2CADR OF JOB ENTERED.
 0007   REF    1                          5100  52 066 0              DXCH    NEWLOC
 0008   REF    1                          5101   3 5163 0             CAF     EXECBANK
 0009   REF   25  LAST 1039               5102  56 004 0              XCH     FBANK
 0010   REF    1                          5103  54 061 1              TS      EXECTEM1
 0011   REF    1                          5104   1 2626 0             TCF     NOVAC2          ENTER EXECUTIVE BANK.

R0012                 TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

 0014                                     5105   0 0004 0  FINDVAC    INHINT
 00145  REF    4  LAST 1097               5106  54 063 0              TS      NEWPRIO
 0015                                     5107   0 0006 1             EXTEND
 0016   REF 303   LAST 1097               5110   5 0002 0             INDEX   Q
 0017                                     5111   3 0001 0             DCA     0
 0018   REF    2  LAST 1097               5112  52 066 0   SPVACIN    DXCH    NEWLOC
 0019   REF    2  LAST 1097               5113   3 5163 0             CAF     EXECBANK
 0020   REF   26  LAST 1097               5114  56 004 0              XCH     FBANK
 0021   REF    1                          5115   1 2602 0             TCF     FINDVAC2        OFF TO EXECUTIVE SWITCHED-BANK.

R00211                TO ENTER A FINDVAC WITH THE PRIORITY IN NEWPRIO TO THE 2CADR ARRIVING IN A AND L:

R002125               USERS OF SPVAC MUST INHINT BEFORE STORING IN NEWPRIO.

 00213  REF 304   LAST 1097               5116  56 002 0   SPVAC      XCH     Q
 00214  REF    6  LAST  381               5117   6 7751 0             AD      NEG2
 00215  REF 305   LAST 1097               5120  56 002 0              XCH     Q
 00216  REF    1                          5121   1 5112 1             TCF     SPVACIN

R0022                 TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

 0024   REF 306   LAST 1097               5122  22 002 0   CHANG1     LXCH    Q
 0025   REF    3  LAST 1097               5123   3 5163 0             CAF     EXECBANK
 0026   REF   30  LAST 1019               5124  56 006 1              XCH     BBANK
 0027   REF    1                          5125   1 2707 1             TCF     CHANJOB

R0030                 TO SUSPEND AN INTERPRETIVE JOB:

 0031   REF   30  LAST 1068               5126   4 0164 0  CHANG2     CS      LOC             NEGATIVE LOC SHOWS JOB = INTERPRETIVE.
R00315                ITRACE (4) REFERS TO "CHANG2".
 0032   REF 210   LAST 1076               5127  54 001 1              TS      L
 0033    REF   4  LAST 1097       5130  3 5163 0    +2       CAF      EXECBANK
 00335   REF  31  LAST 1097       5131  54 006 0             TS       BBANK
 0034    REF   2  LAST 1097       5132  1 2706 0             TCF      CHANJOB -1
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P0035            TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0037   REF   31  LAST 1097       5133  54 164 0  JOBSLEEP TS      LOC
 0038   REF    5  LAST 1098       5134  3 5163 0           CAF     EXECBANK
 0039   REF   27  LAST 1097       5135  54 004 1           TS      FBANK
 0040   REF    1                  5136  1 2777 0           TCF     JOBSLP1

R0041            TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0042                             5137  0 0004 0  JOBWAKE  INHINT
 00421  REF    3  LAST 1097       5140  54 065 0           TS      NEWLOC
 0043   REF   71  LAST 1036       5141  4 4752 1           CS      TWO                   EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0044   REF  307  LAST 1097       5142  26 002 1           ADS     Q
 0045   REF    6  LAST 1099       5143  3 5163 0           CAF     EXECBANK
 0046   REF   28  LAST 1099       5144  56 004 0           XCH     FBANK
 0047   REF    1                  5145  1 3024 0           TCF     JOBWAKE2

R0048            TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0049                             5146  0 0004 0  PRIOCHNG INHINT                        NEW PRIORITY ARRIVES IN A. RETURNS TO
 0050   REF    5  LAST 1097       5147  54 063 0           TS      NEWPRIO               CALLER AS SOON AS NEW JOB PRIORITY IS
 0051   REF    7  LAST 1099       5150  3 5163 0           CAF     EXECBANK              HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0052   REF   32  LAST 1098       5151  56 006 1           XCH     BBANK                 STYLE CHANGE-JOB.
 0053   REF    9  LAST 1019       5152  54 165 1           TS      BANKSET
 0054   REF  308  LAST 1099       5153  3 0002 0           CA      Q
 0055   REF    1                  5154  1 3073 1           TCF     PRIOCH2

R0058            TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059   REF    8  LAST 1099       5155  3 5163 0  ENDOFJOB CAF     EXECBANK
 0060   REF   29  LAST 1099       5156  54 004 1           TS      FBANK
 0061   REF    1                  5157  1 3104 0           TCF     ENDJOB1

 0062   REF    2  LAST 1097       5160  3 0061 0  ENDFINO  CA      EXECTEM1              RETURN TO CALLER AFTER JOB ENTRY
 0063   REF   30  LAST 1099       5161  54 004 1           TS      FBANK                 COMPLETE.
 0064   REF    2  LAST  525       5162  1 6744 1           TCF     Q+2
 0066   REF    2  LAST 1097       5163   02602 1  EXECBANK CADR    FINDVAC2

 00665  REF  720  LAST 1084       5164   00110 1  FAKEPRET ADRES   MPAC -36D             LOC(MPAC +6) - LOC(QPRET)
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P0067           LOCATE AN AVAILABLE VAC AREA.

 0068                            01,2602                         BANK    01
 00685  REF   1                                                  COUNT*  $$/EXEC
 0069   REF   3  LAST 1099       01,2602  54 061 1   FINDVAC2 TS      EXECTEM1         (SAVE CALLER'S BANK FIRST.)
 0070   REF   4  LAST  245       01,2603  10 400 1            CCS     VAC1USE
 0071   REF   1                  01,2604   1 2621 1           TCF     VACFOUND
 0072   REF   3  LAST  245       01,2605  10 454 0            CCS     VAC2USE
 0073   REF   2  LAST 1100       01,2606   1 2621 1           TCF     VACFOUND
 0074   REF   3  LAST  245       01,2607  10 530 0            CCS     VAC3USE
 0075   REF   3  LAST 1100       01,2610   1 2621 1           TCF     VACFOUND
 0076   REF   3  LAST  245       01,2611  10 604 1            CCS     VAC4USE
 0077   REF   4  LAST 1100       01,2612   1 2621 1           TCF     VACFOUND
 0078   REF   3  LAST  245       01,2613  10 660 0            CCS     VAC5USE
 0079   REF   5  LAST 1100       01,2614   1 2621 1           TCF     VACFOUND
 00792  REF   4  LAST 1100       01,2615  22 061 0            LXCH    EXECTEM1
 00794  REF 309  LAST 1099       01,2616   3 0002 0           CA      Q
 0080   REF   3  LAST  246       01,2617   0 5706 0           TC      BAILOUT1
 0081                            01,2620    31201 0           OCT     31201            NO VAC AREAS

 0082   REF  72  LAST 1099       01,2621   6 4752 0  VACFOUND AD      TWO              RESERVE THIS VAC AREA BY STORING A ZERO
 0083                            01,2622  22 007 0            ZL                       IN ITS VAC USE REGISTER AND STORE THE
 0084   REF 361  LAST 1096       01,2623  50 000 1            INDEX   A                ADDRESS OF THE FIRST WORD OF IT IN THE
 0085                            01,2624  21'777 0            LXCH    0 -1             LOW NINE BITS OF THE PRIORITY WORD.
 0086   REF   6  LAST 1099       01,2625  26 063 0            ADS     NEWPRIO

 0087   REF 216  LAST 1080       01,2626   3 4755 1  NOVAC2   CAF     ZERO             NOVAC ENTERS HERE. FIND A CORE SET.
 0088   REF   5  LAST  462       01,2627  54 064 1            TS      LOCCTR
 0089   REF   1                  01,2630   3 2635 0           CAF     NO.CORES         SEVEN SETS OF ELEVEN REGISTERS EACH.
 0090   REF   1                  01,2631  54 062 1   NOVAC3   TS      EXECTEM2
 0091   REF   6  LAST 1100       01,2632  50 064 0            INDEX   LOCCTR
 0092   REF  12  LAST  858       01,2633  10 167 0            CCS     PRIORITY         EACH PRIORITY REGISTER CONTAINS -0 IF
 0093   REF   1                  01,2634   1 2675 0           TCF     NEXTCORE         THE CORRESPONDING CORE SET IS AVAILABLE.
 0094                            01,2635    00007 0  NO.CORES DEC     7
 0095   REF   2  LAST 1100       01,2636   1 2675 0           TCF     NEXTCORE         AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                                                  BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
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0097   REF   7  LAST 1100   01,2637   3 0063 1  CORFOUND CA     NEWPRIO     SET THE PRIORITY OF THIS JOB IN THE CORE
0098   REF   7  LAST 1100   01,2640  50 064 0            INDEX  LOCCTR      SET'S PRIORITY REGISTER AND SET THE
0099   REF  13  LAST 1100   01,2641  54 167 0            TS     PRIORITY    JOB'S PUSH-DOWN POINTER AT THE BEGINNING
0100   REF   9  LAST  858   01,2642   7 5004 1           MASK   LOW5        OF THE WORK AREA AND OVERFLOW INDICATOR
0101   REF   8  LAST 1101   01,2643  50 064 0            INDEX  LOCCTR
0102   REF  29  LAST 1071   01,2644  54 166 1            TS     PUSHLOC     OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

0103   REF   9  LAST 1101   01,2645  10 064 1            CCS    LOCCTR      IF CORE SET ZERO IS BEING LOADED, SET UP
0104   REF   1              01,2646   1 2662 0           TCF    SETLOC      OVFIND AND FIXLOC IMMEDIATELY .
0105   REF  11  LAST 1084   01,2647  54 121 1            TS     OVFIND
0106   REF  30  LAST 1101   01,2650   3 0166 0           CA     PUSHLOC
0107   REF  54  LAST 1085   01,2651  54 120 0            TS     FIXLOC

0108   REF   7  LAST  997   01,2652  10 067 1  SRECTEST CCS     NEWJOB      SEE IF ANY ACTIVE JOBS WAITING (RARE).
0109   REF   2  LAST 1101   01,2653   1 2662 0           TCF    SETLOC      MUST BE AWAKENED BUT UNCHANGED JOB.
0110   REF  10  LAST 1088   01,2654   0 5675 0           TC     CCSHOLE
0111   REF  11  LAST 1101   01,2655   0 5675 0           TC     CCSHOLE
0112   REF   8  LAST 1101   01,2656  54 067 1            TS     NEWJOB      +0 SHOWS ACTIVE JOB ALREADY SET.
0113   REF   4  LAST 1099   01,2657  52 066 0            DXCH   NEWLOC
0114   REF  32  LAST 1099   01,2660  52 165 1            DXCH   LOC
0115   REF   1              01,2661   1 5160 1           TCF    ENDFIND

0116   REF   5  LAST 1101   01,2662  52 066 0  SETLOC   DXCH    NEWLOC      SET UP THE LOCATION REGISTERS FOR THIS
0117   REF  10  LAST 1101   01,2663  50 064 0            INDEX  LOCCTR
0118   REF  33  LAST 1101   01,2664  52 165 1            DXCH   LOC
0119   REF   9  LAST 1101   01,2665  50 067 0            INDEX  NEWJOB      THIS INDEX INSTRUCTION INSURES THAT THE
0120   REF  14  LAST 1101   01,2666   4 0167 0           CS     PRIORITY    HIGHEST ACTIVE PRIORITY WILL BE COMPARED
0121   REF   8  LAST 1101   01,2667   6 0063 1           AD     NEWPRIO     WITH THE NEW PRIORITY TO SEE IF NEWJOB
0122                        01,2670   0 0006 1           EXTEND             SHOULD BE SET TO SIGNAL A SWITCH.
0123   REF   2  LAST 1101   01,2671   6 5160 0           BZMF   ENDFIND
0124   REF  11  LAST 1101   01,2672   3 0064 0           CA     LOCCTR      LOCCTR IS LEFT SET AT THIS CORE SET IF
0125   REF  10  LAST 1101   01,2673  54 067 1            TS     NEWJOB      THE CALLER WANTS TO LOAD ANY MPAC
0126   REF   3  LAST 1101   01,2674   1 5160 1           TCF    ENDFIND     REGISTERS, ETC.

0127   REF   1              01,2675   3 3034 0  NEXTCORE CAF    COREINC
0128   REF  12  LAST 1101   01,2676  26 064 1            ADS    LOCCTR
0129   REF   2  LAST 1100   01,2677  10 062 1            CCS    EXECTEM2
0130   REF   1              01,2700   1 2631 0           TCF    NOVAC3
01302  REF   5  LAST 1100   01,2701  22 061 0            LXCH   EXECTEM1
01304  REF 310  LAST 1100   01,2702   3 0002 0           CA     Q
0131   REF   4  LAST 1100   01,2703   0 5706 0           TC     BAILOUT1    NO CORE SETS AVAILABLE.
0132                        01,2704    31202 0           OCT    31202
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P0133              THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

 01345  REF  34  LAST 1101   01,2705   22 164 1    -2       LXCH    LOC
 0135   REF  10  LAST 1099   01,2706   30 165 0    -1       CAE     BANKSET           BANKSET, NOT BBANK, HAS RIGHT CONTENTS.
 0136                        01,2707   0 0004 0   CHANJOB   INHINT
 01362                       01,2710   0 0006 1             EXTEND
 01364  REF  15  LAST  995   01,2711   04 007 1             ROR     SUPERBNK          PICK UP CURRENT SBANK FOR BBCON
 01366  REF 211  LAST 1097   01,2712   56 001 0             XCH     L                 LOC IN A AND BBCON IN L.
 01368  REF  11  LAST 1101   01,2713   50 067 0    +4       INDEX   NEWJOB            SWAP LOC AND BANKSET.
 0137   REF  35  LAST 1102   01,2714   52 165 1             DXCH    LOC
 0138   REF  36  LAST 1102   01,2715   52 165 1             DXCH    LOC

 01382  REF  11  LAST 1102   01,2716   30 165 0             CAF     BANKSET
 01384                       01,2717   0 0006 1             EXTEND
 01388  REF  16  LAST 1102   01,2720   01 007 1             WRITE   SUPERBNK          SET SBANK FOR NEW JOB.
 0139   REF 721  LAST 1099   01,2721   52 155 1             DXCH    MPAC              SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
 0140   REF  12  LAST 1102   01,2722   50 067 0             INDEX   NEWJOB
 0141   REF 722  LAST 1102   01,2723   52 155 1             DXCH    MPAC
 0142   REF 723  LAST 1102   01,2724   52 155 1             DXCH    MPAC
 0143   REF 724  LAST 1102   01,2725   52 157 0             DXCH    MPAC +2
 0144   REF  13  LAST 1102   01,2726   50 067 0             INDEX   NEWJOB
 0145   REF 725  LAST 1102   01,2727   52 157 0             DXCH    MPAC +2
 0146   REF 726  LAST 1102   01,2730   52 157 0             DXCH    MPAC +2
 0147   REF 727  LAST 1102   01,2731   52 161 0             DXCH    MPAC +4
 0148   REF  14  LAST 1102   01,2732   50 067 0             INDEX   NEWJOB
 0149   REF 728  LAST 1102   01,2733   52 161 0             DXCH    MPAC +4
 0150   REF 729  LAST 1102   01,2734   52 161 0             DXCH    MPAC +4
 0151   REF 730  LAST 1102   01,2735   52 163 1             DXCH    MPAC +6
 0152   REF  15  LAST 1102   01,2736   50 067 0             INDEX   NEWJOB
 0153   REF 731  LAST 1102   01,2737   52 163 1             DXCH    MPAC +6
 0154   REF 732  LAST 1102   01,2740   52 163 1             DXCH    MPAC +6

 0155   REF 217  LAST 1100   01,2741   3 4755 1             CAF     ZERO
 0156   REF  12  LAST 1101   01,2742   56 121 0             XCH     OVFIND            MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
 0157                        01,2743   0 0006 1             EXTEND
 0158                        01,2744   1 2747 0             BZF     +3
 0159   REF  31  LAST 1101   01,2745   4 0166 1             CS      PUSHLOC
 0160   REF  32  LAST 1102   01,2746   54 166 1             TS      PUSHLOC

 0161   REF  33  LAST 1102   01,2747   52 167 0             DXCH    PUSHLOC
 0162   REF  16  LAST 1102   01,2750   50 067 0             INDEX   NEWJOB
 0163   REF  34  LAST 1102   01,2751   52 167 0             DXCH    PUSHLOC
 0164   REF  35  LAST 1102   01,2752   52 167 0             DXCH    PUSHLOC           SWAPS PUSHLOC AND PRIORITY.
 0165   REF  10  LAST 1101   01,2753   3 5004 0             CAF     LOW9              SET FIXLOC TO BASE OF VAC AREA.
 0166   REF  15  LAST 1101   01,2754   7 0167 0             MASK    PRIORITY
 0167   REF  55  LAST 1101   01,2755   54 120 0             TS      FIXLOC

 0168   REF  36  LAST 1102   01,2756   10 166 1             CCS     PUSHLOC           SET OVERFLOW INDICATOR ACCORDING TO
 0169   REF 218  LAST 1102   01,2757   3 4755 1             CAF     ZERO
 0170   REF   1              01,2760   1 2765 0             TCF     ENDPRCHG -1
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0171   REF  37  LAST 1102   01,2761  4 0166 1                CS      PUSHLOC
0172   REF  38  LAST 1103   01,2762  54 166 1                TS      PUSHLOC
0173   REF 113  LAST 1066   01,2763  3 4753 1                CAF     ONE
0174   REF  13  LAST 1102   01,2764  56 121 0                XCH     OVFIND
0175   REF  17  LAST 1102   01,2765  54 067 1                TS      NEWJOB

0176                        01,2766  0 0003 1      ENDPRCHG  RELINT
0177   REF  37  LAST 1102   01,2767  52 165 1                DXCH    LOC              BASIC JOBS HAVE POSITIVE ADDRESSES, SO
0178                        01,2770  0 0006 1                EXTEND                   DISPATCH WITH A DTCB-
0179                        01,2771  6 2773 0                BZMF    +2               IF INTERPRETIVE, SET UP EBANK, ETC.
0180                        01,2772  52 006 0                DTCB
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 0181                               01,2773  4 0000 0            COM                EPILOGUE TO JOB CHANGE FOP INTERPRETIVE
 0182     REF 114  LAST 1103        01,2774  6 4753 1            AD       ONE
 0183     REF  38  LAST 1103        01,2775  54 164 0            TS       LOC       RESUME.
 0186     REF   1                   01,2776  1 6053 0            TCF      INTRSM

R0187              COMPLETE JOBSLEEP PPEPAPATIONS.

 0188                               01,2777  0 0004 0  JC@SLP1   INHINT
 0189     REF  16  LAST 1102        01,3000  4 0167 0            CS       PRIORITY  NNZ PPIOPITY SHOWS JOB ASLEEP.
 0190     REF  17  LAST 1104        01,3001  54 167 0            TS       PRIORITY
 0191     REF   8  LAST 1038        01,3002  3 6077 1            CAF      LOW7
 0192     REF  33  LAST 1099        01,3003  7 0006 0            MASK     EBANK
 01921                              01,3004  0 0006 1            EXTEND
 01922    PEF  17  LAST 1102        01,3005  04 007 1            ROR      SUPERBNK  SAVE OLD SUPERBANK VALUE.
 0193     REF  12  LAST 1102        01,3006  54 165 1            TS       BANKSET
 0194     REF 219  LAST 1102        01,3007  4 4755 0            CS       ZERO
 0195     REF 149  LAST 1074        01,3010  54 131 0  JC@SLP2   TS       BUF +1    HOLDS - HIGHEST PRIORITY.
 0196     REF   1                   01,3011  1 3121 1            TCF      EJSCAN    SCAN FOR HIGHEST PRIOPITY ALA ENDOFJOB.

 01961                              01,3012  0 0004 0  NUCHANG2  INHINT             QUICK... DONT LET NEWJOB CHANGE TO +0 .
 019611   REF  18  LAST 1103        01,3013  10 067 1            CCS      NEWJOB
 019612                             01,3014  1 3017 0            TCF      +3        NEWJOB STILL PNZ
 019613                             01,3015  0 0003 1            RELINT             NEWJOB HAS CHANGED TO +0. WAKE UP JOB
 019614   REF   1                   01,3016  1 3217 1            TCF      ADVAN +2  VIA NUDIPECT. (VERY PAPE CASE.)

 01962    PEF  73  LAST 1100        01,3017  3 4752 0            CAF      TWO
 01963                              01,3020  0 0006 1            EXTEND
 01964    REF  30  LAST  858        01,3021  05 011 1            WOR      DSALMOUT  TURN ON ACTIVITY LIGHT
 01965    REF  39  LAST 1104        01,3022  52 165 1            DXCH     LOC       AND SAVE ADDRESS INFO FOR BENEFIT OF
 01966    REF   3  LAST 1098        01,3023  1 2713 1            TCF      CHANJOB + 4 POSSIBLE SLEEPING JOB.
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P0197              TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0199       LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0201       LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

 0202   REF   6  LAST 1101   01,3024  54 061 1  JOBWAKE2 TS     EXECTEM1
 0203   REF 220  LAST 1104   01,3025  3 4755 1           CAF    ZERO           BEGIN CORE SET SCAN.
 0204   REF  13  LAST 1101   01,3026  54 064 1           TS     LOCCTR
 0205   REF   2  LAST 1100   01,3027  3 2635 0           CAF    NO.CORES
 0206   REF   3  LAST 1101   01,3030  54 062 1  JOBWAKE4 TS     EXECTEM2
 0207   REF  14  LAST 1105   01,3031  50 064 0           INDEX  LOCCTR
 0208   REF  18  LAST 1104   01,3032  10 167 0           CCS    PRIORITY
 0209   REF   1              01,3033  1 3036 0           TCF    JOBWAKE3       ACTIVE JOB - CHECK NEXT CORE SET.
 0210                        01,3034   00014 1  COREINC  DEC    12             12 REGISTERS PER CORE SET.
 0211   REF   1              01,3035  1 3045 1           TCF    WAKETEST       SLEEPING JOB - SEE IF CADR MATCHES.

 0212   REF   2  LAST 1101   01,3036  3 3034 0  JOBWAKE3 CAF    COREINC
 0213   REF  15  LAST 1105   01,3037  26 064 1           ADS    LOCCTR
 0214   REF   4  LAST 1105   01,3040  10 062 1           CCS    EXECTEM2
 0215   REF   1              01,3041  1 3030 0           TCF    JOBWAKE4
 0216   REF 115  LAST 1104   01,3042  4 4753 0           CS     ONE            EXIT IF SLEEPING JOB NOT FOUND.
 0217   REF  16  LAST 1105   01,3043  54 064 1           TS     LOCCTR
 0218   REF   4  LAST 1101   01,3044  1 5160 1           TCF    ENDFIND

 0219   REF   6  LAST 1101   01,3045  4 0065 0  WAKETEST CS     NEWLOC
 0220   REF  17  LAST 1105   01,3046  50 064 0           INDEX  LOCCTR
 0221   REF  40  LAST 1104   01,3047  6 0164 1           AD     LOC
 0222                        01,3050  0 0006 1           EXTEND
 0223                        01,3051  1 3053 0           BZE    +2             IF MATCH.
 0224   REF   2  LAST 1105   01,3052  1 3036 0           TCF    JOBWAKE3       EXAMINE NEXT CORE SET IF NO MATCH.

 0225   REF  18  LAST 1105   01,3053  50 064 0           INDEX  LOCCTR         RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
 0226   REF  19  LAST 1105   01,3054  4 0167 0           CS     PRIORITY
 0227   REF   9  LAST 1101   01,3055  54 063 0           TS     NEWPRIO
 0228   REF  19  LAST 1105   01,3056  50 064 0           INDEX  LOCCTR
 0229   REF  20  LAST 1105   01,3057  54 167 0           TS     PRIORITY

 0230   REF   1              01,3060  4 4350 1           CS     FBANKMSK       MAKE UP THE 2CADR OF THE WAKE ADDRESS
 0231   REF   7  LAST 1105   01,3061  7 0065 0           MASK   NEWLOC         USING THE CADR IN NEWLOC AND THE EBANK
 0232   REF   3  LAST 1017   01,3062  6 4741 1           AD     2K             HALF OF BBANK SAVED IN BANKSET.
 0233   REF   8  LAST 1105   01,3063  56 065 1           XCH    NEWLOC
 0234   REF   2  LAST 1105   01,3064  7 4350 1           MASK   FBANKMSK
 0235   REF  20  LAST 1105   01,3065  50 064 0           INDEX  LOCCTR
 0236   REF  13  LAST 1104   01,3066  6 0165 0           AD     BANKSET
 0237   REF   9  LAST 1105   01,3067  54 066 0           TS     NEWLOC +1

 0238   REF  21  LAST 1105   01,3070  10 064 1           CCS    LOCCTR         SPECIAL TREATMENT IF THIS JOB WAS
 0239   REF   3  LAST 1101   01,3071  1 2662 0           TCF    SETLOC         ALREADY IN THE RUN (0) POSITION.
 0240   REF   1              01,3072  1 2652 0           TCF    SPECTEST
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P0241           PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

 0243    REF  41  LAST 1105    01,3073   54 164 0  PRIOCH2  TS      LOC
 0244    REF 221  LAST 1105    01,3074   3 4755 1           CAF     ZERO           SET FLAG TO TELL ENDJOB SCANNER IF THIS
 0245    REF 150  LAST 1104    01,3075   54 130 1           TS      BUF            JOB IS STILL HIGHEST PRIORITY.
 0246    REF  11  LAST 1102    01,3076   3 5004 0           CAF     LOW9
 0247    REF  21  LAST 1105    01,3077   7 0167 0           MASK    PRIORITY
 0248    REF  10  LAST 1105    01,3100   6 0063 1           AD      NEWPRIO
 0249    REF  22  LAST 1106    01,3101   54 167 0           TS      PRIORITY
 0250                          01,3102   4 0000 0           COM
 0251    REF   1               01,3103   1 3010 1           TCF     JOBSLP2        AND TO EJSCAN.
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P0252          RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

 0254                          01,3104  0 0004 0  ENDJOB1  INHINT
 0255   REF 222  LAST 1106     01,3105  4 4755 0           CS      ZERO
 0256   REF 151  LAST 1106     01,3106  54 131 0           TS      BUF +1
 0257   REF  23  LAST 1106     01,3107  56 167 1           XCH     PRIORITY
 0258   REF  12  LAST 1106     01,3110  7 5004 1           MASK    LOW9
 02581  REF 212  LAST 1102     01,3111  54 001 1           TS      L

 02582  REF   2  LAST 1097     01,3112  4 5164 0           CS      FAKEPRET
 025821 REF 213  LAST 1107     01,3113  6 0001 0           AD      L

 02583                         01,3114  0 0006 1           EXTEND
 02584  REF   2  LAST 1104     01,3115  6 3121 0           BZMF    EJSCAN             NOVAC ENDOFJOB

 0259   REF 214  LAST 1107     01,3116  10 001 1           CCS     L
 0260   REF 362  LAST 1100     01,3117  50 000 1           INDEX   A
 0261                          01,3120  54 000 0           TS      0

 0262   REF  24  LAST 1107     01,3121  10 203 1  EJSCAN   CCS     PRIORITY +12D
 0263   REF   1                01,3122  0 3172 0           TC      EJ1
 0264   REF  12  LAST 1101     01,3123  0 5675 0           TC      CCSHOLE
 0265                          01,3124  1 3125 0           TCF     +1

 0266   REF  25  LAST 1107     01,3125  10 217 1           CCS     PRIORITY +24D     EXAMINE EACH PRIORITY REGISTER TO FIND
 0267   REF   2  LAST 1107     01,3126  0 3172 0           TC      EJ1               THE JOB OF HIGHEST ACTIVE PRIORITY.
 0268   REF  13  LAST 1107     01,3127  0 5675 0           TC      CCSHOLE
 0269                          01,3130  1 3131 0           TCF     +1

 0270   REF  26  LAST 1107     01,3131  10 233 1           CCS     PRIORITY +36D
 0271   REF   3  LAST 1107     01,3132  0 3172 0           TC      EJ1
 0272   REF  27  LAST 1107     01,3133   67610 1  -CCSPR   -CCS    PRIORITY
 0273                          01,3134  1 3135 1           TCF     +1

 0274   REF  28  LAST 1107     01,3135  10 247 1           CCS     PRIORITY +48D
 0275   REF   4  LAST 1107     01,3136  0 3172 0           TC      EJ1
 0276   REF  14  LAST 1107     01,3137  0 5675 0           TC      CCSHOLE
 0277                          01,3140  1 3141 1           TCF     +1

 0278   REF  29  LAST 1107     01,3141  10 263 1           CCS     PRIORITY +60D
 0279   REF   5  LAST 1107     01,3142  0 3172 0           TC      EJ1
 0280   REF  15  LAST 1107     01,3143  0 5675 0           TC      CCSHOLE
 0281                          01,3144  1 3145 0           TCF     +1

 0282   REF  30  LAST 1107     01,3145  10 277 1           CCS     PRIORITY +72D
 0283   REF   6  LAST 1107     01,3146  0 3172 0           TC      EJ1
 0284   REF  16  LAST 1107     01,3147  0 5675 0           TC      CCSHOLE
 0285                          01,3150  1 3151 0           TCF     +1

 02851  REF  31  LAST 1107     01,3151  10 313 1           CCS     PRIORITY +84D
 02852  REF   7  LAST 1107   01,3152  0 3172 0          TC      EJ1
 02853  REF  17  LAST 1107   01,3153  0 5675 0          TC      CCSHOLE
 02854                       01,3154  1 3155 1          TCF     +1
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P0286             EVALUATE THE RESULTS OF THE SCAN.

 0287   REF 152  LAST 1107   01,3155  10 131 0             CCS     BUF +1          SEE IF THERE ARE ANY ACTIVE JOBS WAITING
 0288   REF  18  LAST 1108   01,3156  0 5675 0             TC      CCSHOLE
 0289   REF  19  LAST 1109   01,3157  0 5675 0             TC      CCSHOLE

 0290                        01,3160  1 3162 0             TCF     +2
 0291   REF   2  LAST  215   01,3161  1 3207 0             TCF     DUMMYJOB
 0292   REF 153  LAST 1109   01,3162  10 130 1             CCS     BUF             BUF IS ZERO IF THIS IS A PRIOCHNG AND
 0293                        01,3163  1 3165 1             TCF     +2              CHANGED PRIORITY IS STILL HIGHEST.
 0294   REF   2  LAST 1102   01,3164  1 2765 0             TCF     ENDPRCHG -1

 0295   REF 363  LAST 1107   01,3165  50 000 1             INDEX   A               OTHERWISE, SET NEWJOB TO THE RELATIVE
 0296                        01,3166  2'7777 0             CAF     0 -1            ADDRESS OF THE NEW JOB'S CORE SET.
 0297   REF   1              01,3167  6 3133 0             AD      -CCSPR
 0298   REF  19  LAST 1104   01,3170  54 067 1             TS      NEWJOB
 0299   REF   4  LAST 1104   01,3171  1 2705 0             TCF     CHANJOB -2

 0300   REF 154  LAST 1109   01,3172  54 132 0  EJ1        TS      BUF +2
 0301   REF 155  LAST 1109   01,3173  6 0131 1             AD      BUF +1          - OLD HIGH PRIORITY.
 0302   REF 364  LAST 1109   01,3174  10 000 0             CCS     A
 0303   REF 156  LAST 1109   01,3175  4 0132 0             CS      BUF +2
 0304   REF   1              01,3176  1 3202 0             TCF     EJ2             NEW HIGH PRIORITY.
 0305                        01,3177  13 200 1             NOOP
 0306   REF 311  LAST 1101   01,3200  50 002 0             INDEX   Q
 0307                        01,3201  0 0002 0             TC      2               PROCEED WITH SEARCH.

 0308   REF 157  LAST 1109   01,3202  54 131 0  EJ2        TS      BUF +1
 0309                        01,3203  0 0006 1             EXTEND
 0310   REF 158  LAST 1109   01,3204  22 130 0             QXCH    BUF             FOR LOCATING CCS PRIORITY + X INSTR.
 0311   REF 159  LAST 1109   01,3205  50 130 0             INDEX   BUF
 0312                        01,3206  0 0002 0             TC      2
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P0314           IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,
R0316   BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

 0318   REF   4  LAST  292        1361                         EBANK= SELFRET          SELF-CHECK STORAGE IN EBANK.

 0319   REF 223  LAST 1107    01,3207  4 4755 0  DUMMYJOB CS      ZERO                  SET NEWJOB TO -0 FOR IDLING.
 0320   REF  20  LAST 1109    01,3210  54 067 1           TS      NEWJOB
 0321                         01,3211  0 0003 1           RELINT
 0322   REF  74  LAST 1104    01,3212  4 4752 1           CS      TWO                   TURN OFF THE ACTIVITY LIGHT.
 0323                         01,3213  0 0006 1           EXTEND
 0324   REF  31  LAST 1104    01,3214  03 011 1           WAND    DSALMOUT
 0328   REF  21  LAST 1110    01,3215  10 067 1  ADVAN    CCS     NEWJOB                IS A NEWJOB ACTIVE ?
 0329   REF   1               01,3216  1 3012 0           TCF     NUCHANG2              YES... ONE REQUIRING A CHANGE JOB.
 0330   REF  75  LAST 1110    01,3217  3 4752 0           CAF     TWO                   NEW JOB ALREADY IN POSITION FOR
 0331   REF   1               01,3220  1 3226 0           TCF     NUDIRECT              EXECUTION.

 03317  REF   5  LAST 1110    01,3221  3 1361 1           CA      SELFRET
 03318  REF 215  LAST 1107    01,3222  54 001 1           TS      L                     PUT RETURN ADDRESS IN L.
 0332   REF   1               01,3223  3 3225 1           CAF     SELFBANK
 0333   REF   5  LAST  598    01,3224  1 5166 1           TCF     SUPDXCHZ + 1           AND DISPATCH JOB.

 03338  REF   6  LAST 1110        1361                    EBANK= SELFRET
 0334   REF   3  LAST  293    01,3225   66102 1  SELFBANK BBCON   SELFCHK

 0335                         01,3226  0 0006 1  NUDIRECT EXTEND                        TURN THE GREEN LIGHT BACK ON.
 0336   REF  32  LAST 1110    01,3227  05 011 1           WOR     DSALMOUT
 0337   REF  42  LAST 1106    01,3230  52 165 1           DXCH    LOC                   JOBS STARTED IN THIS FASHION MUST BE
 03372  REF   6  LAST 1110    01,3231  1 5165 1           TCF     SUPDXCHZ

 03378                            5165                    BLOCK   2                     IN FIXED-FIXED SO OTHERS MAY USE.

 03379  REF   2 LAST 1097 TO 1100:     59     59*         COUNT*  $$/EXEC
R033791 SUPDXCHZ - ROUTINE TO TRANSFER TO SUPERBANK.
R033792 CALLING SEQUENCE
A033793                                                   TCF     SUPDXCHZ              WITH 2CADR OF DESIRED LOCATION IN A + L.

 0338   REF 216  LAST 1110        5165  56 001 0  SUPDXCHZ XCH     L                     BASIC.
 03381                            5166  0 0006 1  +1       EXTEND
 03382  REF  18  LAST 1104        5167  01 007 1           WRITE   SUPERBNK
 03383  REF  34  LAST 1104        5170  54 006 0           TS      BBANK
 03384  REF 217  LAST 1110        5171  0 0001 0           TC      L

 0339                             5172   77677 1  NEG100   OCT     77677
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R0001    PROGRAM DESCRIPTION                                                                                  DATE - 10 OCTOBER 1966
R0003    MOD NO - 2                                                                                           LOG SECTION - WAITLIST
R0005    MOD BY - MILLER    (DTMAX INCREASED TO 162.5 SEC)                                                    ASSEMBLY SUNBURST REV 5
R00072   MOD 3 BY KERNAN   (INHINT INSERTED AT WAITLIST)  2/28/68 SKIPPER REV 4

R00073   MOD 4BY KERNAN (TWIDDLE IN 54)  3/28/68 SKIPPER REV 13.
R00799

R0008    FUNCTIONAL DESCRIPTION-
R0009            PART OF A SECTION OF PROGRAMS,-WAITLIST, TASKOVER, T3RUPT, USED  TO CALL A PROGRAM, (CALLED A TASK),
R0011       WHICH IS TO BEGIN IN C(A) CENTISECONDS.  WAITLIST UPDATES TIME3, LST1 AND LST2. THE MEANING OF THESE LISTS
R0013       FOLLOWS.

R0014                      C(TIME3)  = 16384 -(T1-T) CENTISECONDS, (T=PRESENT TIME, T1-TIME FOR TASK1)
R0016

R0017                                   C(LST1)    = -(T2-T1)+1
R0018                                   C(LST1 +1) = -(T3-T2)+1
R0019                                   C(LST1 +2) = -(T4-T3)+1
R0020                                                .
R0021                                                .
R0022                                   C(LST1 +6) = -(T8-T7)+1
R0023                                   C(LST1 +7) = -(T9-T8)+1

R0024                                   C(LST2)    = 2CADR OF TASK1
R0025                                   C(LST2 +2) = 2CADR OF TASK2
R0026                                                .
R0027                                                .
R0028                                   C(LST2 +14)= 2CADR OF TASK8
R0029                                   C(LST2 +16)= 2CADR OF TASK9

R0030    WARNINGS-
R0031    --------
R0032                   1) 1 <= C(A) <= 162500 (1 CENTISECOND TO 162.5 SEC)
R0033                   2) 9 TASKS MAXIMUM
R0034                   3) TASKS CALLED UNDER INTERRUPT INHIBITED
R0035                   4) TASKS END BY TC TASKOVER

R0036    CALLING SEQUENCE-

R0037                   L-1     CA      DELTAT   (TIME IN CENTISECONDS TO TASK START)
R0039                   L       TC      WAITLIST
R0040                   L+1     2CADR   DESIRED TASK
R0041                   L+2     (MINOR OF 2CADR)
R0042                   L+3     RELINT           (RETURNS HERE)

R00421   TWIDDLE-
R00422   -------
R00423                  TWIDDLE IS FOR USE WHEN THE TASK BEING SET UP IS IN THE SAME EBANK AND FBANK AS THE USER.   IN
R00425                  SUCH CASES, IT IMPROVES UPON WAITLIST BY ELIMINATING THE NEED FOR THE BBCON HALF OF THE 2CADR,
R00427                SAVING A WORD.   TWIDDLE IS LIKE WAITLIST IN EVERY RESPECT EXCEPT CALLING SEQUENCE, TC WIT-

R0043                 L-1     CA      DELTAT
R00431                L       TC      TWIDDLE
R00432                L+1     ADRES   DESIRED TASK
R00433                L+2     RELINT                    (RETURNS HERE)

R00439   NORMAL EXIT MODES-

R0044                 AT L+3 OF CALLING SEQUENCE

R0045    ALARM OR ABORT EXIT MODES-

R0046                 TC      ABORT
R0047                 OCT     1203   (WAITLIST OVERFLOW - TOO MANY TASKS)

R0048    ERASABLE INITIALIZATION REQUIRED-

R0049                 ACCOMPLISHED BY FRESH START,--LST2,...., LST2 +16 =ENDTASK
R0050                                               LST1,...., LST1 +7  =NEG1/2

R0051    OUTPUT--

R0052                 LST1 AND LST2 UPDATED WITH NEW TASK AND ASSOCIATED TIME.
R0053    DEBRIS-

R0054                 CENTRALS- A,Q,L
R0055                 OTHER    - WAITEXIT, WAITADR, WAITTEMP, WAITBANK
R0056    DETAILED ANALYSIS OF TIMING-

R0057           CONTROL WILL NOT BE RETURNED TO THE SPECIFIED ADDRESS (2CADR)   IN EXACTLY DELTA T CENTISECONDS.
R0059       THE APPROXIMATE TIME MAY BE CALCULATED AS FOLLOWS

R0060                 LET T0 = THE TIME OF THE TC WAITLIST
R0061                 LET TS = T0 +147U + COUNTER INCREMENTS (SET UP TIME)
R0062                 LET X  = TS -(100TS)/100  (VARIANCE FROM COUNTERS)
R0063                 LET Y  = LENGTH OF TIME OF INHIBIT INTERRUPT AFTER T3RUPT
R0064                 LET Z  = LENGTH OF TIME TO PROCESS TASKS WHICH ARE DUE THIS T3RUPT BUT DISPATCHED EARLIER.
R0066       (Z=0, USUALLY)
R0067                 LET DELT0 = THE ACTUAL TIME TAKEN TO GIVE CONTROL TO 2CADR
R0068              THEN   DELT0 = TS+DELTA T -X +Y +Z +1.05MS* +COUNTERS*
R0069       *-THE TIME TAKEN BY WAITLIST ITSELF AND THE COUNTER TICKING DURING THIS WAITLIST TIME.
R0071

R0072           IN SHORT, THE ACTUAL TIME TO RETURN CONTROL TO A 2CADR IS AUGMENTED BY THE TIME TO SET UP THE TASK:S
R0074       INTERRUPT, ALL COUNTERS TICKING, THE T3RUPT PROCESSING TIME, THE WAITLIST PROCESSING TIME AND THE POSSIBILITY
R0076       OF OTHER TASKS INHIBITING THE INTERRUPT.

 0077                         5173                    BLOCK  02
 0078    REF  14  LAST  223   E3,1400                    EBANK= LST1         TASK  LISTS IN SWITCHED E BANK.

 0079    REF   1                                         COUNT* $$/WAIT
 00795                        5173  0 0004 0  TWIDDLE   INHINT
 0080    REF 218  LAST 1110   5174  54 001 1            TS     L             SAVE DELAY TIME IN L
 0081    REF  32  LAST 1074   5175  3 4733 1            CA     POSMAX
 0082    REF 312  LAST 1109   5176  26 002 1            ADS    Q             CREATING OVERFLOW AND Q-1 IN Q
 0083    REF  35  LAST 1110   5177  3 0006 1            CA     BBANK
 00832                        5200  0 0006 1            EXTEND
 00834   REF  19  LAST 1110   5201  04 007 1            ROR    SUPERBNK
 0084    REF 219  LAST 1113   5202  56 001 0            XCH    L

 00849                        5203  0 0004 0  WAITLIST  INHINT
 0085    REF 313  LAST 1113   5204  56 002 0            XCH    Q             SAVE DELTA T IN Q AND RETURN IN
 0086    REF   1              5205  54 061 1            TS     WAITEXIT      WAITEXIT.
 0087                         5206  0 0006 1            EXTEND
 0088    REF   2  LAST 1113   5207  5 0061 0            INDEX  WAITEXIT      IF TWIDDLING, THE TS SKIPS TO HERE
 0089                         5210  3 0001 0            DCA    0             PICK UP 2CADR OF TASK
 0090    REF   1              5211  54 063 0  -1        TS     WAITADR       BBCON WILL REMAIN IN L
 0091    REF   1              5212  3 5220 1  DLY2      CAF    WAITBB        ENTRY FROM FIXDELAY AND VARDELAY.
 0092    REF  36  LAST 1113   5213  56 006 1            XCH    BBANK
 0093    REF   1              5214  1 3222 0            TCF    WAIT2

R0094              RETURN TO CALLER AFTER TASK INSERTION:

 0095    REF   3  LAST 1113   5215  52 062 1  LVWTLIST  DXCH   WAITEXIT
 0096    REF  76  LAST 1110   5216  6 4752 0            AD     TWO
 0097                         5217  52 006 0            DTCB

 0099    REF  15  LAST 1113   E3,1400                   EBANK= LST1
 0100    REF   2  LAST 1113   5220   02063 0  WAITBB    BBCON  WAIT2

R0101              RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1

 0102    REF 314  LAST 1113   5221  50 002 0  FIXDELAY  INDEX  Q             BOTH ROUTINES MUST BE CALLED UNDER
 0103                         5222  3 0000 1            CAF    0             WAITLIST CONTROL AND TERMINATE THE TASK
 0104    REF 315  LAST 1113   5223  24 002 0            INCR   Q             IN WHICH THEY WERE CALLED.

R0105              RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.

 0106    REF 316  LAST 1113   5224  56 002 0  VARDELAY  XCH    Q             DT TO Q. TASK ADRES TO WAITADR.
 0107    REF   2  LAST 1113   5225  54 063 0            TS     WAITADR
 0108    REF  37  LAST 1113   5226  3 0006 1            CA     BBANK         BBANK IS SAVED DURING DELAY.
 0109                         5227  0 0006 1            EXTEND
 0110    REF  20  LAST 1113   5230  04 007 1            ROR    SUPERBNK      ADD SBANK TO BBCON.
 0111    REF 220  LAST 1113   5231  54 001 1            TS     L
 0112    REF   1              5232  3 5235 0            CAF    DELAYEX
 0113    REF   4  LAST 1113   5233  54 061 1            TS     WAITEXIT      GO TO TASKOVER AFTER TASK ENTRY.
 0114    REF   1              5234  1 5212 1            TCF    DLY2
 0115   REF  67  LAST  961      5235  1 5257 0  DELAYEX  TCF    TASKOVER -2     RETURNS TO TASKOVER
```

```
R0116   ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

 0118   REF  16  LAST 1113   E3,1400                        EBANK= LST1
 0119   REF   1                 5236   72537 0  ENDTASK -2CADR  SVCT3
 0119   REF   1                 5237   73714 1

 0120   REF  28  LAST  922      5240  10 076 1  SVCT3    CCS     FLAGWRD2        DRIFT FLAG
 0121   REF  68  LAST 1114      5241  1 5261 0           TCF     TASKOVER
 0122   REF  69  LAST 1115      5242  1 5261 0           TCF     TASKOVER
 0123                           5243  1 5244 1           TCF     +1

 01231  REF   3  LAST  224      5244  11 301 0  CKIMUSE  CCS     IMUCADR         DON'T DO NBDONLY IF SOMEONE ELSE IS IN
 01232  REF   1                 5245  1 5256 1           TCF     SVCT3X          IMUSTALL.
 01233                          5246  1 5251 0           TCF     +3
 01234  REF   2  LAST 1115      5247  1 5256 1           TCF     SVCT3X
 01235  REF   3  LAST 1115      5250  1 5256 1           TCF     SVCT3X

 0124   REF   1                 5251  3 7726 0     +3    CAF     PRIO35          COMPENSATE FOR NBD COEFFICIENTS ONLY.
 0125   REF  25  LAST  982      5252  0 5072 1           TC      NOVAC               ENABLE EVERY 81.93 SECONDS
 0126   REF   6  LAST  852   E3,1460                     EBANK=  NBDX
 0127   REF   1                 5253   03563 1           2CADR   NBDONLY
 0127   REF   1                 5254   14063 1
 0128   REF  70  LAST 1115      5255  1 5261 0           TCF     TASKOVER


 01281  REF  15  LAST  776      5256  0 5221 0  SVCT3X   TC      FIXDELAY        DELAY MAX OF 2 TIMES FOR IMUZERO.
 01282                          5257   00764 1           DEC     500
 01283  REF   2  LAST 1115      5260  0 5240 1           TC      SVCT3           CHECK DRIFT FLAG AGAIN.
```

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P0129             BEGIN TASK INSERTION.

 0130                          01,3232                           BANK    01
 0131   REF   1                                                  COUNT*  $$/WAIT
 0132   REF   1                01,3232   54 062 1   WAIT2        TS      WAITBANK         BBANK OF CALLING PROGRAM.
 01322  REF 317  LAST 1113     01,3233   3 0002 0                CA      Q
 01324                         01,3234   0 0006 1                EXTEND
 01326  REF   1                01,3235   6 3524 1                BZMF    WAITPOOH

 0133   REF   2  LAST  221     01,3236   4 0026 1                CS      TIME3
 0134   REF  36  LAST 1047     01,3237   6 4744 1                AD      BIT8             BIT 8 = OCT 200
 0135   REF 365  LAST 1109     01,3240   10 000 0                CCS     A                TEST 200 - C(TIME3).  IF POSITIVE,
A0136                                               IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0137                                               C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0138                                               ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0139   REF   2  LAST 1092     01,3241   6 5112 0                AD      OCT40001         OVERFLOW HAS OCCURRED.  SET C(A) =
 0140   REF 366  LAST 1116     01,3242   4 0000 0                CS      A                T - T1 + 1.0 - 201

R0141   NORMAL CASE (C(A) NNZ) YIELDS SAME C(A):  -( -(1.0-(T1-T)) + 200) - 1

 0142   REF   1                01,3243   6 3371 1                AD      OCT40201
 0143   REF 318  LAST 1116     01,3244   6 0002 0                AD      Q                RESULT = TD - T1 + 1.

 0144   REF 367  LAST 1116     01,3245   10 000 0                CCS     A                TEST TD - T1 + 1

 0145   REF  17  LAST 1115     01,3246   6 1400 1                AD      LST1             IF TD - T1 POS, GO TO WTLST5 WITH
 0146   REF   1                01,3247   1 3311 0                TCF     WTLST5           C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0147                          01,3250   13 251 0                NOOP
 0148   REF 319  LAST 1116     01,3251   4 0002 1                CS      Q

R0149   NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0150   SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0151   SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0152   CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0153   REF   1                01,3252   6 4736 1                AD      POS1/2           WHEN TD IS NEXT, FORM QUANTITY
 0154   REF   2  LAST 1116     01,3253   6 4736 1                AD      POS1/2             1.0 - DELTA T = 1.0 - (TD - T)
 0155   REF   3  LAST 1116     01,3254   56 026 0                XCH     TIME3
 0156   REF   7  LAST 1037     01,3255   6 4735 1                AD      NEGMAX
 0157   REF 320  LAST 1116     01,3256   6 0002 0                AD      Q                1.0 - DELTAT T NOW COMPLETE.
 0158                          01,3257   0 0006 1                EXTEND                   ZERO INDEX Q.
 0159                          01,3260   22 007 0                QXCH    7                (ZQ)
 0160   REF  18  LAST 1116   01,3261  57'400 1  WTLST4    XCH     LST1
 0161   REF  19  LAST 1117   01,3262  57'401 0            XCH     LST1 +1
 0162   REF  20  LAST 1117   01,3263  57'402 0            XCH     LST1 +2
 0163   REF  21  LAST 1117   01,3264  57'403 1            XCH     LST1 +3
 0164   REF  22  LAST 1117   01,3265  57'404 0            XCH     LST1 +4
 0165   REF  23  LAST 1117   01,3266  57'405 1            XCH     LST1 +5
 0166   REF  24  LAST 1117   01,3267  57'406 1            XCH     LST1 +6
 0167   REF  25  LAST 1117   01,3270  57'407 0            XCH     LST1 +7

 0168   REF   3  LAST 1113   01,3271  3 0063 1            CA      WAITADR         (MINOR PART OF TASK CADR HAS BEEN IN L.)
 0169   REF 321  LAST 1116   01,3272  50 002 0            INDEX   Q
 0170                        01,3273  1 3274 1            TCF     +1

 0171   REF  24  LAST  746   01,3274  53'411 0            DXCH    LST2
 0172   REF  25  LAST 1117   01,3275  53'413 1            DXCH    LST2 +2
 0173   REF  26  LAST 1117   01,3276  53'415 1            DXCH    LST2 +4
 0174   REF  27  LAST 1117   01,3277  53'417 0            DXCH    LST2 +6
 0175   REF  28  LAST 1117   01,3300  53'421 0            DXCH    LST2 +8D
 0176   REF  29  LAST 1117   01,3301  53'423 1            DXCH    LST2 +10D       AT END, CHECK THAT C(LST2+10) IS STD
 0177   REF  30  LAST 1117   01,3302  53'425 1            DXCH    LST2 +12D
 0178   REF  31  LAST 1117   01,3303  53'427 0            DXCH    LST2 +14D
 0179   REF  32  LAST 1117   01,3304  53'431 1            DXCH    LST2 +16D
 0180   REF   3  LAST  223   01,3305  6 5236 0            AD      ENDTASK           END ITEM, AS CHECK FOR EXCEEDING
A0181                                                                             THE LENGTH OF THE LIST.
 0182                        01,3306  0 0006 1            EXTEND                  DUMMY TASK ADRES SHOULD BE IN FIXED-
 0183   REF   1              01,3307  1 5215 0            BZF     LVWTLIST        FIXED SO ITS ADRES ALONE DISTINGUISHES
 0184   REF   1              01,3310  1 3364 1            TCF     WTABORT         IT.
 0185    REF 368  LAST 1116    01,3311  10 000 0  WTLST5    CCS      A                 TEST  T0 - T2 + 1
 0186    REF  26  LAST 1117    01,3312  6 1401 0            AD       LST1 +1
 0187                          01,3313  1 3317 0            TCF      +4
 0188    REF 116  LAST 1105    01,3314  6 4753 1            AD       ONE
 0189    REF   1               01,3315  0 3375 0            TC       WTLST2
 0190                          01,3316   00001 0            OCT      1

 0191    REF 369  LAST 1118    01,3317  10 000 0  +4        CCS      A                 TEST  T0 - T3 + 1
 0192    REF  27  LAST 1118    01,3320  6 1402 0            AD       LST1 +2
 0193                          01,3321  1 3325 1            TCF      +4
 0194    REF 117  LAST 1118    01,3322  6 4753 1            AD       ONE
 0195    REF   2  LAST 1118    01,3323  0 3375 0            TC       WTLST2
 0196                          01,3324   00002 0            OCT      2

 0197    REF 370  LAST 1118    01,3325  10 000 0  +4        CCS      A                 TEST  T0 - T4 + 1
 0198    REF  28  LAST 1118    01,3326  6 1403 1            AD       LST1 +3
 0199                          01,3327  1 3333 0            TCF      +4
 0200    REF 118  LAST 1118    01,3330  6 4753 1            AD       ONE
 0201    REF   3  LAST 1118    01,3331  0 3375 0            TC       WTLST2
 0202                          01,3332   00003 1            OCT      3

 0203    REF 371  LAST 1118    01,3333  10 000 0  +4        CCS      A                 TEST  T0 - T5 + 1
 0204    REF  29  LAST 1118    01,3334  6 1404 0            AD       LST1 +4
 0205                          01,3335  1 3341 0            TCF      +4
 0206    REF 119  LAST 1118    01,3336  6 4753 1            AD       ONE
 0207    REF   4  LAST 1118    01,3337  0 3375 0            TC       WTLST2
 0208                          01,3340   00004 0            OCT      4

 0209    REF 372  LAST 1118    01,3341  10 000 0  +4        CCS      A                 TEST  T0 - T6 + 1
 0210    REF  30  LAST 1118    01,3342  6 1405 1            AD       LST1 +5
 0211                          01,3343  1 3347 0            TCF      +4
 0212    REF 120  LAST 1118    01,3344  6 4753 1            AD       ONE
 0213    REF   5  LAST 1118    01,3345  0 3375 0            TC       WTLST2
 0214                          01,3346   00005 1            OCT      5

 0215    REF 373  LAST 1118    01,3347  10 000 0   +4       CCS      A                 TEST T0 - T7 + 1
 0216    REF  31  LAST 1118    01,3350  6 1406 1            AD       LST1 +6
 0217                          01,3351  1 3355 0            TCF      +4
 0218    REF 121  LAST 1118    01,3352  6 4753 1            AD       ONE
 0219    REF   6  LAST 1118    01,3353  0 3375 0            TC       WTLST2
 0220                          01,3354   00006 1            OCT      6
 0221   REF 374  LAST 1118   01,3355  10 000 0    +4        CCS    A
 0222   REF  32  LAST 1118   01,3356   6 1407 0             AD     LST1  +7
 0223                        01,3357   1 3363 0             TCF    +4
 0224   REF 122  LAST 1118   01,3360   6 4753 1             AD     ONE
 0225   REF   7  LAST 1118   01,3361   0 3375 0             TC     WTLST2
 0226                        01,3362    00007 0             OCT    7

 0227   REF 375  LAST 1119   01,3363  10 000 0    +4        CCS    A
 0228   REF   1              01,3364   0 3372 1  WTABORT    TC     FILLED
 0229                        01,3365  13 366 0              NOOP                      CAN'T GET HERE
 0230   REF 123  LAST 1119   01,3366   6 4753 1             AD     ONE
 0231   REF   8  LAST 1119   01,3367   0 3375 0             TC     WTLST2
 0232                        01,3370    00010 0             OCT    10

 0233                        01,3371    40201 0  OCT40201   OCT    40201
 02332   REF    5  LAST 1113     01,3372   52 062 1   FILLED    DXCH    WAITEXIT
 02334   REF    5  LAST 1101     01,3373   0 5706 0             TC      BAILOUT1          NO ROOM IN THE INN
 02336                           01,3374    31203 1             OCT     31203
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R0234    THE ENTRY TO WTLST2 JUST PRECEDING OCT  N  IS FOR T  LE TD LE T    -1.
R0235                                                     N           N+1

R0236    (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TO - T    + 1)
R0237                                                           N+1

R0238    THE LST1 ENTRY -(T    - T +1) IS TO BE REPLACED BY -(TO - T + 1), AND
R0239                      N+1    N                                N

R0240    THE ENTRY -(T    - TO + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
R0241                 N+1

 0242    REF   1                01,3375  54 064 1  WTLST2     TS      WAITTEMP            C(A) = -(TO - T    + 1)
 0243    REF 322  LAST 1117     01,3376  50 002 0             INDEX   Q
 0244                           01,3377  3 0000 1             CAF     0
 0245    REF 323  LAST 1121     01,3400  54 002 1             TS      Q                 INDEX VALUE INTO Q.

 0246    REF 124  LAST 1119     01,3401  3 4753 1             CAF     ONE
 0247    REF   2  LAST 1121     01,3402  6 0064 0             AD      WAITTEMP
 0248    REF 324  LAST 1121     01,3403  50 002 0             INDEX   Q                 C(A) = -(TO - T ) + 1.
 0249    REF  33  LAST 1119     01,3404  27'377 1             ADS     LST1 -1                          N

 0250    REF   3  LAST 1121     01,3405  4 0064 1             CS      WAITTEMP
 0251    REF 325  LAST 1121     01,3406  50 002 0             INDEX   Q
 0252    REF   1                01,3407  1 3261 0             TCF     WTLST4

R0253    C(TIME3) = 1.0 - (T1 - T)

R0254    C(LST1   ) = - (T2 - T1) + 1
R0255    C(LST1+1) = - (T3 - T2) + 1
R0256    C(LST1+2) = - (T4 - T3) + 1
R0257    C(LST1+3) = - (T5 - T4) + 1
R0258    C(LST1+4) = - (T6 - T5) + 1

R0259    C(LST2    ) = 2CADR   TASK1
R0260    C(LST2+2  ) = 2CADR   TASK2
R0261    C(LST2+4  ) = 2CADR   TASK3
R0262    C(LST2+6  ) = 2CADR   TASK4
R0263    C(LST2+8  ) = 2CADR   TASK5
R0264    C(LST2+10) = 2CADR   TASK6
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P0265               ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

 0266                                 01,3410  0 0006 1  T3RUPT    EXTEND
 0267      REF  21  LAST 1113         01,3411  04 007 1            ROR      SUPERBNK       READ CURRENT SUPERBANK VALUE AND
 0268      REF   6  LAST  985         01,3412  54 016 1            TS       BANKRUPT       SAVE WITH E AND F BANK VALUES.
 0269                                 01,3413  0 0006 1            EXTEND
 0270      REF   6  LAST  985         01,3414  22 012 1            QXCH     QRUPT

 0271      REF   6  LAST 1089         01,3415  3 4734 0  T3RUPT2   CAF      NEG1/2         DISPATCH WAITLIST TASK.
 0272      REF  34  LAST 1121         01,3416  57'407 0            XCH      LST1 +7
 0273      REF  35  LAST 1122         01,3417  57'406 1            XCH      LST1 +6
 0274      REF  36  LAST 1122         01,3420  57'405 1            XCH      LST1 +5
 0275      REF  37  LAST 1122         01,3421  57'404 0            XCH      LST1 +4        1.  MOVE UP LST1 CONTENTS, ENTERING
 0276      REF  38  LAST 1122         01,3422  57'403 1            XCH      LST1 +3            A VALUE OF 1/2 +1 AT THE BOTTOM
 0277      REF  39  LAST 1122         01,3423  57'402 0            XCH      LST1 +2            FOR T6-T5, CORRESPONDING TO THE
 0278      REF  40  LAST 1122         01,3424  57'401 0            XCH      LST1 +1            INTERVAL 81.91 SEC FOR ENDTASK.
 0279      REF  41  LAST 1122         01,3425  57'400 1            XCH      LST1
 0280      REF  33  LAST 1113         01,3426  6 4733 1            AD       POSMAX         2. SET T3 = 1.0 - T2 -T USING LIST 1.
 0281      REF   4  LAST 1116         01,3427  26 026 1            ADS      TIME3          SO T3 WONT TICK DURING UPDATE.
 0282      REF   4  LAST  569         01,3430  54 332 1            TS       RUPTAGN
 0283      REF 224  LAST 1110         01,3431  4 4755 0            CS       ZERO
 0284      REF   5  LAST 1122         01,3432  54 332 1            TS       RUPTAGN        SETS RUPTAGN TO +1 ON OVERFLOW.

 0285                                 01,3433  0 0006 1            EXTEND                  DISPATCH TASK.
 0286      REF   4  LAST 1117         01,3434  4 5237 0            DCS      ENDTASK
 0287      REF  33  LAST 1117         01,3435  53'431 1            DXCH     LST2 +16D
 0288      REF  34  LAST 1122         01,3436  53'427 0            DXCH     LST2 +14D
 0289      REF  35  LAST 1122         01,3437  53'425 1            DXCH     LST2 +12D
 0290      REF  36  LAST 1122         01,3440  53'423 1            DXCH     LST2 +10D
 0291      REF  37  LAST 1122         01,3441  53'421 0            DXCH     LST2 +8D
 0292      REF  38  LAST 1122         01,3442  53'417 0            DXCH     LST2 +6
 0293      REF  39  LAST 1122         01,3443  53'415 1            DXCH     LST2 +4
 0294      REF  40  LAST 1122         01,3444  53'413 1            DXCH     LST2 +2
 0295      REF  41  LAST 1122         01,3445  53'411 0            DXCH     LST2

 0296      REF 221  LAST 1113         01,3446  56 001 0            XCH      L
 0297                                 01,3447  0 0006 1            EXTEND
 0298      REF  22  LAST 1122         01,3450  01 007 1            WRITE    SUPERBNK       SET SUPERBANK FROM BBCON OF 2CADR
 0299      REF 222  LAST 1122         01,3451  56 001 0            XCH      L              RESTORE TO L FOR DXCH Z.
 0300                                 01,3452  52 006 0            DTCB
```

```
P0301                RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK:

 0302                             5261                    BLOCK   02
 0303    REF    2 LAST 1113 TO 1116:    54     54*        COUNT*  $$/WAIT
 0304    REF    6  LAST 1122      5261  10 332 1  TASKOVER CCS     RUPTAGN        IF +1 RETURN TO T3RUPT, IF -0 RESUME.
 0305    REF    2  LAST 1113      5262  3 5220 1          CAF     WAITBB
 0306    REF   38  LAST 1113      5263  54 006 0          TS      BBANK
 0307    REF    1                 5264  1 3415 0          TCF     T3RUPT2        DISPATCH NEXT TASK IF IT WAS DUE.

 0308    REF    7  LAST 1122      5265  3 0016 0          CA      BANKRUPT
 0309                             5266  0 0006 1          EXTEND
 0310    REF   23  LAST 1122      5267  01 007 1          WRITE   SUPERBNK       RESTORE SUPERBANK BEFORE RESUME IS DONE

 0311                             5270  0 0006 1  RESUME   EXTEND
 0312    REF    7  LAST 1122      5271  22 012 1          QXCH    QRUPT
 0313    REF    8  LAST 1123      5272  3 0016 0  NOQRSM   CA      BANKRUPT
 0314    REF   39  LAST 1123      5273  56 006 1          XCH     BBANK
 0315    REF   11  LAST  156      5274  52 011 0  NOQBRSM  DXCH    ARUPT
 03155                            5275  0 0003 1          RELINT
 0316                             5276  5 0017 1          RESUME
```

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PC317    LONGCALL

R0318    PROGRAM DESCRIPTION                                     DATE- 17 MARCH 1967
R0319    PROGRAM WRITTEN BY W.H. VANDEVER                       LOG SECTION WAITLIST
R0320    MOD BY- R. MELANSON TO ADD DOCUMENTATION           ASSEMBLY SUNDISK REV. 100

R0321    FUNCTIONAL DESCRIPTION-
R0322    LONGCALL IS CALLED WITH THE DELTA TIME ARRIVING IN A,L SCALED AS TIME2,TIME1 WITH THE 2CADR OF THE TASK
R0324    IMMEDIATELY FOLLOWING THE TC LONGCALL.  FOR EXAMPLE, IT MIGHT BE DONE AS FOLLOWS WHERE TIMELOC IS THE NAME OF
R0326    A DP REGISTER CONTAINING A DELTA TIME AND WHERE TASKTODO IS THE NAME OF THE LOCATION AT WHICH LONGCALL IS TO
R0328    START

R0329    CALLING SEQUENCE-
A0330                                                            EXTEND
A0331                                                            DCA     TIMELOC
A0332                                                            TC      LONGCALL
A0333                                                            2CADR   TASKTODO

R0334    NORMAL EXIT MODE-
R0335       1). TC     WAITLIST
R0336       2). DTCB   (TO L+3 OF CALLING ROUTINE 1ST PASS THRU LONGCYCL)
R0337       3). DTCB   (TO TASKOVER ON SUBSEQUENT PASSES THRU LONGCYCL)

R0338    ALARM OR ABORT EXIT MODE-
R0339       NONE

R0340    OUTPUT-
R0341       LONGTIME AND LONGTIME+1 = DELTA TIME
R0342       LONGEXIT AND LONGEXIT+1 = RETURN 2CADR
R0343       LONGCADR AND LONGCADR+1 = TASK 2CADR
R0344       A = SINGLE PRECISION TIME FOR WAITLIST

R0345    ERASABLE INITIALIZATION-
R0346       A = MOST SIGNIFICANT PART OF DELTA TIME
R0347       L = LEAST SIGNIFICANT PART OF DELTA TIME
R0348       Q = ADDRESS OF 2CADR TASK VALUE

R0349    DEBRIS-
R0350       A,Q,L
R0351       LONGCADR AND LONGCADR+1
R0352       LONGEXIT AND LONGEXIT+1
R0353       LONGTIME AND LONGTIME+1

R0354    *** THE FOLLOWING IS TO BE IN FIXED-FIXED AND UNSWITCHED ERRASIBLE ***

 0355                           5277                         BLOCK  02
 0356    REF  42  LAST 1122   E3,1400                        EBANK= LST1
 0357    REF   I                5277  53153 0  LONGCALL DXCH   LONGTIME           OBTAIN THE DELTA TIME

 0358                           5300  0 0006 1               EXTEND               OBTAIN THE 2CADR
 0359    REF 326  LAST 1121         5301  5 0002 0                 NCX     Q
 0360                               5302  3 0001 0                 DCA     Q
 0361    REF   1                    5303  53'147 0                 DXCH    LONGCADR

 0362                               5304  0 0006 1                 EXTEND                          NOW GO TO THE APPROPRIATE SWITCHED BANK
 0363    REF   1                    5305  3 5310 0                 DCA     LGCL2CDR                FOR THE REST OF LONGCALL
 0364                               5306  52 006 0                 DTCB

 0365    REF  43  LAST 1124    E3,1400                             EBANK=  LST1
 0366    REF   1                    5307   03453 0  LGCL2CDR 2CADR   LNGCALL2
 0366    REF   1                    5310   02063 0

R0367    *** THE FOLLOWING MAY BE IN A SWITCHED BANK, INCLUDING ITS ERASABLE ***

 0368                          01,3453                             BANK    01
 0369    REE   2 LAST 1116 TC 1123:    145    145*                 COUNT*  $$/WAIT
 0370    REF   1               01,3453  23'435 1  LNGCALL2 LXCH    LONGEXIT +1     SAVE THE CORRECT BB FOR RETURN
 0371    REF  77  LAST 1113    01,3454  3 4752 0                   CA      TWO             OBTAIN THE RETURN ADDRESS
 0372    REF 327  LAST 1125    01,3455  26 002 1                   ADS     Q
 0373    REF   2  LAST 1125    01,3456  55'434 1                   TS      LONGEXIT

 03731   REF   2  LAST 1124    01,3457  3 1152 0                   CA      LONGTIME        CHECK FOR LEGITIMATE DELTA-TIME
 03732   REF 376  LAST 1119    01,3460  10 000 0                   CCS     A
 03733   REF   1               01,3461  1 3467 0                   TCF     LONGCYCL        HI-ORDER OK --> ALL IS OK.
 03734                         01,3462  1 3464 0                   TCF     +2              HI-ORDER ZERO --> CHECK LO-ORDER.
 03735   REF   1               01,3463  1 3522 0                   TCF     LONGPOOH        HI-ORDER NEG. --> NEG. DT
 03736   REF   3  LAST 1125    01,3464  3 1153 1      +2           CA      LONGTIME +1     CHECK LO-ORDER FOR ZERO OR NEGATIVE.
 03737                         01,3465  0 0006 1                   EXTEND
 03738   REF   2  LAST 1125    01,3466  6 3522 1                   BZMF    LONGPOOH        BAD DELTA-TIME.  ABORT

R0374             *** WAITLIST TASK LONGCYCL ***
 0375                          01,3467  0 0006 1  LONGCYCL EXTEND                  CAN WE SUCCESFULLY TAKE ABOUT 1.25
 0376    REF   1               01,3470  4 3501 1                   DCS     DPBIT14         MINUTES OFF OF LONGTIME
 0377    REF   4  LAST 1125    01,3471  21'153 0                   DAS     LONGTIME

 0378    REF   5  LAST 1125    01,3472  11'153 0                   CCS     LONGTIME +1     THE REASONIBG BEHIND THIS PART IS
 0379    REF   1               01,3473  1 3512 0                   TCF     MUCHTIME        INVOLVED, TAKING INTO ACCOUNT THAT THE
A0380                                                                                      WORDS MAY NOT BE SIGNED CORRECTED (DP
A0381                                                                                      BASIC INSTRUCTIONS
A0382                                                                                      DO NOT SIGN CORRECT) AND THAT WE SUBTRAC
A0383                                                                                      TED BIT14 (1 OVER HALF THE POS. VALUE
A0384                                                                                      REPRESENTIBLE IN SINGLE WORD)
 0385                          01,3474  13 475 0                   NOOP                    CAN:T GET HERE     **********
 0386                          01,3475  1 3476 0                   TCF     +1
 0387    REF   6  LAST 1125    01,3476  11'152 1                   CCS     LONGTIME
 0388    REF   2  LAST 1125    01,3477  1 3512 0                   TCF     MUCHTIME
 0389                          01,3500   00000 1  DPBIT14  OCT     00000
 0390                          01,3501   20000 0           OCT     20000

A0391                                                                                      LONGCALL
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 0392   REF  67  LAST 1093   01,3502  3 4736 1  LASTTIME CA      BIT14              GET BACK THE CORRECT DELTA TFOR WAITLIST
 0393   REF   7  LAST 1125   01,3503  27'153 0           AOS     LONGTIME +1
 0395   REF  37  LAST  885   01,3504  0 5203 0           TC      WAITLIST
 0396   REF  44  LAST 1125   E3,1400                     EBANK=  LST1
 0397   REF   1              01,3505   03517 1           2CADR   GETCADR            THE ENTRY TO OUR LONGCADR
 0397   REF   1              01,3506   02063 0

 0399   REF   1              01,3507  3 3521 1  LONGRTRN CA      TSKOVCDR           SET IT UP SO THAT ONLY THE FIRST EXIT IS
 0400   REF   3  LAST 1125   01,3510  53'435 0           DXCH    LONGEXIT           TO THE CALLER OF LONGCALL
 0401                        01,3511  52 006 0           DTCB                       THE REST ARE TC TASKOVER

 0402   REF  68  LAST 1126   01,3512  3 4736 1  MUCHTIME CA      BIT14              WE HAVE OVER OUR ABOUT 1.25 MINUTES
 0404   REF  38  LAST 1126   01,3513  0 5203 0           TC      WAITLIST           SO SET UP FOR ANOTHER CYCLE THROUGH HERE
 0405   REF  45  LAST 1126   E3,1400                     EBANK=  LST1
 0406   REF   2  LAST 1125   01,3514   03467 1           2CADR   LONGCYCL
 0406                        01,3515   02063 0

 0408   REF   1              01,3516  1 3507 1           TCF     LONGRTRN           NOW EXIT PROPERLY

R0409            *** WAITLIST TASK  GETCADR ***
 0410   REF   2  LAST 1125   01,3517  53'147 0  GETCADR  DXCH    LONGCADR           GET THE LONGCALL THAT WE WISHED TO START
 0411                        01,3520  52 006 0           DTCB                       AND TRANSFER CONTROL TO IT

 0412   REF  71  LAST 1115   01,3521   05261 1  TSKOVCDR GENADR  TASKOVER
 0413   REF   4  LAST 1126   01,3522  53'435 0  LONGPOOH DXCH    LONGEXIT
 0414                        01,3523  1 3525 1           TCF     +2
 0415   REF   6  LAST 1120   01,3524  52 062 1  WAITPOOH DXCH    WAITEXIT
 0416   REF   2  LAST 1073   01,3525  0 5716 1   +2      TC      POODOO1
 0417                        01,3526   21204 1           OCT     21204
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R0001    SUBROUTINE TO CONVERT RAD VECTOR AT GIVEN TIME TO LAT,LONG AND ALT

R0002    CALLING SEQUENCE

R0003      L-1    CALL
R0004      L              LAT-LONG
R0005    SUBROUTINES USED

R0006     R-TO-RP,ARCTAN,SETGAMMA,SETRE
R0007    ERASABLE INIT. REQ.

R0008      AXO,-AYO,AZO,TEPHEM (SET AT LAUNCH TIME)
R0009    ALPHAV = POSITION VECTOR METERS B-29
R0010      MPAC-- TIME  (CSECS B-28)
R0011     ERADFLAG =1, TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0012     LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0013    OUTPUT

R0014      LATITUDE IN LAT    (REVS. B-0)
R0015      LONGITUDE IN LONG    (REVS. B-0)
R0016    ALTITUDE IN ALT METERS B-29
 0017                        30,3766                    BANK    30
 0018    REF   1             13,2000                    SETLOC  LATLONG
 0019                        13,2347                    BANK

 0020    REF   1                                        COUNT*  $$/LT-LG
 0021    REF   7  LAST  966  E4,1431                    EBANK=  ALPHAV
 0022                        13,2347   40220 0 LAT-LONG STQ     SETPD
 0023    REF   2  LAST  146  13,2350   03674 1                  INCORPEX
 0024                        13,2351   00001 0                  0D
 0025                        13,2352   24007 0          STOVL   6D           SAVE TIME IN 6-7D FOR R-TO-RP
 0026    REF   8  LAST 1127  13,2353   02032 1                  ALPHAV
 0027                        13,2354   51406 1          PUSH    ABVAL        0-5D= R FOR R-TO-RP
 0028    REF   2  LAST  115  13,2355   16070 1          STODL   ALPHAM       ABS. VALUE OF R FOR ALT FORMULA BELOW
 0029    REF   6  LAST 1095  13,2356   24007 0                  ZEROVEC      SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0030                        13,2357   71414 0          BOFF    COS          USE COS(0) TO GET NON-ZERO IN MPAC
 0031    REF   6  LAST  966  13,2360   01743 0                  LUNAFLAG     0=EARTH,1=MOON
 0032    REF   1             13,2361   26362 1                  CALLRTRP
 0033                        13,2362   77624 1 CALLRTRP CALL
 0034    REF   5  LAST  973  13,2363   51700 1                  R-TO-RP      RP VECTOR CONVERTED FROM R B-29
 0035                        13,2364   77656 1          UNIT                 UNIT RP B-1
 0036    REF   9  LAST 1127  13,2365   36032 0          STCALL  ALPHAV       U2= 1/2 SINL FOR SETRE SUBR BELOW
 0037    REF   1             13,2366   26546 1                  SETGAMMA      SET GAMMA=B2/A2 FOR EARTH,=1 FOR MOON
 0038                        13,2367   77624 1          CALL                  SCALED B-1
 0039    REF   1             13,2370   26556 0                  SETRE        CALC RE METERS B-29
 0040                        13,2371   63545 0          DLOAD   DSQ
 0041    REF  10  LAST 1127  13,2372   02032 1                  ALPHAV
 0042                        13,2373   63525 0          PDDL    DSQ
 0043    REF  11  LAST 1127  13,2374   02034 1                  ALPHAV +2
 0044                        13,2375   75415 0          DAD     SQRT
 0045                           13,2376   76405 1           DMP     SL1R
 0046    REF   1                13,2377   00011 1                   GAMRP
 0047    REF   7  LAST   586    13,2400   14021 1           STODL   COSTH              COS(LAT) 8-1
 0048    REF  12  LAST  1127    13,2401   02036 0                   ALPHAV +4
 0049    REF   7  LAST   586    13,2402   34023 1           STCALL  SINTH              SIN(LAT) 8-1
 0050    REF   4  LAST   586    13,2403   26506 0                   ARCTAN
 0051    REF   5  LAST   928    13,2404   15120 0           STODL   LAT                LAT 80
 0052    REF  13  LAST  1128    13,2405   02032 1                   ALPHAV
 0053    REF   8  LAST  1128    13,2406   14021 1           STODL   COSTH              COS(LONG) 8-1
 0054    REF  14  LAST  1128    13,2407   02034 1                   ALPHAV +2
 0055    REF   8  LAST  1128    13,2410   34023 1           STCALL  SINTH              SIN(LONG) 8-1
 0056    REF   5  LAST  1128    13,2411   26506 0                   ARCTAN
 0057    REF   5  LAST   928    13,2412   15122 1           STODL   LONG               LONG. REVS 8-0 IN RANGE -1/2 TO 1/2
 0058    REF   3  LAST  1127    13,2413   02070 1                   ALPHAM
 0059                           13,2414   77625 0           DSU                        ALT= R-RE METERS 8-29
 0060    REF   2  LAST   146    13,2415   03673 0                   ERADM
 0061    REF   5  LAST   928    13,2416   35124 0           STCALL  ALT                EXIT WITH ALT METERS 8-29
 0062    REF   3  LAST  1127    13,2417   03674 1                   INCORPEX
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R0063   SUBROUTINE TO CONVERT LAT,LONG,ALT AT GIVEN TIME TO RADIUS VECTOR
R0064   CALLING SEQUENCE

R0065      L-1     CALL
R0066      L                LALOTORV
R0067   SUBROUTINES USED

R0068    SETGAMMA,SETRE,RP-TO-R
R0069   ERASABLE INIT. REQ.

R0070      AXO,AYO,AZO,TEPHEM  SET AT LAUNCH TIME
R0071      LAT-- LATITUDE  (REVS B0)
R0072      LONG-- LONGITUDE  (REVS B0)
R0073   ALT--ALTITUDE (METERS) B-29
R0074      MPAC-- TIME  (CSECS B-28)
R0075      ERADFLAG =1 TO COMPUTE EARTH RADIUS, =0 FOR FIXED EARTH RADIUS
R0076    LUNAFLAG=0 FOR EARTH,1 FOR MOON
R0077   OUTPUT

R0078   R-VECTOR IN ALPHAV (METERS B-29)
 0079                         13,2420   40220 0  LALOTORV STQ     SETPD          LAT,LONG,ALT TO R VECTOR
 0080   REF   4  LAST 1128    13,2421   03674 1                   INCORPEX
 0081                         13,2422   00001 0                   0D
 0082                         13,2423   34007 1           STCALL  6D             6-7D= TIME FOR RP-TO-R
 0083   REF   2  LAST 1127    13,2424   26546 1                   SETGAMMA       GAMMA=B2/A2 FOR EARTH,1 FOR MOON B-1
 0084                         13,2425   73545 1           DLOAD   SIN                     COS(LONG)COS(LAT) IN MPAC
 0085   REF   6  LAST 1128    13,2426   01120 0                   LAT                UNIT RP= SIN(LONG)COS(LAT)     2-3D
 0086                         13,2427   65275 1           DMPR    PDDL           PD 2         GAMMA*SIN(LAT)         0-1D
 0087   REF   2  LAST 1128    13,2430   00011 1                   GAMRP
 0088   REF   7  LAST 1129    13,2431   01120 0                   LAT                 0-1D= GAMMA*SIN(LAT) B-2
 0089                         13,2432   65346 0           COS     PDDL           PD 4      2-3D=COS(LAT) B-1 TEMPORARILY
 0090   REF   6  LAST 1128    13,2433   01122 1                   LONG
 0091                         13,2434   57356 0           SIN     DMPR           PD 2
 0092                         13,2435   71525 0           PDDL    COS            PD 4     2-3D=SIN(LONG)COS(LAT) B-2
 0093   REF   8  LAST 1129    13,2436   01120 0                   LAT
 0094                         13,2437   71525 0           PDDL    COS            PD 6      4-5D=COS(LAT) B-1 TEMPORARILY
 0095   REF   7  LAST 1129    13,2440   01122 1                   LONG
 0096                         13,2441   55475 1           DMPR    VDEF           PD 4     MPAC= COS(LONG)COS(LAT) B-2
 0097                         13,2442   41456 0           UNIT    PUSH           0-5D= UNIT RP FOR RP-TO-R SUBR.
 0098   REF  15  LAST 1128    13,2443   36032 0           STCALL  ALPHAV         ALPHAV +4= SINL FOR SETRE SUBR.
 0099   REF   2  LAST 1127    13,2444   26556 0                   SETRE          RE METERS B-29
 0100                         13,2445   43145 0           DLOAD   BOFF           SET MPAC=0 FOR EARTH,NON-ZERO FOR MOON
 0101   REF   7  LAST 1127    13,2446   24007 0                   ZEROVEC
 0102   REF   7  LAST 1127    13,2447   01743 0                   LUNAFLAG
 0103   REF   1               13,2450   26452 0                   CALLRPRT
 0104                         13,2451   77746 1           COS                    USE COS(0) TO GET NON-ZERO IN MPAC
 0105                         13,2452   77624 1  CALLRPRT CALL
 0106   REF   6  LAST  972    13,2453   55716 1                   RP-TO-R        EXIT WITH UNIT R VECTOR IN MPAC
 0107   REF  16  LAST 1129    13,2454   16032 1           STODL   ALPHAV
 0108   REF   3  LAST 1128    13,2455   03673 0                   ERADM
 0109                            13,2456   74215 1            DAC     VXSC              (RE + ALT)(UNIT R) METERS B-30
 0110    REF   6  LAST 1128      13,2457   01124 1                    ALT
 0111    REF  17  LAST 1129      13,2460   02032 1                    ALPHAV
 0112                            13,2461   77772 0            VSL1                      R METERS B-29
 0113    REF  18  LAST 1130      13,2462   36032 0            STCALL  ALPHAV            EXIT WITH R IN METERS B-29
 0114    REF   5  LAST 1129      13,2463   03674 1                    INCORPEX
R0115    SUBROUTINE TO COMPUTE EARTH RADIUS

R0116    INPUT

R0117      1/2 SIN LAT IN ALPHAV +4

R0118    OUTPUT

R0119      EARTH RADIUS IN ERADM AND MPAC   (METERS B-29)

 0120                            13,2464   63545 0  GETERAC   DLOAD   DSQ
 0121    REF  19  LAST 1130      13,2465   02036 0                    ALPHAV +4         SIN**2(L)
 0122                            13,2466   44352 0            SL1     BOSU
 0123    REF   1                 13,2467   24005 1                    DP1/2             COS**2(L)
 0124                            13,2470   44275 1            DMPR    BOSU
 0125    REF   1                 13,2471   26505 0                    EE
 0126    REF   2  LAST 1130      13,2472   24005 1                    DP1/2
 0127                            13,2473   75465 1            BODV    SQRT
 0128    REF   1                 13,2474   26501 1                    B2XSC
 0129                            13,2475   77622 1            SR4R
 0130    REF   4  LAST 1129      13,2476   03673 0            STORE   ERADM
 0131                            13,2477   77616 0            RVQ

R01311   THE FOLLOWING CONSTANTS WERE COMPUTED WITH A=6378166,B=6356784 METERS
R01312   B2XSC= B**2 SCALED B-51
R01313   B2/A2= B**2/A**2 SCALED B-1
R01314   EE=(1-B**2/A**2) SCALED B-0
 0132                            13,2500   00446 1  B2XSC     2DEC    .0179450689        B**2 SCALED B-51
 0132                            13,2501   00305 1
 0133    REF   8  LAST 1095      12,2004            DP1/2     =       XUNIT
 0134                            13,2502   17711 0  B2/A2     2DEC    .9933064884 B-1   GAMMA= B**2/A**2 B-1
 0134                            13,2503   05254 1
 0135                            13,2504   00155 0  EE        2DEC    6.6935116 E-3     (1-B**2/A**2) B-0
 0135                            13,2505   25250 1
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P0137   ARCTAN SUBROUTINE


R0138   CALLING SEQUENCE

R0139     SIN THETA IN SINTH B-1
R0140     COS THETA IN COSTH B-1
R0141     CALL ARCTAN

R0142   OUTPUT
R0143     ARCTAN THETA IN MPAC AND THETA B-0 IN RANGE -1/2 TO +1/2


 0144                        13,2506   77600 1  ARCTAN   BDV
 0145   REF   1              13,2507   26510 1                     CLROVFLW
 0146                        13,2510   63545 0  CLROVFLW DLOAD     DSQ
 0147   REF   9  LAST 1128   13,2511   00023 0                     SINTH
 0148                        13,2512   63525 0           PDDL      DSQ
 0149   REF   9  LAST 1128   13,2513   00021 1                     COSTH
 0150                        13,2514   77615 0           DAD
 0151                        13,2515   75454 0           BZE       SQRT
 0152   REF   1              13,2516   26534 1                     ARCTANXX       ATAN=0/0  SET THETA=0
 0153                        13,2517   40065 0           BDDV      BOV
 0154   REF  10  LAST 1131   13,2520   00023 0                     SINTH
 0155   REF   1              13,2521   26541 0                     ATAN=90
 0156                        13,2522   67542 0           SR1       ASIN
 0157   REF   4  LAST  941   13,2523   00025 0           STORE     THETA
 0158                        13,2524   50125 1           PDDL      BMN
 0159   REF  10  LAST 1131   13,2525   00021 1                     COSTH
 0160   REF   1              13,2526   26530 0                     NEGCOS
 0161                        13,2527   43545 1           DLOAD     RVQ
 0162                        13,2530   57545 1  NEGCOS   DLOAD     DCOMP
 0163                        13,2531   43244 1           BPL       DAD
 0164   REF   1              13,2532   26536 0                     NEGOUT
 0165   REF   3  LAST 1130   13,2533   24005 1                     DP1/2
 0166   REF   5  LAST 1131   13,2534   00025 0  ARCTANXX STORE     THETA
 0167                        13,2535   77616 0           RVQ

 0168                        13,2536   52025 1  NEGOUT   DSU       GOTO
 0169   REF   4  LAST 1131   13,2537   24005 1                     DP1/2
 0170   REF   7  LAST 1131   13,2540   26534 1                     ARCTANXX
 0171                        13,2541   75345 1  ATAN=90  DLOAD     SIGN
 0172   REF   1              13,2542   11003 1                     LODP1/4
 0173   REF  11  LAST 1131   13,2543   00023 0                     SINTH
 0174   REF   6  LAST 1131   13,2544   00025 0           STORE     THETA
 0175                        13,2545   77616 0           RVQ

 0176   REF   2  LAST  933   12,2006            2DZERO   =         DPZERO
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R0177    ..... SETGAMMA SUBROUTINE .....
R0178    SUBROUTINE TO SET GAMMA FOR THE LAT-LONG AND LALOTORV SUBROUTINES

R0179     GAMMA = B**2/A**2 FOR EARTH (B-1)
R0180     GAMMA = 1 FOR MOON (B-1)

R0181    CALLING SEQUENCE
R0182     L          CALL
R0183     L+1                SETGAMMA

R0184    INPUT
R0185     LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0186    OUTPUT
R0187     GAMMA IN GAMRP  (B-1)

 0188                          13,2546   43145 0  SETGAMMA DLOAD   BOFF              BRANCH FOR EARTH
 0189    REF   1               13,2547   26503 0                   B2/A2             EARTH GAMMA
 0190    REF   8  LAST 1129    13,2550   01743 0                   LUNAFLAG
 0191    REF   1               13,2551   26554 1                   SETGMEX
 0192                          13,2552   77735 0           SLOAD
 0193    REF   1               13,2553   24005 1                   1B1               MOON GAMMA
 0194    REF   3  LAST 1129    13,2554   00011 1  SETGMEX  STORE   GAMRP
 0195                          13,2555   77616 0           RVQ
 0196                             0010            GAMRP    =       8D
```

```
R0197   .....SETRE SUBROUTINE .....
R0198   SUBROUTINE TO SET RE (EARTH OR MOON RADIUS)

R0199   RE= RM FOR MOON
R0200    RE= RREF FOR FIXED EARTH RADIUS OR COMPUTED RF FOR FISCHER ELLIPSOID

R0201   CALLING SEQUENCE
R0202    L         CALL
R0203    L+1              SETRE

R0204   SUBROUTINES USED
R0205    GETERAD

R0206   INPUT
R0207    ERADFLAG=0 FOR FIXED RE, 1 FOR COMPUTED RE
R0208    ALPHAV +4= 1/2 SINL IF GETERAD IS CALLED
R0209    LUNAFLAG=0 FOR EARTH,=1 FOR MOON

R0210   OUTPUT
R0211    ERADM= 504RM FOR MOON (METERS B-29)
R0212    ERADM= ERAD OR COMPUTED RF FOR EARTH (METERS B-29)

 0213                      13,2556  71220 1  SETRE     STQ     DLOAD
 0214   REF   1            13,2557  00051 0                    SETREX
 0215   REF   1            13,2560  10003 0                    504RM
 0216                      13,2561  71214 0            BON     DLOAD          BRANCH FOR MOON
 0217   REF   9  LAST 1132 13,2562  01703 1                    LUNAFLAG
 0218   REF   1            13,2563  26573 1                    TSTRLSRM
 0219   REF   1            13,2564  10001 1                    ERAD
 0220                      13,2565  45014 0            BOFF    CALL           ERADFLAG=0 FOR FIXED RE,1 FOR COMPUTED
 0221   REF   4  LAST  967 13,2566  00742 0                    ERADFLAG
 0222   REF   1            13,2567  26571 0                    SETRXX
 0223   REF   1            13,2570  26464 0                    GETERAD
 0224   REF   5  LAST 1130 13,2571  37673 1  SETRXX    STCALL  ERADM          EXIT WITH RE OR RM METERS B-29
 0225   REF   2  LAST 1133 13,2572  00051 0                    SETREX
 0226                      13,2573  77214 0  TSTRLSRM  BON     VLOAD          ERADFLAG=0,SET R0=RLS
 0227   REF   5  LAST 1133 13,2574  00702 1                    ERADFLAG                =1      R0=RM
 0228   REF   2  LAST 1133 13,2575  26571 0                    SETRXX
 0229   REF  14  LAST  976 13,2576  02023 1                    RLS
 0230                      13,2577  64446 0            ABVAL   SR2R           SCALE FROM B-27 TO B-29
 0231                      13,2600  77650 1            GOTO
 0232   REF   3  LAST 1133 13,2601  26571 0                    SETRXX
 0233   REF  12  LAST  965     0051          SETREX    =       S2
```

```
P0001    ..... RP-TO-R SUBROUTINE .....
R0002    SUBROUTINE TO CONVERT RP (VECTOR IN PLANETARY COORDINATE SYSTEM,EITHER
R0003     EARTH-FIXED OR MOON-FIXED) TO R (SAME VECTOR IN THE BASIC REF. SYSTEM)

R0004     R=MT(T)*(RP+LPXRP)     MT= M MATRIX TRANSPOSE

R0005    CALLING SEQUENCE
R0006     L         CALL
R0007     L+1                RP-TO-R

R0008    SUBROUTINES USED
R0009     EARTHMX,MOONMX,EARTHL  -

R0010       ITEMS AVAILABLE FROM LAUNCH DATA
R0011        504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0012        IN THE MOON-FIXED COORD. SYSTEM    RADIANS  B0
R0013          ITEMS NECESSARY FOR SUBR. USED (SEE DESCRIPTION OF SUBR.)

R0014    INPUT
R0015     MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0016     0-5D= RP VECTOR
R0017     6-7D= TIME

R0018    OUTPUT
R0019     MPAC= R VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

 0020    REF   1                26,2000                        SETLOC PLANTIN1
 0021                           26,3716                        BANK

 0022    REF   2 LAST   52 TO  155:    18    18*               COUNT* $$/LUROT

 0023                           26,3716   46020 1  RP-TO-R   STO     BHIZ
 0024    REF   1                26,3717   00050 1                    RPREXIT
 0025    REF   1                26,3720   55733 0                    RPTORA
 0026                           26,3721   77624 1            CALL                      COMPUTE M MATRIX FOR MOON
 0027    REF   1                26,3722   51730 1                    MOONMX            LP=LM FOR MOON  RADIANS B0
 0028                           26,3723   77775 1            VLOAD
 0029    REF   1                26,3724   02013 1                    504LM
 0030                           26,3725   53235 0  RPTORB    VXV     VAD
 0031    REF   1                26,3726   00001 0                    504RPR
 0032    REF   2  LAST 1134     26,3727   00001 0                    504RPR
 0033                           26,3730   52105 1            VXM     GOTO
 0034    REF   1                26,3731   00025 0                    MMATRIX           MPAC=R=MT(T)*(RP+LPXRP)
 0035    REF   1                26,3732   51716 0                    RPRPXXXX          RESET PUSHLOC TO 0 BEFORE EXITING
 0036                           26,3733   77624 1  RPTORA    CALL                      EARTH COMPUTATIONS
 0037    REF   1                26,3734   55743 1                    EARTHMX           M MATRIX B-1
 0038                           26,3735   77624 1            CALL
 0039    REF   1                26,3736   15761 0                    EARTHL            L VECTOR RADIANS B0
 0040                           26,3737   76521 0            MXV     VSL1              LP=M(T)*L  RAD B-0
 0041    REF   2  LAST 1134     26,3740   00025 0                    MMATRIX
 0042                         26,3741    77650 1            GOTO
 0043   REF    1              26,3742    55725 1                   RPTORB
 00432  REF    1              24,2000                       SETLOC PLANTIN
 00434                        24,3700                       BANK
 00436  REF    1                                            COUNT* $$/LUROT
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```
R0044    ***** R-TO-RP SUBROUTINE *****
R0045    SUBROUTINE TO CONVERT R (VECTOR IN REFERENCE COORD. SYSTEM) TO RP
R0046     (VECTOR IN PLANETARY COORD SYSTEM) EITHER EARTH-FIXED OR MOON-FIXED

R0047     RP=M(T)*(R-LXR)

R0048    CALLING SEQUENCE
R0049     L         CALL
R0050     L+1                R-TO-RP

R0051    SUBROUTINES USED
R0052     EARTHMX,MOONMX,EARTHL

R0053    INPUT
R0054     MPAC= 0 FOR EARTH,NON-ZERO FOR MOON
R0055     0-5D= R VECTOR
R0056     6-7D= TIME

R0057       ITEMS AVAILABLE FROM LAUNCH DATA
R0058        504LM= THE LIBRATION VECTOR L OF THE MOON AT TIME TIMSUBL,EXPRESSED
R0059        IN THE MOON-FIXED COORD. SYSTEM    RADIANS B0
R0060          ITEMS NECESSARY FOR SUBROUTINES USED (SEE DESCRIPTION OF SUBR.)

R0061    OUTPUT
R0062     MPAC=RP VECTOR METERS B-29 FOR EARTH, B-27 FOR MOON

 0063                           24,3700    46020 1   R-TO-RP   STQ      BHIZ
 0064    REF   2  LAST 1134     24,3701    00050 1                      RPREXIT
 0065    REF   1                24,3702    51722 1                      RTORPA
 0066                           24,3703    77624 1             CALL
 0067    REF   2  LAST 1134     24,3704    51730 1                      MOONMX
 0068                           24,3705    61375 1             VLOAD    VXM
 0069    REF   2  LAST 1134     24,3706    02013 1                      504LM             LP=LM
 0070    REF   3  LAST 1134     24,3707    00025 0                      MMATRIX
 0071                           24,3710    77772 0             VSL1                        L=MT(T)*LP  RADIANS B0
 0072                           24,3711    51235 1   RTORPB    VXV      BVSL
 0073    REF   3  LAST 1134     24,3712    00001 0                      504RPR
 0074    REF   4  LAST 1136     24,3713    00001 0                      504RPR
 0075                           24,3714    77721 0             MXV                        M(T)*(R-LXR) B-2
 0076    REF   4  LAST 1136     24,3715    00025 0                      MMATRIX
 0077                           24,3716    40372 0   RPRPXXXX  VSL1     SETPD
 0078                           24,3717    00001 0                      0D
 0079                           24,3720    77650 1             GOTO
 0080    REF   3  LAST 1136     24,3721    00050 1                      RPREXIT
 0081                           24,3722    77624 1   RTORPA    CALL                       EARTH COMPUTATIONS
 0082    REF   2  LAST 1134     24,3723    55743 1                      EARTHMX
 0083                           24,3724    77624 1             CALL
 0084    REF   2  LAST 1134     24,3725    15761 0                      EARTHL
 0085                           24,3726    77650 1             GOTO                       MPAC=L=(-AX,-AY,0) RAD B-0
 0086    REF   1                24,3727    51711 1                      RTORPB
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R0087    ***** MOONMX SUBROUTINE *****
R0088    SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE MOON

R0089    CALLING SEQUENCE
R0090     L        CALL
R0091     L+1             MOONMX

R0092    SUBROUTINES USED
R0093     NEWANGLE

R0094    INPUT
R0095     6-7D= TIME
R0096       ITEMS AVAILABLE FROM LAUNCH DATA
R0097        BSUBO,BDOT
R0098        TIMSUBO,NODIO,NODDOT,FSUBO,FDOT
R0099        COSI= COS(I) B-1
R0100        SINI= SIN(I) B-1
R0101          I  IS THE ANGLE BETWEEN THE MEAN LUNAR EQUATORIAL PLANE AND THE
R0102          PLANE OF THE ECLIPTIC  (1 DEGREE  32.1 MINUTES)

R0103    OUTPUT
R0104     MMATRIX= 3X3 M MATRIX B-1    (STORED IN VAC AREA)

 0105                        24,3730   40220 0  MOONMX   STQ     SETPD
 0106    REF   1             24,3731   00051 0                   EARTHMXX
 0107                        24,3732   00011 1                   8D
 0108                        24,3733   77770 1           AXT,1                    B REQUIRES SL 0, SL 5 IN NEWANGLE
 0109                        24,3734   00005 1                   5
 0110                        24,3735   65345 0           DLOAD   PDDL             PD 10D             8-9D=BSUBO
 0111    REF   1             24,3736   14017 1                   BSUBO                               10-11D= BDOT
 0112    REF   1             24,3737   14011 1                   BDOT
 0113                        24,3740   45006 0           PUSH    CALL             PD 12D
 0114    REF   1             24,3741   53732 1                   NEWANGLE         EXIT WITH PD 8D AND MPAC= B  REVS B0
 0115                        24,3742   71406 0           PUSH    COS              PD 10D
 0116    REF   1             24,3743   14041 1           STODL   COB              PD 8D     COS(B) B-1
 0117                        24,3744   77756 0           SIN                                SIN(B) B-1
 0118    REF   1             24,3745   14043 0           STODL   SOB                         SETUP INPUT FOR NEWANGLE
 0119    REF   1             24,3746   14015 0                   FSUBO                                8-9D=FSUBO
 0120                        24,3747   41525 0           PDDL    PUSH             PD 10D THEN 12D   10-11D=FDOT
 0121    REF   1             24,3750   14007 0                   FDOT
 0122                        24,3751   45170 0           AXT,1   CALL             F REQUIRES SL 1, SL 6 IN NEWANGLE
 0123                        24,3752   00004 0                   4
 0124    REF   2  LAST 1137  24,3753   53732 1                   NEWANGLE         EXIT WITH PD 8D AND MPAC= F REVS B0
 0125    REF   1             24,3754   14027 1           STODL   AVECTR +2        SAVE F TEMP
 0126    REF   1             24,3755   14013 0                   NODIO                                8-9D=NODIO
 0127                        24,3756   41525 0           PDDL    PUSH             PD 10D THEN 12D   10-11D=NODDOT
 0128    REF   1             24,3757   14005 1                   NODDOT                               MPAC=T
 0129                        24,3760   45170 0           AXT,1   CALL             NODE REQUIRES SL 0, SL 5 IN NEWANGLE
 0130                        24,3761   00005 1                   5
 0131    REF   3  LAST 1137  24,3762   53732 1                   NEWANGLE         EXIT WITH PD 8D AND MPAC= NODI REVS B0
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0132                       24,3763   71406 0             PUSH    COS              PD 10D   8-9D= NODI  REVS  B0
0133                       24,3764   77606 1             PUSH                     PD 12D 10-11D= COS(NODI)  B-1
0134   REF    2  LAST 1137 24,3765   00025 0             STORE   AVECTR
0135                       24,3766   76405 1             DMP     SL1R
0136   REF    2  LAST 1137 24,3767   00041 1                     COB                                      COS(NODI)    B-1
0137   REF    1            24,3770   14035 1             STODL   BVECTR +2        PD 10D   20-25D=AVECTR= COB*SIN(NODI)
0138                       24,3771   76405 1             DMP     SL1R                                     SOB*SIN(NODI)
0139   REF    2  LAST 1137 24,3772   00043 0                     SOB
0140   REF    2  LAST 1138 24,3773   14037 0             STODL   BVECTR +4        PD 8D
0141                       24,3774   41556 1             SIN     PUSH             PD 10D                 -SIN(NODI)    B-1
0142                       24,3775   52076 1             DCOMP   GOTO                      26-31D=BVECTR= COB*COS(NODI)
0143   REF    1            24,3776   53653 1                     MOONMXA
01475                      25,3653                       BANK    25
01476  REF    1            25,2000                       SETLOC  PLANTIN3
01477                      25,3653                       BANK
01478  REF    1                                          COUNT*  $$/LUROT

0148   REF    3  LAST 1138 25,3653   14033 1   MOONMXA   STODL   BVECTR           PD 8D                    SOB*COS(NODI)
01481  REF    3  LAST 1138 25,3654   00027 1                     AVECTR +2        MOVE F FROM TEMP LOC. TO 504F
01482  REF    1            25,3655   14007 0             STODL   504F
01483                      25,3656   76405 1             DMP     SL1R
01484  REF    3  LAST 1138 25,3657   00041 1                     COB
01485  REF    4  LAST 1138 25,3660   14027 1             STODL   AVECTR +2
0149   REF    1            25,3661   00011 1                     SINNODI          8-9D=SIN(NODI)  B-1
0150                       25,3662   76405 1             DMP     SL1R
0151   REF    3  LAST 1138 25,3663   00043 0                     SOB
0152   REF    5  LAST 1138 25,3664   14031 0             STODL   AVECTR +4                                  0
0153   REF   13  LAST  847 25,3665   06524 1                     HI6ZEROS                 8-13D= CVECTR= -SOB  B-1
0154                       25,3666   57525 1             PDDL    DCOMP            PD 10D                   COB
0155   REF    4  LAST 1138 25,3667   00043 0                     SOB
0156                       25,3670   63325 0             PDDL    PDVL             PD 12D THEN PD 14D
0157   REF    4  LAST 1138 25,3671   00041 1                     COB
0158   REF    4  LAST 1138 25,3672   00033 1                     BVECTR
0159                       25,3673   63361 0             VXSC    PDVL             PD 20D         BVECTR*SINI  B-2
0160   REF    1            25,3674   14003 1                     SINI
0161   REF    1            25,3675   00011 1                     CVECTR
0162                       25,3676   53361 0             VXSC    VAD              PD 14D         CVECTR*COSI  B-2
0163   REF    1            25,3677   14001 0                     COSI
0164                       25,3700   77772 0             VSL1
0165   REF    5  LAST 1136 25,3701   24041 1             STOVL   MMATRIX +12D     PD 8D  M2=BVECTR*SINI+CVECTR*COSI  B-1
0166                       25,3702   63361 0             VXSC    PDVL             PD 14D
0167   REF    2  LAST 1138 25,3703   14003 1                     SINI                            CVECTR*SINI  B-2
0168   REF    5  LAST 1138 25,3704   00033 1                     BVECTR
0169                       25,3705   52361 1             VXSC    VSU              PD 8D          BVECTR*COSI  B-2
0170   REF    2  LAST 1138 25,3706   14001 0                     COSI
0171                       25,3707   65372 1             VSL1    PDDL             PD 14D
0172   REF    2  LAST 1138 25,3710   00007 0                     504F             8-13D=OVECTR=BVECTR*COSI-CVECTR*SINI B-1
0173                       25,3711   74346 0             COS     VXSC
0174   REF    1            25,3712   00011 1                     OVECTR
0175                       25,3713   73525 1             PDDL    SIN              PD 20D  14-19D= OVECTR*COSF  B-2
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 0176   REF    3  LAST 1138   25,3714   00007 0                    504F
 0177                         25,3715   52361 1           VXSC     VSU             PD 14D           AVECTR*SINF  B-2
 0178   REF    6  LAST 1138   25,3716   00025 0                    AVECTR
 0179                         25,3717   77772 0           VSL1
 0180   REF    6  LAST 1138   25,3720   14033 1           STODL    MMATRIX +6      M1= AVECTR*SINF-CVECTR*COSF  B-1
 0181   REF    4  LAST 1139   25,3721   00007 0                    504F
 0182                         25,3722   74356 1           SIN      VXSC            PD 8D
 0183                         25,3723   71525 0           PDDL     COS             PD 14D  8-13D=CVECTR*SINF B-2
 0184   REF    5  LAST 1139   25,3724   00007 0                    504F
 0185                         25,3725   53361 0           VXSC     VAD             PD 8D           AVECTR*COSF 8-2
 0186   REF    7  LAST 1139   25,3726   00025 0                    AVECTR
 0187                         25,3727   57572 0           VSL1     VCOMP
 0188   REF    7  LAST 1139   25,3730   34025 1           STCALL   MMATRIX         M0= -(AVECTR*COSF+CVECTR*SINF)  B-1
 0189   REF    2  LAST 1137   25,3731   00051 0                    EARTHMXX
R0190   COMPUTE X=X0+(XDOT)(T+T0)
R0191   8-9D= X0 (REVS B-0),PUSHLOC SET AT 12D
R0192   10-11D=XDOT (REVS/CSEC) SCALED B+23 FOR WEARTH,B+28 FOR NODDOT AND BDOT
R0193                            AND B+27 FOR FDOT
R0194    X1=DIFFERENCE IN 23 AND SCALING OF XDOT,=0 FOR WEARTH,5 FOR NODDOT AND
R0195                                          BDOT AND 4 FOR FDOT
R0196   6-7D=T (CSEC B-28), TIMSUBO= (CSEC B-42 TRIPLE PREC.)

 0197                         25,3732   54345 1  NEWANGLE DLOAD    SR              ENTER PD 12D
 0198                         25,3733   00007 0                    6D
 0199                         25,3734   20617 0                    14D
 0200                         25,3735   72371 1           TAD      TLOAD           CHANGE MODE TO TP
 0201   REF    1              25,3736   01707 0                    TIMSUBO
 0202   REF 733   LAST 1102   25,3737   00155 0                    MPAC
 0203   REF    1              25,3740   14017 1           STODL    TIMSUBM         T+T0 CSEC B-42
 0204   REF    2  LAST 1139   25,3741   00020 0                    TIMSUBM +1
 0205                         25,3742   77605 1           DMP                      PD 10D  MULT BY XDOT IN 10-11D
 0206                         25,3743   43257 0           SL*      DAD             PD 8D   ADD X0 IN 8-9D AFTER SHIFTING
 0207                         25,3744   20206 1                    5,1                     SUCH THAT SCALING IS B-0
 0208                         25,3745   67206 1           PUSH     SLOAD           PD 10D SAVE PARTIAL (X0+XDOT*T) IN B-9D
 0209   REF    3  LAST 1139   25,3746   00017 1                    TIMSUBM
 0210                         25,3747   41261 1           SL       DMP
 0211                         25,3750   20212 1                    9D
 0212                         25,3751   00013 0                    10D             XDOT
 0213                         25,3752   43257 0           SL*      DAD             PD 8D   SHIFT SUCH THAT THIS PART OF X
 0214                         25,3753   20213 0                    10D,1                   IS SCALED REVS/CSEC B-0
 02141                        25,3754   77600 1           BOV                      TURN OFF OVERFLOW IF SET BY SHIFT
 02142                        25,3755   53756 0                    +1              INSTRUCTION BEFORE EXITING
 0215                         25,3756   77616 0           RVQ                      MPAC=X= X0+(XDOT)(T+T0)  REVS B0
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L         PLANETARY INERTIAL ORIENTATION                                                    USER'S PAGE NO.   7       E0 S3

R0216     ***** EARTHMX SUBROUTINE *****
R0217     SUBROUTINE TO COMPUTE THE TRANSFORMATION MATRIX M FOR THE EARTH

R0218     CALLING SEQUENCE
R0219      L         CALL
R0220      L+1                EARTHMX

R0221     SUBROUTINES USED
R0222      NEWANGLE

R0223     INPUT
R0224        INPUT AVAILABLE FROM LAUNCH DATA      AZO  REVS B-0
R0225                                              TEPHEM  CSEC B-42
R0226      6-7D= TIME CSEC B-28

R0227     OUTPUT
R0228      MMATRIX= 3X3 M MATRIX B-1   (STORED IN VAC AREA)

 02282                            26,3743                        BANK    26
 02284   REF    2  LAST 1134      26,2000                        SETLOC  PLANTIN1
 02286                            26,3743                        BANK
 02288   REF    3 LAST 1134 TO 1135:      21      39*            COUNT*  $$/LUROT

 0229                             26,3743   40220 0  EARTHMX    STQ     SETPD            SET   8-9D=AZO
 0230    REF    3  LAST 1139      26,3744   00051 0                     EARTHMXX
 0231                             26,3745   00011 1                     8D               10-11D=WEARTH
 0232                             26,3746   77770 1             AXT,1                    FOR SL 5, AND SL 10  IN NEWANGLE
 0233                             26,3747   00000 1                     0
 0234                             26,3750   65345 0             DLDAD   PDDL               LEAVING PD SET AT 12D FOR NEWANGLE
 0235    REF    1                 26,3751   01712 1                     AZO
 0236    REF    1                 26,3752   14021 1                     WEARTH
 0237                             26,3753   45006 0             PUSH    CALL
 0238    REF    4  LAST 1137      26,3754   53732 1                     NEWANGLE
 0239                             26,3755   41401 1             SETPD   PUSH             18-19D=504AZ
 0240                             26,3756   00023 0                     18D                                   COS(AZ) SIN(AZ) 0
 0241                             26,3757   65346 0             COS     PDDL             20-37D=  MMATRIX= -SIN(AZ) COS(AZ) 0  B-1
 0242    REF    1                 26,3760   00023 0                     504AZ                                   0        0      1
 0243                             26,3761   65356 1             SIN     PDDL
 0244    REF   14  LAST 1138      26,3762   06524 1                     HI6ZEROS
 0245                             26,3763   73525 1             PDDL    SIN
 0246    REF    2  LAST 1140      26,3764   00023 0                     504AZ
 0247                             26,3765   65276 1             DCOMP   PDDL
 0248    REF    3  LAST 1140      26,3766   00023 0                     504AZ
 0249                             26,3767   63346 0             COS     PDVL
 0250    REF   15  LAST 1140      26,3770   06524 1                     HI6ZEROS
 0251                             26,3771   41525 0             PDDL    PUSH
 0252    REF    5  LAST  492      26,3772   06522 1                     HIDPHALF
 0253                             26,3773   77650 1             GOTO
 0254    REF    4  LAST 1140      26,3774   00051 0                     EARTHMXX
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L         PLANETARY INERTIAL ORIENTATION

P0255     ***** EARTHL SUBROUTINE *****
R0256     SUBROUTINE TO COMPLETE L VECTOR FOR EARTH

R0257     CALLING SEQUENCE
R0258      L          CALL
R0259      L+1                  EARTHL

R0260     INPUT
R0261      AXO,AYO SET AT LAUNCH TIME WITH AYO IMMEDIATELY FOLLOWING AXO IN CORE

R0262     OUTPUT
R0263                    -AX
R0264        MPAC=       -AY      RADIANS B-0
R0265                     0

 026505                            06,3761                              BANK    06
 02651  REF    1                   06,2000                              SETLOC  EARTHLOC
 026515                            06,3761                              BANK
 02652  REF    1                                                        COUNT*  $$/LUROT

 0266                              06,3761    57545 1    EARTHL         DLOAD   DCOMP
 0267   REF    1                   06,3762    01716 0                           AXO
 0268   REF    1                   06,3763    14017 1                   STODL   504LPL
 0269   REF    1                   06,3764    01714 1                           -AYO
 0270   REF    2  LAST 1141        06,3765    14021 1                   STODL   504LPL +2
 0271   REF    4  LAST  324        06,3766    24007 0                           LO6ZEROS
 0272   REF    3  LAST 1141        06,3767    24023 0                   STOVL   504LPL +4
 0273   REF    4  LAST 1141        06,3770    00017 1                           504LPL
 0274                              06,3771    77616 0                   RVQ
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```
P0275    CONSTANTS AND ERASABLE ASSIGNMENTS
 0276    REF   5  LAST 1131   12,2004          181        =        DP1/2           1  SCALED B-1
 0279    REF  13  LAST 1082      0050          RPREXIT    =        S1              R-TO-RP AND RP-TO-R SUBR EXIT
 0280    REF  13  LAST 1133      0051          EARTHMXX   =        S2              EARTHMX,MOONMX SUBR. EXITS
 0281                            0000          504RPR     =        0D              6 REGS   R OR RP VECTOR
 0282                            0010          SINNODI    =        8D              2        SIN(NODI)
 0283                            0010          DVECTR     =        8D              6        D VECTOR MOON
 0284                            0010          CVECTR     =        8D              6        C VECTR MOON
 0285                            0022          504AZ      =        18D             2       AZ
 0286                            0016          TIMSUBM    =        14D             3        TIME SUB M (MOON) T+TO IN GETAZ
 0287                            0016          504LPL     =        14D             6        L OR LP VECTOR
 0288                            0024          AVECTR     =        20D             6        A VECTOR (MOON)
 0289                            0032          BVECTR     =        26D             6        B VECTOR (MOON)
 0290                            0024          MMATRIX    =        20D             18       M MATRIX
 0291                            0040          COB        =        32D             2        COS(B) B-1
 0292                            0042          SOB        =        34D             2        SIN(B) B-1
 0293                            0006          504F       =        6D              2        F (MOON)
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L        MEASUREMENT INCORPORATION                                                                   USER'S PAGE NO.    1        EQ  S3

P0001     INCORP1--PERFORMS THE SIX DIMENSIONAL STATE VECTOR DEVIATION FOR POSITI
R0002    ON AND VELOCITY OR THE NINE DIMENSIONAL DEVIATION OF POSITION,VELOCITY,A
R0003    NO RADAR OR LANDMARK BIAS.THE OUTPUT OF THE BVECTOR ROUTINE ALONG WITH T
R0004    HE ERROR TRANSITION MATRIX(W) ARE USED AS INPUT TO THE ROUTINE.THE DEVIA
R0005    TION IS OBTAINED BY COMPUTING AN ESTIMATED TRACKING MEASUREMENT FROM THE
R0006    CURRENT STATE VECTOR AND COMPARING IT WITH AN ACTUAL TRACKING MEASUREMEN
R0007    T AND APPLYING A STATISTICAL WEIGHTING VECTOR.
R0008    INPUT
R0009       DMENFLG = 0 6DIMENSIONAL BVECTOR  1= 9DIMENSIONAL
R0010              W = ERROR TRANSITION MATRIX 6X6 OR 9X9
R0011       VARIANCE = VARIANCE (SCALAR)
R0012         DELTAQ = MEASURED DEVIATION(SCALAR)
R0013        BVECTOR = 6 OR 9 DIMENSIONAL BVECTOR

R0014    OUTPUT
R0015         DELTAX = STATE VECTOR DEVIATIONS 6 OR 9 DIMENSIONAL
R0016             ZI = VECTOR USED FOR THE INCORPORATION 6 OR 9 DIMENSIONAL
R0017        GAMMA = SCALAR
R0018        OMEGA = OMEGA WEIGHTING VECTOR 6 OR 9 DIMENTIONAL
R0019    CALLING SEQUENCE
R0020       L  CALL INCORP1

R0021    NORMAL EXIT

R0022       L+1 OF CALLING SEQUENCE

 0023                           37,3652                              BANK    37
 0024    REF   1                23,2000                              SETLOC  MEASINC
 0025                           23,2533                              BANK

 0026    REF   1                                                     COUNT*  $$/INCOR

 0027    REF  18   LAST  615    E5,1400                              EBANK=  W

 0028                           23,2533    77620 0    INCORP1    STQ
 0029    REF   2   LAST  127    23,2534    02772 1                       EGRESS
 0030                           23,2535    66370 0               AXT,1   SSP
 0031                           23,2536    00066 1                       540
 0032    REF  14   LAST 1142    23,2537    00051 0                       S1
 0033                           23,2540    00022 1                       180             IX1 = 54   S1= 18
 0034                           23,2541    66374 1               AXT,2   SSP
 0035                           23,2542    00022 1                       180
 0036    REF  14   LAST 1142    23,2543    00052 0                       S2
 0037                           23,2544    00006 1                       6               IX2 = 18   S2=6
 0038                           23,2545    63775 1    Z123       VLOAD   MXV*
 0039    REF  22   LAST  587    23,2546    03525 0                       BVECTOR         BVECTOR (0)
 0040    REF  19   LAST 1143    23,2547    02467 0                       W +540,1
 0041    REF   2   LAST  127    23,2550    12665 1               STORE   ZI +180,2
 0042                           23,2551    77775 1               VLOAD
 0043    REF  23   LAST 1143    23,2552    03533 1                       BVECTOR +6      BVECTOR (1)
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0044                         23,2553   52717 1             MXV*    VAC*
0045    REF  20  LAST 1143   23,2554   02555 0                     W +108D,1
0046    REF   3  LAST 1143   23,2555   75112 1                     Z1 +18D,2
0047    REF   4  LAST 1144   23,2556   12665 1             STORE   Z1 +18D,2
0048                         23,2557   77775 1             VLOAD
0049    REF  24  LAST 1143   23,2560   03541 1                     BVECTOR +12D       BVECTOR (2)
0050                         23,2561   52717 1             MXV*    VAO*
0051    REF  21  LAST 1144   23,2562   02643 1                     W +162D,1
0052    REF   5  LAST 1144   23,2563   75112 1                     Z1 +18D,2          B(0)*W+B(1)*(W+54)+B(2)*(W+108)FIRST PAS
0053    REF   6  LAST 1144   23,2564   12665 1             STORE   Z1 +18D,2          Z1 THEN Z2 THEN Z3
0054                         23,2565   77700 0             TIX,1
0055    REF   1              23,2566   46567 1                     INCOR1
0056                         23,2567   43104 0   INCOR1    TIX,2   BON
0057    REF   1              23,2570   46545 1                     Z123               LOOP FOR Z1,Z2,Z3
0058    REF   3  LAST  589   23,2571   02706 1                     DMENFLG
0059    REF   1              23,2572   46576 1                     INCOR1A
0060                         23,2573   77775 1             VLOAD
0061    REF  16  LAST  915   23,2574   06524 1                     ZEROVECS
0062    REF   7  LAST 1144   23,2575   02657 1             STORE   Z1 +12D
0063                         23,2576   77201 1   INCOR1A   SETPD   VLOAD
0064                         23,2577   00001 0                     0
0065    REF   8  LAST 1144   23,2600   02643 1                     Z1
0066                         23,2601   47036 1             VSQ     RTB
0067    REF   6  LAST  588   23,2602   21634 0                     TPMODE
0068                         23,2603   47515 0             PDVL    VSQ
0069    REF   9  LAST 1144   23,2604   02651 1                     Z1 +6
0070                         23,2605   76234 0             RTB     TAD
0071    REF   7  LAST 1144   23,2606   21634 0                     TPMODE
0072                         23,2607   47515 0             PDVL    VSQ
0073    REF  10  LAST 1144   23,2610   02657 1                     Z1 +12D
0074                         23,2611   76234 0             RTB     TAD
0075    REF   8  LAST 1144   23,2612   21634 0                     TPMODE
0076                         23,2613   77171 0             TAD     AXT,2
0077    REF  11  LAST  588   23,2614   02707 0                     VARIANCE
0078                         23,2615   00000 1                     0
0079    REF   2  LAST  127   23,2616   02665 0             STORE   TRIPA              Z1*2 + Z2*2 + Z3*2 + VARIANCE
0080                         23,2617   40151 0             TLOAD   BOV
0081    REF  12  LAST 1144   23,2620   02707 0                     VARIANCE           CLEAR OVFIND
0082                         23,2621   46622 0                     +1
0083    REF   1              23,2622   02670 1             STORE   TEMPVAR            TEMP STORAGE FOR VARIANCE
0084                         23,2623   77654 0             BZE
0085    REF   1              23,2624   46633 0                     INCOR1C
0086                         23,2625   40112 1   INCOR1B   SL2     BOV
0087    REF   2  LAST 1144   23,2626   46633 0                     INCOR1C
0088    REF   2  LAST 1144   23,2627   02670 1             STORE   TEMPVAR
0089                         23,2630   52114 1             INCR,2  GOTO
0090                         23,2631   00001 0             DEC     1
0091    REF   1              23,2632   46625 1                     INCOR1B
0092                         23,2633   61551 1   INCOR1C   TLOAD   ROUND
0093    REF   3  LAST 1144   23,2634   02665 0                     TRIPA
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 0094                              23,2635   75405 1               DMP     SQRT
 0095    REF    3  LAST 1144       23,2636   02670 1                       TEMPVAR
 0096                              23,2637   76257 0               SL*     TAD
 0097                              23,2640   57576 1                       0,2
 0098    REF    4  LAST 1144       23,2641   02665 0                       TRIPA
 0099                              23,2642   63101 1               NORM    INCR,2
 0100    REF   19  LAST 1010       23,2643   00050 1                       X2
 0101                              23,2644   77775 1               DEC     -2
 0102                              23,2645   77134 1               SXA,2   AXT,2
 0103    REF    2  LAST  115       23,2646   02103 1                       NORMGAM           NORMALIZATION COUNT -2 FOR GAMMA
 0104                              23,2647   00242 0                       1620D
 0105                              23,2650   40265 1               BDDV    SETPD
 0106    REF    7  LAST  915       23,2651   06514 1                       DP1/4TH
 0107                              23,2652   00001 0                       0
 0108    REF    2  LAST  147       23,2653   03500 1               STORE   GAMMA
 0109                              23,2654   60351 0               DLOAD   NORM
 0110    REF    5  LAST 1145       23,2655   02665 0                       TRIPA
 0111    REF   35  LAST 1082       23,2656   00047 1                       X1
 0112                              23,2657   65345 0               DLOAD   PDDL              PD 0-1 = NORM (A)
 0113    REF  734  LAST 1139       23,2660   00155 0                       MPAC
 0114    REF    8  LAST  588       23,2661   03547 1                       DELTAQ
 0115                              23,2662   77701 1               NORM
 0116    REF   15  LAST 1143       23,2663   00051 0                       S1
 0117                              23,2664   70460 1               XSU,1   SR1
 0118    REF   16  LAST 1145       23,2665   00050 1                       S1
 0119                              23,2666   41471 0               DDV     PUSH              PD 0-1 = DELTAQ/A
 01193                             23,2667   77650 1               GOTO
 01196   REF    1                  23,2670   45711 1                       NEWZCOMP
 0120                              23,2671   77731 1       -3      SSP
 0121    REF   15  LAST 1143       23,2672   00052 0                       S2
 0122                              23,2673   00066 1                       54D
 0123                              23,2674   60775 1   INCOR2      VLOAD   VXM*              COMPUTE OMEGA1,2,3
 0124    REF   11  LAST 1144       23,2675   02643 1                       ZI
 0125    REF   22  LAST 1144       23,2676   75134 0                       W +1620,2
 0126                              23,2677   77206 0               PUSH    VLOAD
 0127    REF   12  LAST 1145       23,2700   02651 1                       ZI +6
 0128                              23,2701   53303 1               VXM*    VAD
 0129    REF   23  LAST 1145       23,2702   75112 1                       W +1800,2
 0130                              23,2703   77206 0               PUSH    VLOAD
 0131    REF   13  LAST 1145       23,2704   02657 1                       ZI +12D
 0132                              23,2705   53303 1               VXM*    VAD
 0133    REF   24  LAST 1145       23,2706   75070 1                       W +1980,2
 0134                              23,2707   61006 0               PUSH    TIX,2             PD 2-7=OMEGA1,8-13=OMEGA2,14-19=OMEGA3
 0135    REF    1                  23,2710   46674 0                       INCOR2
 0136                              23,2711   45575 1               VLOAD   STADR
 0137    REF    2  LAST  147       23,2712   74260 0               STORE   OMEGA +12D
 0138                              23,2713   45575 1               VLOAD   STADR
 0139    REF    3  LAST 1145       23,2714   74266 0               STORE   OMEGA +6
 0140                              23,2715   45575 1               VLOAD   STADR
 0141    REF    4  LAST 1145       23,2716   74274 0               STORE   OMEGA
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L        MEASUREMENT INCORPORATION                                                    USER'S PAGE NO.   4      E5 S3

 0142                          23,2717   77214 0          BON     VLOAD
 0143   REF   4  LAST 1144     23,2720   02706 1                  DMENFLG
 0144   REF   1                23,2721   46724 1                  INCOR2AB
 0145   REF  17  LAST 1144     23,2722   06524 1                  ZEROVECS
 0146   REF   5  LAST 1145     23,2723   03517 1          STORE   OMEGA +12D
 0147                          23,2724   66374 1 INCOR2AB AXT,2   SSF
 0148                          23,2725   00022 1                  18D
 0149   REF  16  LAST 1145     23,2726   00052 0                  S2
 0150                          23,2727   00006 1                  6
 0151                          23,2730   77773 1 INCOR3   VLOAD*
 0152   REF   6  LAST 1146     23,2731   74252 1                  OMEGA +18D,2
 0153                          23,2732   53761 1          VXSC    VSL*
 0154                          23,2733   00001 0                  0                DELTAQ/A
 0155                          23,2734   20201 0                  0,1
 0156   REF   5  LAST  592     23,2735   12707 1          STORE   DELTAX +18D,2
 0157                          23,2736   77304 0          TIX,2   VLOAD
 0158   REF   1                23,2737   46730 1                  INCOR3
 0159   REF   6  LAST 1146     23,2740   02673 1                  DELTAX +6
 0160                          23,2741   77732 1          VSL3
 0161   REF   7  LAST 1146     23,2742   02673 1          STORE   DELTAX +6
 0162                          23,2743   77650 1          GOTO
 0163   REF   3  LAST 1143     23,2744   02772 1                  EGRESS
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R0164    INCORP2 -INCORPORATES THE COMPUTED STATE VECTOR DEVIATIONS INTO THE
R0165   ESTIMATED STATE VECTOR. THE STATE VECTOR UPDATED MAY BE FOR EITHER THE
R0166   LEM OR THE CSM.DETERMINED BY FLAG VEHUPFLG.(ZERO = LEM) (1 = CSM)
R0167   INPUT
R0168      PERMANENT STATE VECTOR FOR EITHER THE LEM OR CSM
R0169      VEHUPFLG = UPDATE VEHICLE 0=LEM  1=CSM
R0170      W =          ERROR TRANSITION MATRIX
R0171      DELTAX  =  COMPUTED STATE VECTOR DEVIATIONS
R0172      OMEGFLG =  SIZE OF W MATRIX (ZERO =6X6) (1=9X9)
R0173      GAMMA   =  SCALAR FOR INCORPORATION
R0174      ZI      =  VECTOR USED IN INCORPORATION
R0175      OMEGA   =  WEIGHTING VECTOR

R0176   OUTPUT
R0177      UPDATED PERMANENT STATE VECTOR

R0178   CALLING SEQUENCE
R0179      L  CALL INCORP2

R0180   NORMAL EXIT
R0181      L+1 OF CALLING SEQUENCE

 0182   REF    1                23,2000                       SETLOC MEASINC1
 0183                           23,2745                       BANK

 0184   REF    2 LAST 1143 TO 1147:   138   138*              COUNT* $$/INCOR

 0185                           23,2745   45020 1  INCORP2    STQ    CALL
 0186   REF    4  LAST 1146     23,2746   02772 1                    EGRESS
 0187   REF   27  LAST  782     23,2747   27410 1                    INTSTALL
 0188                           23,2750   74375 0             VLOAD  VXSC              CALC. GAMMA * OMEGA1,2,3
 0189   REF    7  LAST 1146     23,2751   03503 1                    OMEGA
 0190   REF    3  LAST 1145     23,2752   03500 1                    GAMMA
 0191   REF    2  LAST  127     23,2753   26713 0             STOVL  OMEGAM1
 0192   REF    8  LAST 1147     23,2754   03511 1                    OMEGA +6
 0193                           23,2755   77761 1             VXSC
 0194   REF    4  LAST 1147     23,2756   03500 1                    GAMMA
 0195   REF    2  LAST  127     23,2757   26721 1             STOVL  OMEGAM2
 0196   REF    9  LAST 1147     23,2760   03517 1                    OMEGA +120
 0197                           23,2761   77761 1             VXSC
 0198   REF    5  LAST 1147     23,2762   03500 1                    GAMMA
 0199   REF    2  LAST  127     23,2763   02727 1             STORE  OMEGAM3
 0200                           23,2764   77776 1             EXIT
 0201   REF    1                23,2765  3 3246 1             CAF    5400              INITIAL IX 1 SETTING FOR W MATRIX
 0202   REF    1                23,2766  55'315 0             TS     WIXA
 0203   REF    1                23,2767  55'316 0             TS     WIXB
 0204   REF  225  LAST 1122     23,2770  3 4755 1             CAF    ZERO
 0205   REF    1                23,2771  55'317 1             TS     ZIXA              INITIAL IX 2 SETTING FOR Z COMPONENT
 0206   REF    1                23,2772  55'320 0             TS     ZIXB
 0207   REF  103  LAST  974     23,2773  0 5353 1  FAZA       TC     PHASCHNG
 0208                           23,2774   04022 0               OCT     04022
 0209     REF  67  LAST  977    23,2775   05504 0               TC      UPFLAG
 0210     REF   2  LAST  713    23,2776   00236 0               ADRES   REINTFLG
 0212     REF   2  LAST 1147    23,2777   31316 1   FAZA1       CA      WIXB                START FIRST PHASE OF INCORP2
 0213     REF   2  LAST 1147    23,3000   55315 0               TS      WIXA                 TO UPDATE 6 OR 9 DIM. W MATRIX IN TEMP
 0214     REF   2  LAST 1147    23,3001   31320 1               CA      ZIXB
 0215     REF   2  LAST 1147    23,3002   55317 1               TS      ZIXA
 0216     REF 219  LAST 1017    23,3003   06042 1               TC      INTPRET
 0217                           23,3004   73150 1               LXA,1   LXA,2
 0218     REF   3  LAST 1148    23,3005   01315 1                       WIXA
 0219     REF   3  LAST 1148    23,3006   01317 0                       ZIXA
 0220                           23,3007   70731 0               SSP     DLOAD*
 0221     REF  17  LAST 1145    23,3010   00051 0                       S1
 0222                           23,3011   00006 1                       6
 0223     REF  14  LAST 1145    23,3012   75134 0                       ZI,2
 0224                           23,3013   60276 1               DCOMP   NORM                CALC UPPER 3X9 PARTITION OF W MATRIX
 0225     REF  17  LAST 1146    23,3014   00052 0                       S2
 0226                           23,3015   65161 1               VXSC    XCHX,2
 0227     REF   3  LAST 1147    23,3016   02713 0                       OMEGAM1
 0228     REF  18  LAST 1148    23,3017   00051 0                       S2
 0229                           23,3020   57144 1               LXC,2   XAD,2
 0230     REF  20  LAST 1145    23,3021   00047 1                       X2
 0231     REF   3  LAST 1145    23,3022   02103 1                       NORMGAM
 0232                           23,3023   65057 0               VSL*    XCHX,2
 0233                           23,3024   57576 1                       0,2
 0234     REF  19  LAST 1148    23,3025   00051 0                       S2
 0235                           23,3026   77653 1               VAD*
 0236     REF  25  LAST 1145    23,3027   02467 0                       W +540,1
 0237     REF   2  LAST  127    23,3030   02735 1               STORE   HOLDW
 0238                           23,3031   57543 1               DLOAD*  DCOMP               CALC MIDDLE 3X9 PARTITION OF W MATRIX
 0239     REF  15  LAST 1148    23,3032   75134 0                       ZI,2
 0240                           23,3033   74301 0               NORM    VXSC
 0241     REF  20  LAST 1148    23,3034   00052 0                       S2
 0242     REF   3  LAST 1147    23,3035   02721 1                       OMEGAM2
 0243                           23,3036   71124 0               XCHX,2  LXC,2
 0244     REF  21  LAST 1148    23,3037   00051 0                       S2
 0245     REF  21  LAST 1148    23,3040   00047 1                       X2
 0246                           23,3041   53674 1               XAD,2   VSL*
 0247     REF   4  LAST 1148    23,3042   02103 1                       NORMGAM
 0248                           23,3043   57576 1                       0,2
 0249                           23,3044   52724 1               XCHX,2  VAD*
 0250     REF  22  LAST 1148    23,3045   00051 0                       S2
 0251     REF  26  LAST 1148    23,3046   02555 0                       W +1080,1
 0252     REF   3  LAST 1148    23,3047   02743 0               STORE   HOLDW +6
 0253                           23,3050   77614 1               BOFF
 0254     REF   5  LAST 1146    23,3051   02746 0                       DMENFLG             BRANCH IF 6 DIMENSIONAL
 0255     REF   1               23,3052   47072 1                       FAZB
 0256                           23,3053   57543 1               DLOAD*  DCOMP               CALC LOWER 3X9 PARTITION OF W MATRIX
 0257     REF  16  LAST 1148    23,3054   75134 0                       ZI,2
 0258                           23,3055   74301 0               NORM    VXSC
 0259  REF  23  LAST 1148   23,3056   00052 0                   S2
 0260  REF   3  LAST 1147   23,3057   02727 1                   OMEGAM3
 0261                       23,3060   71124 0          XCHX,2   LXC,2
 0262  REF  24  LAST 1149   23,3061   00051 0                   S2
 0263  REF  22  LAST 1148   23,3062   00047 1                   X2
 0264                       23,3063   53674 1          XAD,2    VSL*
 0265  REF   5  LAST 1148   23,3064   02103 1                   NORMGAM
 0266                       23,3065   57576 1                   0,2
 0267                       23,3066   52724 1          XCHX,2   VAD*
 0268  REF  25  LAST 1149   23,3067   00051 0                   S2
 0269  REF  27  LAST 1148   23,3070   02643 1                   W +1620,1
 0270  REF   4  LAST 1148   23,3071   02751 0          STORE    HOLDW +12D
 0271                       23,3072   77624 1  FAZ8    CALL
 0272  REF  16  LAST  585   23,3073   11210 1                   GRP2PC
 0273                       23,3074   77776 1          EXIT
 0274  REF   4  LAST 1148   23,3075  3 1315 1  FAZ81   CA       WIXA          START 2ND PHASE OF INCORP2 TO TRANSFER
 0275  REF   1              23,3076  6 3247 0          AD       6DD              TEMP REG TO PERM W MATRIX
 0276  REF   3  LAST 1148   23,3077   55'316 0         TS       WIXB
 0277  REF   4  LAST 1148   23,3100  3 1317 0          CA       ZIXA
 0278  REF   2  LAST  221   23,3101  6 7751 0          AD       MINUS2
 0279  REF   3  LAST 1148   23,3102   55'320 0         TS       ZIXB
 0280  REF 220  LAST 1148   23,3103  0 6042 1          TC       INTPRET
 0281                       23,3104   66350 1          LXA,1    SSP
 0282  REF   5  LAST 1149   23,3105   01315 1                   WIXA
 0283  REF  18  LAST 1148   23,3106   00051 0                   S1
 0284                       23,3107   00006 1                   6
 0285                       23,3110   77775 1          VLOAD
 0286  REF   5  LAST 1149   23,3111   02735 1                   HOLDW
 0287  REF  28  LAST 1149   23,3112   06467 1          STORE    W +540,1
 0288                       23,3113   77775 1          VLOAD
 0289  REF   6  LAST 1149   23,3114   02743 0                   HOLDW +6
 0290  REF  29  LAST 1149   23,3115   06555 1          STORE    W +1080,1
 0291                       23,3116   77214 0          BOFF     VLOAD
 0292  REF   6  LAST 1148   23,3117   02746 0                   OMENFLG
 0293  REF   1              23,3120   47130 0                   FAZB5
 0294  REF   7  LAST 1149   23,3121   02751 0                   HOLDW +12D
 0295  REF  30  LAST 1149   23,3122   06643 0          STORE    W +1620,1
 0296                       23,3123   52100 1  FAZB2   TIX,1    GOTO
 0297                       23,3124   47126 1                   +2
 0298  REF   1              23,3125   47136 0                   FAZC          DONE WITH W MATRIX. UPDATE STATE VECTOR
 0299                       23,3126   77634 0          RTB
 0300  REF   1              23,3127   46773 0                   FAZA
 0301                       23,3130   43335 0  FAZB5   SLOAD    OAO
 0302  REF   4  LAST 1149   23,3131   01321 0                   ZIXB
 0303  REF   1              23,3132   07251 0                   1200
 0304                       23,3133   52030 0          BHIZ     GOTO
 0305  REF   2  LAST 1149   23,3134   47136 0                   FAZC
 0306  REF   1              23,3135   47123 1                   FAZB2
 0307                       23,3136   77624 1  FAZC    CALL
 0308  REF  17  LAST 1149   23,3137   11210 1                   GRP2PC
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0309                           23,3140  53375 0            VLOAD   VAD              START 3RD PHASE OF INCORP2
0310   REF   4  LAST  588      23,3141  01701 0                    X789             7TH,8TH,9TH,COMPONENT OF STATE VECTOR
0311   REF   8  LAST 1146      23,3142  02701 0                    DELTAX +12D      INCORPORATION FOR X789
0312   REF   2  LAST  147      23,3143  03472 0            STORE   TX789
0313                           23,3144  47014 1            BON     RTB
0314   REF  12  LAST  537      23,3145  00707 1                    VEHUPFLG
0315   REF   1                 23,3146  47236 0                    DOCSM
0316   REF   1                 23,3147  26767 0                    MOVEPLEM
0317                           23,3150  77004 0  FAZAB     BOVB    AXT,2
0318   REF   2  LAST  571      23,3151  57754 0                    TCDANZIG
0319                           23,3152  00000 1                    0
0320                           23,3153  77014 1            BOFF    AXT,2
0321   REF   5  LAST  719      23,3154  04344 0                    MOONTHIS
0322                           23,3155  47157 1                    +2
0323                           23,3156  00002 0                    2
0324                           23,3157  53775 1            VLOAD   VSR*
0325   REF   9  LAST 1150      23,3160  02665 0                    DELTAX           B27 IF MOON ORBIT, B29 IF EARTH
0326                           23,3161  57205 1                    0 -7,2
0327                           23,3162  40055 0            VAD     BOV
0328   REF   4  LAST  323      23,3163  01521 0                    TDELTAV
0329   REF   1                 23,3164  47176 1                    FAZAB1
0330   REF   5  LAST 1150      23,3165  25521 0            STOVL   TDELTAV
0331   REF  10  LAST 1150      23,3166  02673 1                    DELTAX +6        B5 IF MOON ORBIT, B7 IF EARTH
0332                           23,3167  53257 1            VSR*    VAD
0333                           23,3170  57202 0                    0 -4,2
0334   REF   4  LAST  323      23,3171  01527 0                    TNUV
0335                           23,3172  77600 1            BOV
0336   REF   1                 23,3173  47202 1                    FAZAB2
0337   REF   5  LAST 1150      23,3174  35527 1            STCALL  TNUV
0338   REF   1                 23,3175  47211 0                    FAZAB3
0339                           23,3176  53375 0  FAZAB1    VLOAD   VAD
0340   REF  13  LAST  783      23,3177  01535 0                    RCV
0341   REF  11  LAST 1150      23,3200  02665 0                    DELTAX
0342   REF  14  LAST 1150      23,3201  01535 0            STORE   RCV
0343                           23,3202  53375 0  FAZAB2    VLOAD   VAD
0344   REF  11  LAST  783      23,3203  01543 1                    VCV
0345   REF  12  LAST 1150      23,3204  02673 1                    DELTAX +6
0346   REF  12  LAST 1150      23,3205  01543 1            STORE   VCV
0347                           23,3206  45134 0            SXA,2   CALL
0348   REF   4  LAST  299      23,3207  02030 0                    PBODY
0349   REF   1                 23,3210  27671 1                    RECTIFY
03491                          23,3211  77624 1  FAZAB3    CALL
03492  REF  18  LAST 1149      23,3212  11210 1                    GRP2PC
0350                           23,3213  47014 1            BON     RTB
0351   REF  13  LAST 1150      23,3214  00707 1                    VEHUPFLG
0352   REF   1                 23,3215  47241 0                    DOCSM1
0353   REF   2  LAST   37      23,3216  26746 0                    MOVEALEM
0354                           23,3217  77624 1            CALL
0355   REF   1                 23,3220  26070 1                    SVDWN2           STORE DOWNLINK STATE VECTOR
0356                           23,3221  77624 1  FAZAB4    CALL
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L        MEASUREMENT INCORPORATION                                                              USER'S PAGE NO.   9        E5 S3

 0357  REF  19  LAST 1150    23,3222   11210 1                   GRP2PC          PHASE CHANGE
 0358                        23,3223   77214 0            BOFF   VLOAD
 0359  REF   7  LAST 1149    23,3224   02746 0                   OMENFLG
 0360  REF   1               23,3225   47230 0                   FAZAB5          6 DIMENSIONAL
 0361  REF   3  LAST 1150    23,3226   03472 0                   TX789           9 DIMENSIONAL
 0362  REF   5  LAST 1151    23,3227   01701 0            STORE  X789
 0363                        23,3230   66150 0  FAZAB5    LXA,1  SXA,1
 0364  REF   5  LAST 1147    23,3231   02772 1                   EGRESS
 0365  REF  11  LAST 1085    23,3232   00052 0                   QPRET
 0366                        23,3233   77776 1            EXIT
 0367  REF  56  LAST  862    23,3234   04635 0            TC     POSTJUMP        EXIT
 0368  REF   3  LAST  616    23,3235   27421 0            CADR   INTWAKE
 0369                        23,3236   52034 1  DOCSM     RTB    GOTO
 0370  REF   1               23,3237   26722 1                   MOVEPCSM
 0371  REF   1               23,3240   47150 0                   FAZAB
 0372                        23,3241   45034 1  DOCSM1    RTB    CALL
 0373  REF   1               23,3242   26673 1                   MOVEACSM
 0374  REF   2  LAST  299    23,3243   26114 1                   SVDWN1          STORE DOWNLINK STATE VECTOR
 0375                        23,3244   77650 1            GOTO
 0376  REF   1               23,3245   47221 0                   FAZAB4
 0377  REF  18  LAST 1146    23,2523            ZEROO     =      ZEROVECS
 0378                        23,3246   00066 1  54DD      DEC    54
 0379                        23,3247   77771 0  6DD       DEC    -6
 0380                        23,3250   00014 1  12DD      DEC    12
 0400  REF   1               22,2000                      SETLOC RENDEZ
 0401                        22,3711                      BANK
 0402  REF   1                                            COUNT* $$/INCOR

 0403                        22,3711   51575 1  NEWZCOMP  VLOAD  ABVAL
 0404  REF  17  LAST 1148    22,3712   02643 1                   ZI
 0405  REF   1               22,3713   24045 0            STOVL  NORMZI
 0406  REF  18  LAST 1151    22,3714   02651 1                   ZI +6
 0407                        22,3715   41446 1            ABVAL  PUSH
 0408                        22,3716   50025 0            DSU    BMN
 0409  REF   2  LAST 1151    22,3717   00045 0                   NORMZI
 0410                        22,3720   45723 0                   +3
 0411                        22,3721   45545 1            DLOAD  STADR
 0412  REF   3  LAST 1151    22,3722   77732 1            STORE  NORMZI
 0413                        22,3723   51575 1            VLOAD  ABVAL
 0414  REF  19  LAST 1151    22,3724   02657 1                   ZI +12D
 0415                        22,3725   45206 1            PUSH   DSU
 0416  REF   4  LAST 1151    22,3726   00045 0                   NORMZI
 0417                        22,3727   71240 1            BMN    DLOAD
 0418                        22,3730   45733 1                   +3
 0419                        22,3731   77626 0            STADR
 0420  REF   5  LAST 1151    22,3732   77732 1            STORE  NORMZI          LARGEST ABVAL
 0421                        22,3733   66145 1            DLOAD  SXA,1
 0422  REF   6  LAST 1151    22,3734   00045 0                   NORMZI
 0423  REF   7  LAST 1151    22,3735   00044 1                   NORMZI          SAVE X1
 0424                        22,3736   62101 0            NORM   INCR,1
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0425   REF  36  LAST 1145   22,3737   00047 1                      XI
0426                        22,3740   00002 0             DEC      2
0427                        22,3741   53775 1             VLOAD    VSL*
0428   REF  20  LAST 1151   22,3742   02643 1                      ZI
0429                        22,3743   20201 0                      0,1
0430   REF  21  LAST 1152   22,3744   26643 1             STOVL    ZI
0431   REF  22  LAST 1152   22,3745   02651 1                      ZI +6
0432                        22,3746   77657 0             VSL*
0433                        22,3747   20201 0                      0,1
0434   REF  23  LAST 1152   22,3750   26651 1             STOVL    ZI +6
0435   REF  24  LAST 1152   22,3751   02657 1                      ZI +120
0436                        22,3752   66057 0             VSL*     SXA,1
0437                        22,3753   20201 0                      0,1
0438   REF   8  LAST 1151   22,3754   00045 0                      NORMZI +1        SAVE SHIFT
0439   REF  25  LAST 1152   22,3755   02657 1             STORE    ZI +120
0440                        22,3756   54150 1             LXA,1    XSU,1
0441   REF   6  LAST 1149   22,3757   02103 1                      NORMGAM
0442   REF   9  LAST 1152   22,3760   00045 0                      NORMZI +1
0443                        22,3761   77660 1             XSU,1
0444   REF  10  LAST 1152   22,3762   00045 0                      NORMZI +1
0445                        22,3763   70130 1             SXA,1    LXC,1
0446   REF   7  LAST 1152   22,3764   02103 1                      NORMGAM
0447   REF  11  LAST 1152   22,3765   00045 0                      NORMZI +1
0448                        22,3766   40270 0             XAD,1    SETPD
0449   REF  12  LAST 1152   22,3767   00044 1                      NORMZI
0450                        22,3770   00003 1                      20
0451                        22,3771   77650 1             GOTO
0452   REF   2  LAST 1145   22,3772   46671 0                      INCOR2 -3
0453                           0044            NORMZI     =        360
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L       CONIC SUBROUTINES                                                       USER'S PAGE NO.   1       EO S3

P0001   PROGRAM DESCRIPTION - ENTIRE CONIC SUBROUTINE LOG SECTION                  DATE - 1 SEPTEMBER 1967
R0003   MOD NO. - 0                                                                LOG SECTION - CONIC SUBROUTINES
R0005   MOD BY KRAUSE                                                              ASSEMBLY - COLOSSUS REVISION 88
R0007


R0008   FUNCTIONAL DESCRIPTION -

R0009        THE FOLLOWING SET OF SUBROUTINES SOLVE VARIOUS PROBLEMS INVOLVING THE TRAJECTORY PRODUCED BY A CENTRAL
R0011   INVERSE-SQUARE FORCE ACTING ON A POINT MASS, AS OUTLINED IN THE CMC AND LGC LUNAR LANDING MISSION GSOP, SECTION
R0013   5.5.1.2.  A GENERAL USAGE POINT-OF-VIEW WAS TAKEN IN FORMULATING, MECHANIZING, AND SCALING THE SUBROUTINES,
R0015   RATHER THAN OPTIMIZING EACH FOR A PARTICULAR USE.  THEREFORE, MULTIPLE USAGE CAN BE MADE OF THE SUBROUTINES
R0017   INVOLVING ANY REALISTIC SET OF CONSTRAINTS.  IT SHOULD BE NOTED THAT ONLY ONE SET OF CODING IS USED, WHETHER THE
R0019   EARTH, MOON, OR ANY OTHER CELESTIAL BODY IS SPECIFIED AS THE CENTRAL BODY OF THE PROBLEM, PROVIDED ONE OBSERVES
R0021   THE INHERENT SCALE CHANGE REQUIRED IN POSITION, VELOCITY, MU, AND TIME, AS OUTLINED IN MISSION PROGRAMMING
R0023   DEFINITION MEMO NO. 10.  THIS CAN BE ACCOMPLISHED BY SIMPLY ADDING TO THE MUTABLE AND INITIALIZING THE SUBROU-
R0025   TINES APPROPRIATELY.
R0026        DUE TO THE UNIFORMITY OF THE EQUATIONS INVOLVED, CODING WAS MINIMIZED BY TREATING INDIVIDUAL EQUATIONS AND
R0028   BLOCKS OF EQUATIONS AS SUBROUTINES OF LOWER RANK WHENEVER POSSIBLE.  AS A RESULT, THREE BY-PRODUCTS SUBROUTINES,
R0030   DIRECTLY USABLE AS INDEPENDENT SUBROUTINES, WERE GENERATED.


R0031   RESTRICTIONS -

R0032        THE ONLY LIMITATION IN THE SCOPE OF PROBLEM WHICH CAN BE SOLVED BY A PARTICULAR SUBROUTINE IS THE SCALING
R0034   LIMIT OF EACH PARAMETER AS SPECIFIED IN THE GSOP.  THESE SCALING LIMITS WERE CHOSEN SO THAT ALL FEASIBLE TRAJEC-
R0036   TORIES COULD BE HANDLED.
R0037        SINCE THE SUBROUTINES (EXCEPT KEPLER) USE COMMON SUBROUTINES OF LOWER RANK WHICH USE ERASABLE OTHER THAN
R0039   THE PUSHLIST (DUE TO ITS LIMITED SIZE) AND COMMON INTERPRETIVE SWITCHES, THE CONIC SUBROUTINES CANNOT BE ALLOWED
R0041   TO INTERRUPT EACH OTHER.  IT IS UP TO THE USER TO GUARANTEE THIS CONDITION.
R0043
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R0044    PROGRAM DESCRIPTION - KEPLER SUBROUTINE                                      DATE - 11 OCTOBER 1967
R0046    MOD NO. -1                                                                            LOG SECTION - CONIC SUBROUTINES
R0048    MOD BY KRAUSE                                                                ASSEMBLY - COLOSSUS 103 AND SUNDANCE 222
R0050    MOD NO. - 2  (AUGUST 1968) BY ROBERTSON: TO PERMIT BACKDATING BY MORE THAN ONE ORBITAL PERIOD.


R00502   MOD NO. - 3  (DEC 1968) BY ROBERTSON: SUPPRESSION OF X-MODULO-ING


R00503   MOD. NO. - 4  (JAN 1969) BY ROBERTSON: CLEAR OVFIND AT KEPLER ENTRY


R0051    FUNCTIONAL DESCRIPTION -
R0052         THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND THE DESIRED TRANSFER TIME THROUGH WHICH THE STATE IS TO
R0054    BE UPDATED ALONG A CONIC TRAJECTORY, COMPUTES THE NEW, UPDATED STATE VECTOR.  THE TRAJECTORY MAY BE ANY CONIC
R0056    SECTION - CIRCULAR, ELLIPTIC, PARABOLIC, HYPERBOLIC, OR RECTILINEAR WITH RESPECT TO THE EARTH OR THE MOON.  THE
R0058    USE OF THE SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT
R0060    INTRODUCING ANY CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.  AN ITERA-
R0062    TION TECHNIQUE IS UTILIZED IN THE COMPUTATION.
R0063         IF A NEGATIVE TIME-OF-FLIGHT IS INPUT, THE PROGRAM WILL SOLVE FOR THE STATE WHICH WOULD BE PRODUCED BY
R0065    EXTRAPOLATING THE POSITION BACKWARD IN TIME.
R00651        IF THE ABSOLUTE VALUE OF THE DESIRED TRANSFER TIME EXCEEDS THE ORBITAL PERIOD, THE SUBROUTINE, THROUGH A
R00653   MODULAR TECHNIQUE, WILL COMPUTE THE STATE CORRESPONDING TO THE DESIRED TIME (WHETHER POSITIVE OR NEGATIVE).
R0066

R0067    THE RESTRICTIONS ARE -
R0068         1. (PREVIOUS RESTRICTION ON THE NEGATIVE DESIRED TRANSFER TIME IS NOW DELETED.)
R0071         2.  THE PARAMETERS IN THE PROBLEM CANNOT EXCEED THEIR SCALING LIMITS AS SPECIFIED IN THE GSOP.  IF
R0073    ANY OF THESE LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0075

R0076         THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATION SPEED IS DEPENDENT ON THE ACCURACY OF THE
R0078    GUESS, XKEPNEW.  THE AGC COMPUTATION TIME IS APPROXIMATELY .061 SECONDS FOR INITIALIZATION, .065 SECONDS FOR THE
R0080    FINAL COMPUTATIONS, PLUS .083 SECONDS FOR EACH ITERATION.
R0081


R0082    REFERENCES -
R0083         R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP, SECTION 5.5, SGA
R0085    MEMO 67-4.
R0086


R0087    INPUT - ERASABLE INITIALIZATION REQUIRED

R0088            * SCALE FACTOR *
R0089    VARIABLE*IN POWERS OF 2*                                 DESCRIPTION AND REMARKS
R0090    --------*---------------*                                -----------------------
R0091    RRECT   * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0092            * +27 FOR MOON *
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R0093   VRECT    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0094            * +5 FOR MOON  *
R0095   X1 (38D)* NONE          *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0097            *              *RESPECTIVELY, IS THE CENTRAL BODY
R0098   TAU.     * +28          *DESIRED TRANSFER TIME IN CENTISECONDS (DP)
R00987           *              *     MAY BE POS OR NEG AND ABSOLUTE VALUE MAY BE GREATER OR LESS THAN ONE ORBITAL PERIOD.
R0099   XKEPNEW * +17 FOR EARTH*DP GUESS OF ROOT X OF KEPLERS EQN IN SQRT(METERS). SIGN SHOULD AGREE WITH THAT OF TAU.
R0100            * +16 FOR MOON *     AND ABS VALUE SHOULD BE LESS THAN THAT CORRESPONDING TO A PERIOD,VIZ, 2PI SQRT(SEMI-
R0101            *              *     MAJOR AXIS),FOR SPEED OF CONVERGENCE,BUT IF EITHER CONDITION FAILS, XKEPNEW IS RESET
R01017           *              *     BY KEPLER TO A POOR BUT VALID GUESS.
R0102   TC       * +28          *DP PREV. VALUE OF TIME IN CENTISECS.  MUST BE LESS THAN ONE ORBITAL PERIOD.
R0103   XPREV    * +17 FOR EARTH*DP PREV. VALUE OF X IN SQRT(METERS).  MUST BE LESS THAN AN X CORRESPONDING TO ONE
R0105            * +16 FOR MOON *     ORBITAL PERIOD,VIZ,2PI SQRT(SEMI-MAJOR AXIS)
R0106


R0107   SUBROUTINES CALLED -
R0108        GETTIME
R0109


R0110   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0111   KEPRTN-2 GOTO                      MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0113   KEPRTN-1          KEPLER           RETURNS WITH XPREV IN MPAC. PL IS AT 0.
R0114   KEPRTN    ...                      CONTINUE

R0115   KEPLER MUST NOT BE CALLED DIRECTLY SINCE AN INTERRUPTION OF IT WOULD DESTROY THE ERASABLES IT NEEDS TO COMPLETE
R0117   THE INTERRUPTED JOB.  THEREFORE THE USER MUST CALL CSMCONIC OR LEMCONIC WHICH GUARANTEES NO INTERRUPTS AND WHICH
R0119   ALSO CALLS KEPPREP TO COMPUTE A GUESS OF XKEPNEW.
R0120


R0121   ABORT EXIT MODES -
R0122        NONE
R0123


R0124   OUTPUT -

R0125            * SCALE FACTOR *
R0126   VARIABLE* IN POWERS OF 2*                            DESCRIPTION AND REMARKS
R0127   --------*---------------*                            -----------------------
R0128   RCV      * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS
R0129            * +27 FOR MOON *
R0130   VCV      * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC
R0131            * +5 FOR MOON  *
R0132   TC       * +28          *DP TRANSFER TIME IN CENTISECS TO WHICH KEPLER CONVERGED. ALWAYS LESS THAN ONE PERIOD.
R0134   XPREV    * +17 FOR EARTH*DP VALUE OF X IN SQRT(METERS) TO WHICH KEPLER CONVERGED. ALWAYS LESS THAN THE X
R0136            * +16 FOR MOON *     CORRESPONDING TO ONE PERIOD.
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R0137   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0138


R0139   DEBRIS -

R0140        PARAMETERS WHICH MAY BE OF USE -

R0141           * SCALE FACTOR *
R0142   VARIABLE*IN POWERS OF 2*                         DESCRIPTION AND REMARKS
R0143   --------*--------------*                         -----------------------
R0144   URRECT  * +1           *DP UNIT VECTOR OF INITIAL POSITION
R0145   R1      * +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION IN METERS
R0146           * +27 FOR MOON *
R0147   ALPHA   * -22 FOR EARTH*DP INVERSE OF SEMIMAJOR AXIS IN 1/METERS
R0148           * -20 FOR MOON *
R01481  TMODULO * +28          *DP INTEGRAL NUMBER OF PERIODS IN  CENTISECS. WHICH WAS SUBTRACTED FROM TAU. TO PRODUCE A
R01483          *              *TAU. OF LESS THAN ONE PERIOD.

R0149        PARAMETERS OF NO USE -
R0150   DP PARAMETERS - EPSILONT, DELX, DELT, RCNORM, XMODULO, PLUS PUSHLIST REGISTERS 0 THROUGH 39D.
R0152
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R0153    PROGRAM DESCRIPTION - LAMBERT SUBROUTINE                                    DATE - 1 SEPTEMBER 1967
R0155    MOD NO. - 0                                                                 LOG SECTION - CONIC SUBROUTINES
R0157    MOD BY KRAUSE                                                               ASSEMBLY - COLOSSUS REVISION 88
R0159


R0160    FUNCTIONAL DESCRIPTION -

R0161          THIS SUBROUTINE CALCULATES THE INITIAL VELOCITY REQUIRED TO TRANSFER A POINT-MASS ALONG A CONIC TRAJECTORY
R0163    FROM AN INITIAL POSITION TO A TERMINAL POSITION IN A PRESCRIBED TIME INTERVAL.  THE RESULTING TRAJECTORY MAY BE
R0165    A SECTION OF A CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE
R0167    SUBROUTINE CAN BE EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY
R0169    CODING CHANGES, ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.  AN ITERATION TECHNIQUE IS
R0171    UTILIZED IN THE COMPUTATION.
R0172

R0173    THE RESTRICTIONS ARE -
R0174          1. RECTILINEAR TRAJECTORIES CANNOT BE COMPUTED.
R0175          2. AN ACCURACY DEGRADATION OCCURS AS THE COSINE OF THE TRUE ANOMALY DIFFERENCE APPROACHES +1.0.
R0177          3. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0179    AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0180          4. NEGATIVE TRANSFER TIME IS AMBIGUOUS AND WILL RESULT IN NO SOLUTION.
R0182          5. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE
R0184    LIMITS ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R0185          THE NUMBER OF ITERATIONS AND, THEREFORE, THE COMPUTATIONS SPEED IS DEPENDENT ON THE ACCURACY OF THE FIRST
R0187    GUESS OF THE INDEPENDENT VARIABLE, COGA.                                    THE AGC COMPUTATION TIME IS APPROXIMATE-
R0189    LY .105 SECONDS FOR INITIALIZATION, .069 SECONDS FOR FINAL COMPUTATIONS, PLUS .205 SECONDS FOR EACH ITERATION.
R0191


R0192    REFERENCES -
R0193          R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8,
R0195    SGA MEMO 67-4.
R0196


R0197    INPUT - ERASABLE INITIALIZATION REQUIRED

R0198             * SCALE FACTOR *
R0199    VARIABLE* IN POWERS OF 2*                    DESCRIPTION AND REMARKS
R0200    ---------*-----------------*                 -----------------------
R0201    R1VEC    * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0202             * +27 FOR MOON  *
R0203    R2VEC    * +29 FOR EARTH*DP TARGET OR TERMINAL POSITION VECTOR IN METERS
R0204             * +27 FOR MOON  *
R0205    TDESIRED* +28           *DP DESIRED TRANSFER TIME IN CENTISECONDS
R0206    X1 (38D)* NONE          *INDEX REGISTER SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0208             *              *RESPECTIVELY, IS THE CENTRAL BODY
R0209    GEOMSGN * NONE          *SP +.5 IF DESIRED TRANSFER ANGLE IS LESS THAN 180 DEGREES, -.5 IF GREATER THAN 180 DEG.
R0211    GUESSW  * NONE          *AN INTERPRETER SWITCH TO BE SET IF NO GUESS OF COGA IS AVAILABLE, CLEAR IF A GUESS OF
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R0213             *                 *COGA IS TO BE USED BY LAMBERT
R0214   COGA      * +5              *DP GUESS OF COTANGNT OF FLIGHT PATH ANGLE (MEASURED FROM VERTICAL).  THIS WILL BE
R0216                               *IGNORED IF GUESSW IS SET.
R0217   NORMSW    * NONE            *AN INTERPRETER SWITCH TO BE SET IF UN IS TO BE AN INPUT TO THE SUBROUTINE, CLEAR IF
R0219             *                 *LAMBERT IS TO COMPUTE ITS OWN NORMAL (UN).
R0220   UN        * +1              *DP UNIT  NORMAL TO THE DESIRED ORBIT PLANE IN THE DIRECTION OF THE RESULTING ANGULAR
R0222             *                 *MOMENTUM VECTOR.  THIS WILL BE IGNORED IF NORMSW IS CLEAR.
R0224   VTARGTAG* NONE              *A S.P. TAG TO BE SET TO ZERO IF LAMBERT IS TO COMPUTE THE VELOCITY AT R2VEC AS WELL AS
R0226             *                 *AT R1VEC.
R0227   ITERCTR * NONE              *A S.P. COUNTER WHICH SPECIFIES THE MAXIMUM NUMBER OF ITERATIONS ALLOWABLE.
R02271            *                 *(AN ITERATION MEANS A PASS THRU KEPLER EQN (DELTIME). AT LEAST ONE OF THESE MUST
R02272            *                 *ALWAYS OCCUR, EVEN IF COGA CORRESPONDING TO SOLUTION WERE INPUT AS A GUESS.)
R02273            *                 *TWENTY ITERATIONS ARE SUFFICIENT TO SOLVE ALL PROBLEMS INCLUDING THOSE WITHOUT GUESS.
R02274

R0228   SUBROUTINES CALLED -
R0229        GEOM, GETX, DELTIME, ITERATOR, LAMENTER (PART OF NEWSTATE)
R0230


R0231   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0232   L         CALL                        MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0234   L+1               LAMBERT             RETURNS WITH PL AT 0 AND WITH VVEC IN MPAC IF VTARGTAG WAS NON-ZERO OR VTARGET
R0236                                         IN MPAC IF VTARGTAG WAS ZERO
R0237   L+2       BON                         CONTINUE IF SOLNSW CLEAR SINCE SOLUTION IS ACCEPTABLE
R0239   L+3               SOLNSW
R0240   L+4               LAMABORT
R0241        IF A LAMBERT RESULT IS TO BE A FIRST GUESS FOR THE NEXT LAMBERT CALCULATION, COGA MUST BE PRESERVED AND
R0243   GUESSW MUST BE CLEAR FOR EACH SUCCEEDING LAMBERT CALL.
R0244


R0245   ABORT EXIT MODES -
R0246        IF SOLNSW WAS SET UPON EXITING, EITHER LAMBERT WAS ASKED TO COMPUTE A TRANSFER TOO NEAR 0 OR 360 DEG, OR T
R0248   WAS TOO SMALL TO PRODUCE A REALISTIC TRANSFER BETWEEN R1VEC AND R2VEC.  IN EITHER CASE THE FIX MUST BE MADE
R0250   ACCORDING TO THE NEEDS OF THE PARTICULAR USER.  THE ABORT EXIT MODE MAY BE CODED AS ...
R0252   LAMABORT DLOAD  ABS                          A MEASURE OF PROXIMITY TO 0 OR
R0253                   1-CSTH                       360 DEGREES.
R0254            DSU    BMN
R0255                   ONEBIT
R0256                   CHANGER2                     CHANGE R2VEC DIRECTION SLIGHTLY.
R0257            DLOAD  DAD
R0258                   TDESIRED
R0259                   SOMETIME
R0260            STCALL TDESIRED                     INCREASE TDESIRED
R0261                   LAMBERT
R0262
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R0263    OUTPUT -
R0264             * SCALE FACTOR *
R0265    VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0266    --------*--------------*                        -----------------------
R0267    VVEC     * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND REQUIRED TO SATISFY THE BOUNDARY VALUE
R0269             * +5 FOR MOON  *PROBLEM.
R0270    VTARGET * +7 FOR EARTH *DP RESULTANT VELOCITY VECTOR AT R2VEC IN METERS/CENTISECOND.
R0272             * +5 FOR MOON  *
R0273    SOLNSW   * NONE         *INTERPRETER SWITCH WHICH IS SET IF THE SUBROUTINE CANNOT SOLVE THE PROBLEM, CLEAR IF THE
R0275             *              *SOLUTION EXISTS.
R0276    FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0277


R0278    DEBRIS -
R0279         PARAMETERS WHICH MAY BE OF USE -

R0280             * SCALE FACTOR *
R0281    VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0282    --------*--------------*                        -----------------------
R0283    SNTH     * +1           *DP SIN OF ANGLE BETWEEN R1VEC AND R2VEC
R0284    CSTH     * +1           *DP COSINE OF ANGLE
R0285    1-CSTH   * +2           *DP 1-CSTH
R0286    COGA     * +5           *DP COTAN OF INITIAL REQUIRED FLIGHT PATH ANGLE MEASURED FROM VERTICAL
R0289    P        * +4           *DP RATIO  OF SEMILATUS RECTUM TO INITIAL RADIUS
R0290    R1A      * +6           *DP RATIO OF INITIAL RADIUS TO SEMIMAJOR AXIS
R0291    R1 (32D)* +29 FOR EARTH*DP INITIAL RADIUS IN METERS
R0292             * +27 FOR MOON *
R0293    UR1      * +1           *DP UNIT VECTOR OF R1VEC
R0294    U2       * +1           *DP UNIT VECTOR OF R2VEC

R0295         PARAMETERS OF NO USE
R0296    DP PARAMETERS - EPSILONL, CSTH-RHO, TPREV, TERRLAMB, R2, RTNLAMB (SP),  PLUS PUSHLIST REGISTER 0 THROUGH 410
R0298    ADDITIONAL INTERPRETIVE SWITCHES USED - INFINFLG, 360SW, SLOPESW, ORDERSW
R0300
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R0301   PROGRAM DESCRIPTION - TIME-THETA SUBROUTINE                                   DATE - 1 SEPTEMBER 1967
R0303   MOD NO. - 0                                                                   LOG SECTION - CONIC SUBROUTINES
R0305   MOD BY KRAUSE                                                                 ASSEMBLY - COLOSSUS REVISION 88
R0307

R0308   FUNCTIONAL DESCRIPTION -

R0309        THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE
R0311   STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0313   PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR.  THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0315   CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0317   EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0319   ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0320

R0321   THE RESTRICTIONS ARE -
R0322        1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0324   AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0325        2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0327   ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0328        THE AGC COMPUTATION TIME IS APPROXIMATELY .292 SECONDS.
R0329

R0330   REFERENCES -
R0331        R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0333

R0334   INPUT - ERASABLE INITIALIZATION REQUIRED

R0335           * SCALE FACTOR *
R0336   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0337   --------*--------------*                          -----------------------
R0338   RVEC    * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0339           * +27 FOR MOON *
R0340   VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0341           * +5 FOR MOON  *
R0342   SNTH    * +1           *DP SINE OF TRUE-ANOMALY-DIFFERENCE THROUGH WHICH THE STATE IS TO BE UPDATED
R0344   CSTH    * +1           *DP COSINE OF THE ANGLE
R0345   RVSW    * NONE         *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0347           *              *IS TO BE COMPUTED ALSO.
R0348   X1 (38D)*NONE          *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0350           *              *RESPECTIVELY, IS THE CENTRAL BODY.
R0351

R0352   SUBROUTINES CALLED -
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R0353        PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0354


R0355   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0356      IF ONLY TIME IS DESIRED AS OUTPUT -
R0357   L        SET    CALL              MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0359   L+1             RVSW
R0360   L+2             TIMETHET          RETURN WITH PL AT 0 AND T IN MPAC
R0361   L+3      ...                      CONTINUE
R0362

R0363      IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0364   L        CLEAR  CALL              MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0366   L+1             RVSW
R0367   L+2             TIMETHET          RETURNS WITH PL AT 6. THE INITIAL POSITION VECTOR IS IN 0D OF THE PUSHLIST AND
R0369                                     THE INITIAL VELOCITY VECTOR IN MPAC.
R0370   L+3      STOVL  NEWVVEC
R0371   L+4      STADR
R0372   L+5      STORE  NEWRVEC                NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0374   L+6      ...                           CONTINUE
R0375


R0376   ABORT EXIT MODES -
R0377            IF COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-THETA, TIME-THETA WILL TRANSFER TO POODOO WITH
R0379            AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 AND 721).
R0386


R0387   OUTPUT -
R0388        * SCALE FACTOR *
R0389   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0390   --------*--------------*                          -----------------------
R0391   T (300) * +28          *DP TRANSFER TIME IN CENTISECONDS
R0392   INFINFLG* NONE         *AN INTERPRETIVE SWITCH WHICH IS SET IF THE TRANSFER ANGLE REQUIRES CLOSURE THROUGH
R0394           *              *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0396   COGAFLAG* NONE         *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
R0398           *              *CLEAR IF NOT.

R0399   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0400   MPAC -  * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0401    MPAC +5* +5 FOR MOON  *
R0402   0D - 5D * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0403           * +27 FOR MOON *

R0404   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0405
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R0406   DEBRIS -

R0407         PARAMETERS WHICH MAY BE OF USE -

R0408         * SCALE FACTOR *
R0409   VARIABLE*IN POWERS OF 2*                             DESCRIPTION AND REMARKS
R0410   --------*--------------*                             ----------------------
R0411   R1 (320)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0413           * +27 FOR MOON *
R0414   R1A     * +6           *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0416   P       * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0417   COGA    * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0419   UR1     * +1           *DP UNIT VECTOR OF RVEC
R0420   U2      * +1           *DP UNIT VECTOR OF VVEC
R0421   UN      * +1           *DP UNIT VECTOR OF UR1*U2
R0422

R0423         PARAMETERS OF NO USE -
R0424   SP PARAMETERS -  RTNTT, GEOMSGN, RTNPRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 14D-21D, 24D-39D, 41D
R0426   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0427
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R0428   PROGRAM DESCRIPTION - TIME-RADIUS SUBROUTINE                         DATE - 11 OCTOBER 1967
R0430   MOD NO. -1                                                                LOG SECTION - CONIC SUBROUTINES
R0432   MOD BY KRAUSE                                                             ASSEMBLY - COLOSSUS REVISION 88
R0434


R0435   FUNCTIONAL DESCRIPTION -

R0436        THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR AND A DESIRED RADIUS TO WHICH THE
R0438   STATE IS TO BE UPDATED ALONG A CONIC TRAJECTORY, CALCULATES THE CORRESPONDING TIME-OF-FLIGHT AND, IN ADDITION,
R0440   PROVIDES THE OPTION OF COMPUTING THE NEW UPDATED STATE VECTOR.  THE RESULTING TRAJECTORY MAY BE A SECTION OF A
R0442   CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0444   EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0446   ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0447        IF THE DESIRED RADIUS IS BEYOND THE RADIUS OF APOCENTER OF THE CONIC OR BELOW THE RADIUS OF PERICENTER,
R0449   APSESW WILL BE SET AND THE SUBROUTINE WILL RETURN THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY.
R0451

R0452   THE RESTRICTIONS ARE -
R0453        1. THE ANGLE BETWEEN ANY POSITION VECTOR AND ITS VELOCITY VECTOR MUST BE GREATER THAN 1 DEGREE 47.5 MINUTES
R0455   AND LESS THAN 178 DEGREES 12.5 MINUTES.
R0456        2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0458   ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.
R04581       3. AN ACCURACY DEGRADATION OCCURS AS THE SENSITIVITIES OF TIME AND UPDATED STATE VECTOR TO CHANGES IN
R04583  RDESIRED INCREASE.  THIS WILL OCCUR NEAR EITHER APSIS OF THE CONIC AND WHEN THE CONIC IS NEARLY CIRCULAR.  IN
R04585  PARTICULAR, IF THE CONIC IS AN EXACT CIRCLE, THE PROBLEM IS UNDEFINED AND THE SUBROUTINE WILL ABORT.
R04587

R0459        THE AGC COMPUTATION TIME IS APPROXIMATELY .363 SECONDS
R0460


R0461   REFERENCES -
R0462        R-479, MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5, SGA MEMO 67-8.
R0464


R0465   INPUT - ERASABLE INITIALIZATION REQUIRED

R0466            * SCALE FACTOR *
R0467   VARIABLE*IN POWERS OF 2*                               DESCRIPTION AND REMARKS
R0468   --------*--------------*                               -----------------------
R0469   RVEC     * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0470            * +27 FOR MOON *
R0471   VVEC     * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0472            * +5 FOR MOON  *
R0473   RDESIRED* +29 FOR EARTH*DP TERMINAL RADIAL DISTANCE ON CONIC TRAJECTORY FOR WHICH TRANSFER TIME IS TO BE
R0475            * +27 FOR MOON *COMPUTED.
R0476   SGNRDOT  * NONE          *SP TAG SET TO +.5 OR -.5 ACCORDING TO WHETHER THE RADIAL VELOCITY AT RDESIRED IS TO BE
R0478            *               *POSITIVE OR NEGATIVE, RESPECTIVELY.  THIS TAG REDUCES THE DOUBLE-VALUED PROBLEM TO A
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R0480            *                   *SINGLE-VALUED PROBLEM.
R0481   X1 (38D)*NONE                *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0483            *                   *RESPECTIVELY, IS THE CENTRAL BODY.
R0484   RVSW     * NONE              *AN INTERPRETIVE SWITCH TO BE SET IF ONLY TIME IS TO BE AN OUTPUT, CLEAR IF THE NEW STATE
R0486            *                   *IS TO BE COMPUTED ALSO.
R0487


R0488   SUBROUTINES CALLED -
R0489        PARAM, GEOM, GETX, DELTIME, NEWSTATE
R0490


R0491   CALLING SEQUENCE AND NORMAL EXIT MODES -

R0492       IF ONLY TIME IS DESIRED AS OUTPUT -
R0493   L          SET     CALL             MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0495   L+1                RVSW
R0496   L+2                TIMERAD          RETURN WITH PL AT 0 AND T IN MPAC
R0497   L+3        ...                      CONTINUE
R0498

R0499       IF THE UPDATE STATE VECTOR IS DESIRED AS WELL -
R0500   L          CLEAR   CALL             MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0502   L+1                RVSW
R0503   L+2                TIMERAD          RETURNS WITH PL AT 6.  THE INITIAL POSITION VECTOR IS IN 0D OF THE PUSHLIST AND
R0505                                       THE INITIAL VELOCITY VECTOR IN MPAC.
R0506   L+3        STOVL   NEWVVEC
R0507   L+4        STADR
R0508   L+5        STORE   NEWRVEC                   NEWVVEC AND NEWRVEC ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS.
R0510   L+6        ...                               CONTINUE
R0511


R0512   ABORT EXIT MODES -
R0513              IF SOLNSW AND/OR COGAFLAG AND/OR INFINFLG IS SET AT THE EXIT TO TIME-RADIUS, TIME-RADIUS WILL TRANSFER
R0515              TO POODOO WITH AN ALARM CODE (ORIGINALLY 00607), AND NOT RETURN TO THE CALLING PROGRAM. (PCR 692 & 721)
R0522


R0523   OUTPUT -
R0524            * SCALE FACTOR *
R0525   VARIABLE*IN POWERS OF 2*                               DESCRIPTION AND REMARKS
R0526   --------*--------------*                               -----------------------
R0527   T (30D) * +28            *OP TRANSFER TIME IN CENTISECONDS
R0528   INFINFLG* NONE           *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED AND SGNRDOT REQUIRE CLOSURE THROUGH
R0530           *                *INFINITY (NO SOLUTION), CLEAR IF A PHYSICAL SOLUTION IS POSSIBLE.
R0532   COGAFLAG* NONE           *AN INTERPRETIVE SWITCH WHICH IS SET IF RESTRICTION 1 HAS BEEN VIOLATED (NO SOLUTION),
R0534           *                *CLEAR IF NOT.
R0535   APSESW  * NONE           *AN INTERPRETIVE SWITCH WHICH IS SET IF RDESIRED WAS GREATER THAN RADIUS OF APOCENTER OR
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R0537            *                 *LESS THAN RADIUS OF PERICENTER.  THE APOCENTER OR PERICENTER SOLUTION, RESPECTIVELY,
R0539            *                 *WILL THEN BE RETURNED.  THE SWITCH IS CLEAR IF RDESIRED WAS BETWEEN PERICENTER AND
R0541            *                 *APOCENTER.
R05411  SCLNSW   * NONE            *AN INTERPRETIVE SWITCH WHICH IS SET IF THE CONIC IS SO CLOSE TO A CIRCLE THAT THE TERMIN
R05413                             *POINT IS AMBIGUOUS, VIOLATING RESTRICTION 3.  IF ECCENTRICITY IS GREATER THAN 2-TO-THE-
R05415                             *MINUS-18, THE SWITCH IS CLEAR.
R0542

R0543   IN ADDITION, IF RVSW IS CLEAR, THE FOLLOWING ARE OUTPUT-

R0544   MPAC -   * +7 FOR EARTH *DP TERMINAL VELOCITY VECTOR IN METERS/CENTISEC.
R0545    MPAC +5* +5 FOR MOON   *
R0546   0D - 50 * +29 FOR EARTH*DP TERMINAL POSITION VECTOR IN METERS (PL AT 6D)
R0547            * +27 FOR MOON *

R0548   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0549


R0550   DEBRIS -

R0551         PARAMETERS WHICH MAY BE OF USE -

R0552            * SCALE FACTOR *
R0553   VARIABLE*IN POWERS OF 2*                         DESCRIPTION AND REMARKS
R0554   --------*--------------*                         -----------------------
R0555   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0557            * +27 FOR MOON *
R0558   R1A      * +6              *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0560   P        * +4              *DP RATIO OF SEMILATUS RECTUM TO R1
R0561   COGA     * +5              *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0563   UR1      * +1              *DP UNIT VECTOR OF RVEC
R0564   U2       * +1              *DP UNIT VECTOR OF VVEC
R0565   UN       * +1              *DP UNIT VECTOR OF UR1*U2
R0566   CSTH     * +1              *DP COSINE OF TRUE ANOMALY DIFFERENCE BETWEEN RVEC AND RDESIRED.
R0568   SNTH     * +1              *DP SINE OF TRUE ANOMALY DIFFERENCE.
R0569

R0570         PARAMETERS OF NO USE -
R0571   SR PARAMETERS -  RTNTT, GEOMSGN, RTNRRM, MAGVEC2=R2 (DP), PLUS PUSHLIST LOCATIONS 0-11D, 140-21D, 240-39D, 41D
R0573   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW, 360SW
R0574
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R0575   PROGRAM DESCRIPTION - APSIDES SUBROUTINE                                    DATE - 1 SEPTEMBER 1967
R0577   MOD NO. - 0                                                                 LOG SECTION - CONIC SUBROUTINES
R0579   MOD BY KRAUSE                                                               ASSEMBLY - COLOSSUS REVISION 88
R0581

R0582   FUNCTIONAL DESCRIPTION -

R0583        THIS SUBROUTINE, GIVEN AN INITIAL STATE VECTOR CALCULATES THE RADIUS OF PERICENTER AND OF APOCENTER AND THE
R0585   ECCENTRICITY OF THE RESULTING CONIC TRAJECTORY, WHICH MAY BE A STRAIGHT LINE,
R0587   CIRCLE, ELLIPSE, PARABOLA, OR HYPERBOLA WITH RESPECT TO THE EARTH OR THE MOON.  THE USE OF THE SUBROUTINE CAN BE
R0589   EXTENDED USING OTHER PRIMARY BODIES BY SIMPLE ADDITIONS TO THE MUTABLE WITHOUT INTRODUCING ANY CODING CHANGES,
R0591   ACCEPTING THE INHERENT SCALE FACTOR CHANGES IN POSITION AND VELOCITY.
R0592

R0593   THE RESTRICTIONS ARE -
R0594        1.  IF APOCENTER IS BEYOND THE SCALING OF POSITION, THE SCALE FACTOR LIMIT (536,870,910 METERS WITH RESPECT
R0596   TO THE EARTH OR 134,217,727.5 METERS WITH RESPECT TO THE MOON) WILL BE RETURNED.
R0598        2. THE PARAMETERS IN THE PROBLEM MUST NOT EXCEED THEIR SCALING LIMITS SPECIFIED IN THE GSOP.  IF THE LIMITS
R0600   ARE EXCEEDED, THE RESULTING SOLUTION WILL BE MEANINGLESS.

R0601        THE AGC COMPUTATION TIME IS APPROXIMATELY .103 SECONDS.
R0602

R0603   REFERENCES -
R0604        MISSION PROGRAMMING DEFINITION MEMO NO. 10, LUNAR LANDING MISSION GSOP-SECTION 5.5
R0606

R0607   INPUT - ERASABLE INITIALIZATION REQUIRED

R0608            * SCALE FACTOR *
R0609   VARIABLE*IN POWERS OF 2*                          DESCRIPTION AND REMARKS
R0610   --------*--------------*                          ----------------------
R0611   RVEC    * +29 FOR EARTH*DP INITIAL POSITION VECTOR IN METERS
R0612           * +27 FOR MOON *
R0613   VVEC    * +7 FOR EARTH *DP INITIAL VELOCITY VECTOR IN METERS/CENTISECOND
R0614           * +5 FOR MOON  *
R0615   X1 (38D)*NONE          *INDEX REGISTER TO BE SET TO -2D OR -10D ACCORDING TO WHETHER THE EARTH OR MOON,
R0617           *              *RESPECTIVELY, IS THE CENTRAL BODY.
R0618

R0619   SUBROUTINES CALLED -
R0620        PARAM, GEOM
R0621

R0622   CALLING SEQUENCE AND NORMAL EXIT MODES -
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R0623      IF ONLY TIME IS DESIRED AS OUTPUT -
R0624   L           CALL                   MUST BE IN INTERPRETIVE MODE BUT OVFIND ARBITRARY.
R0626   L+1                APSIDES         RETURNS WITH PL AT 0, RADIUS OF APOCENTER IN MPAC AND RADIUS OF PERICENTER IN 0D
R0628   L+2         STODL  APOAPSE
R0629   L+3                0D
R0630   L+4         STORE  PERIAPSE                 APOAPSE AND PERIAPSE ARE SYMBOLIC REPRESENTATIONS OF THE USERS LOCATIONS
R0632   L+5         ...                    CONTINUE
R0633


R0634   OUTPUT -
R0635            * SCALE FACTOR *
R0636   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0637   --------*--------------*                        -----------------------
R0638   MPAC     * +29 FOR EARTH*DP RADIUS OF APOCENTER IN METERS
R0639            * +27 FOR MOON *
R0640   0D-1D    * +29 FOR EARTH*DP RADIUS OF PERICENTER IN METERS
R0641            * +27 FOR MOON *
R0642   ECC      * +3           *DP ECCENTRICITY OF CONIC TRAJECTORY.

R0643   FOR OTHER OUTPUT WHICH MAY BE OF USE, SEE DEBRIS.
R0644


R0645   DEBRIS -

R0646        PARAMETERS WHICH MAY BE OF USE -

R0647            * SCALE FACTOR *
R0648   VARIABLE*IN POWERS OF 2*                        DESCRIPTION AND REMARKS
R0649   --------*--------------*                        -----------------------
R0650   R1 (32D)* +29 FOR EARTH*DP MAGNITUDE OF INITIAL POSITION VECTOR, RVEC, IN METERS
R0652            * +27 FOR MOON *
R0653   R1A      * +6           *DP RATIO OF R1 TO SEMIMAJOR AXIS (NEG. FOR HYPERBOLIC TRAJECTORIES)
R0655   P        * +4           *DP RATIO OF SEMILATUS RECTUM TO R1
R0656   COGA     * +5           *DP COTAN OF ANGLE BETWEEN RVEC AND VVEC
R0658   UR1      * +1           *DP UNIT VECTOR OF RVEC
R0659   U2       * +1           *DP UNIT VECTOR OF VVEC
R0660   UN       * +1           *DP UNIT VECTOR OF UR1*U2
R0661   MAGVEC2 * +7 FOR EARTH *DP MAGNITUDE OF VVEC
R0662            * +5 FOR MOON  *
R0663

R0664        PARAMETERS OF NO USE -
R0665   SP PARAMETERS - RTNAPSE, GEOMSGN, RTNPRM, PLUS PUSHLIST LOCATIONS 0-5,10D-11D, 14D-21D, 31D-38D.
R0667   ADDITIONAL INTERPRETIVE SWITCHES USED - NORMSW
R0668


 0669   REF    1               12,2000                     SETLOC CONICS
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0670                         12,2023                          BANK

0671  REF   1                                                 COUNT*  $$/CONIC
0672  REF   2  LAST   126    E5,1721                          EBANK=  UR1
0678                         12,2023   40001 1  KEPLERN       SETPD   BOV
0679                         12,2024   00001 0                        0
0680                         12,2025   24026 0                        +1
0681                         12,2026   77773 1                VLOAD*
0683  REF   4  LAST   695    12,2027   10005 0                        MUTABLE,1
0684                         12,2030   24017 1                STOVL   14D
0685  REF   4  LAST   712    12,2031   01503 0                        RRECT
0686                         12,2032   66256 0                UNIT    SSP
0687  REF   2  LAST   690    12,2033   00027 1                        ITERCTR
0688                         12,2034   00024 1                        20D
0689  REF   2  LAST   126    12,2035   16647 0                STODL   URRECT
0690                         12,2036   00045 0                        36D
0691  REF   5  LAST   692    12,2037   24041 1                STOVL   R1
0692  REF   5  LAST  1168    12,2040   01503 0                        RRECT
0693                         12,2041   76441 1                DOT     SL1R
0694  REF   3  LAST   499    12,2042   01511 0                        VRECT
0695                         12,2043   76405 1                DMP     SL1R
0696  REF   1                12,2044   00023 0                        1/ROOTMU        1/ROOTMU (-17 OR -14)
0697  REF   1                12,2045   24043 0                STOVL   KEPC1           C1=R.V/ROOTMU (+17 OR +16)

0698  REF   4  LAST  1168    12,2046   01511 0                        VRECT
0699                         12,2047   57236 1                VSQ     DMPR
0700  REF   1                12,2050   00017 1                        1/MU            1/MU (-34 OR -28)
0701                         12,2051   52405 1                DMP     SL3
0702  REF   6  LAST  1168    12,2052   00041 1                        R1
0703                         12,2053   61425 0                DSU     ROUND
0704  REF   1                12,2054   11001 0                        D1/64
0705  REF   1                12,2055   00045 0                STORE   KEPC2           C2=RV.V/MU -1 (+6)

0706                         12,2056   74421 0                BDSU    SR1R
0707  REF   2  LAST  1168    12,2057   11001 0                        D1/64
0708                         12,2060   77671 1                DDV
0709  REF   7  LAST  1168    12,2061   00041 1                        R1
0710  REF   1                12,2062   00011 1                STORE   ALPHA           ALPHA=(1-C2)/R1 (-22 OR -20)


0711                         12,2063   71244 0                BPL     DLOAD           MAXIMUM X DEPENDS ON TYPE OF CONIC
0712  REF   1                12,2064   24073 0                        1REV
0713  REF   1                12,2065   11017 1                        -50SC           -50SC (+12)
0714                         12,2066   40071 0                DDV     BOV
0715  REF   2  LAST  1168    12,2067   00011 1                        ALPHA
0716  REF   1                12,2070   24077 1                        STOREMAX
0717                         12,2071   52166 1                SQRT    GOTO
0718  REF   2  LAST  1168    12,2072   24077 1                        STOREMAX

0719                         12,2073   55366 1  1REV          SQRT    BOOV
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L       CONIC SUBROUTINES                                                         USER'S PAGE NO.  17      E5 S3

 0720   REF   1              12,2074   11021 1                     2PISC          2PISC (+6)
 0721                        12,2075   77600 1             BOV
 0722   REF   3  LAST 1168   12,2076   24077 1                     STOREMAX
 0723   REF   1              12,2077   00013 0   STOREMAX  STORE   XMAX
 0724                        12,2100   65205 0             DMP     PDDL
 0725   REF   2  LAST 1168   12,2101   00023 0                     1/ROOTMU
 0726   REF   3  LAST 1168   12,2102   00011 1                     ALPHA
 0727                        12,2103   65301 0             NORM    PDDL
 0728   REF  37  LAST 1152   12,2104   00047 1                     X1
 0729                        12,2105   56257 1             SL*     DDV
 0730                        12,2106   20173 0                     0 -6,1
 0731                        12,2107   50000 1             BOV     BMN
 0732   REF   1              12,2110   24124 0                     MODDONE
 0733   REF   2  LAST 1169   12,2111   24124 0                     MODDONE        MPAC=PERIOD
 0734                        12,2112   51525 1   PERIODCH  PDDL    ABS            00=PERIOD
 0735   REF   2  LAST  115   12,2113   02074 0                     TAU.
 0736                        12,2114   50025 0             DSU     BMN
 0737                        12,2115   00001 0                     00
 0738   REF   3  LAST 1169   12,2116   24124 0                     MODDONE
 0739                        12,2117   77765 0             SIGN
 0740   REF   3  LAST 1169   12,2120   02074 0                     TAU.
 0741   REF   4  LAST 1169   12,2121   16074 0             STODL   TAU.
 0750                        12,2122   77650 1             GOTO
 0751   REF   1              12,2123   24112 0                     PERIODCH
 0752                        12,2124   71201 1   MODDONE   SETPD   DLOAD
 0753                        12,2125   00001 0                     0
 0754   REF   2  LAST  115   12,2126   02130 1                     XKEPNEW
 0755   REF   1              12,2127   00025 0             STORE   X
 07555                       12,2130   53165 0             SIGN    BZE
 0756   REF   5  LAST 1169   12,2131   02074 0                     TAU.
 07565  REF   1              12,2132   24302 0                     BADX
 0757                        12,2133   51440 0             BMN     ABS
 07575  REF   2  LAST 1169   12,2134   24302 0                     BADX
 0758                        12,2135   51025 1             DSU     BPL
 07585  REF   2  LAST 1169   12,2136   00013 0                     XMAX
 0759   REF   3  LAST 1169   12,2137   24302 0                     BADX
 07595                       12,2140   51145 0   STORBNDS  DLOAD   BPL
 0760   REF   6  LAST 1169   12,2141   02074 0                     TAU.
 07605  REF   1              12,2142   24152 1                     STOREMIN
 0761                        12,2143   57545 1             DLOAD   DCOMP
 07615  REF   3  LAST 1169   12,2144   00013 0                     XMAX
 0762   REF   1              12,2145   14015 0             STODL   XMIN
 07625  REF   1              12,2146   24007 0                     KEPZERO
 0763   REF   4  LAST 1169   12,2147   00013 0             STORE   XMAX
 07635                       12,2150   77650 1             GOTO
 0764   REF   1              12,2151   24155 0                     DXCOMP
 07645                       12,2152   77745 1   STOREMIN  DLOAD
 0765   REF   2  LAST 1169   12,2153   24007 0                     KEPZERO
 07655  REF   2  LAST 1169   12,2154   00015 0             STORE   XMIN
 0766                        12,2155   57345 1   DXCOMP    DLOAD   DMPR
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0767   REF   7  LAST 1169   12,2156   02074 0                      TAU.
0768   REF   1              12,2157   11012 1                      BEE22
07685                       12,2160   77646 0             ABS
0769   REF   1              12,2161   16177 1             STODL    EPSILONT
0770   REF   1              12,2162   01553 0                      XPREV
0779                        12,2163   77621 1   XDIFF     BDSU
0780   REF   2  LAST 1169   12,2164   00025 0                      X
0781   REF   2  LAST  126   12,2165   02643 1             STORE    DELX


0782                        12,2166   63545 0   KEPLOOP   DLOAD    DSQ
0783   REF   3  LAST 1170   12,2167   00025 0                      X                   X=XKEP
0784                        12,2170   41501 0             NORM     PUSH                0D=XSQ (+34 OR +32 -N1)       PL AT 2
0785   REF  38  LAST 1169   12,2171   00047 1                      X1
0786                        12,2172   53605 1             DMP      SRR*
0787   REF   4  LAST 1169   12,2173   00011 1                      ALPHA
0788                        12,2174   21573 0                      0 -6,1
0789   REF   1              12,2175   34031 1             STCALL   XI                  XI=ALPHA XSQ (+6)
0790   REF   1              12,2176   24421 0                      DELTIME
0791                        12,2177   44200 0             BOV      BDSU
0792   REF   1              12,2200   24311 1                      TIMEOVFL            UNLIKELY
0793   REF   8  LAST 1170   12,2201   02074 0                      TAU.
0794   REF   2  LAST  126   12,2202   02645 1             STORE    DELT                DELT=DELINDEP
0795                        12,2203   44246 1             ABS      BDSU
0796   REF   2  LAST 1170   12,2204   02177 1                      EPSILONT
0797                        12,2205   71244 0             BPL      DLOAD
0798   REF   1              12,2206   24333 1                      KEPCONVG
0799   REF   3  LAST  665   12,2207   00037 0                      T
0800                        12,2210   60225 1             DSU      NORM
0801   REF   2  LAST  111   12,2211   01551 1                      TC
0802   REF  39  LAST 1170   12,2212   00047 1                      X1
0803                        12,2213   60325 0             PDDL     NORM
0804   REF   3  LAST 1170   12,2214   02643 1                      DELX
0805   REF  23  LAST 1149   12,2215   00050 1                      X2
0806                        12,2216   41260 0             XSU,1    DMP
0807   REF  24  LAST 1170   12,2217   00047 1                      X2
0808   REF   3  LAST 1170   12,2220   02645 1                      DELT
0809                        12,2221   56257 1             SLR*     DDV
0810                        12,2222   21202 1                      1,1
0811                        12,2223   41542 1             SR1      PUSH                0D=TRIAL DELX                 PL AT 2
0812                        12,2224   71244 0             BPL      DLOAD
0813   REF   1              12,2225   24246 1                      POSDELX
0814   REF   4  LAST 1170   12,2226   00025 0                      X
0815   REF   5  LAST 1169   12,2227   00013 0             STORE    XMAX                MOVE MAX BOUND IN
0816                        12,2230   45221 1             BDSU     DSU                                               PL AT 0
0817   REF   3  LAST 1169   12,2231   00015 0                      XMIN
0818                        12,2232   51000 0             BOV      BPL
0819   REF   1              12,2233   24240 1                      NOXCHNGE
0820   REF   2  LAST 1170   12,2234   24240 1                      NOXCHNGE
0821                        12,2235   62145 0             DLOAD    GOTO
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 0822                           12,2236   00001 0                     0D
 0823     REF    1              12,2237   24260 0                     NEWDELX


 0824                           12,2240   45345 1  NDXCHNGE DLOAD     DSU
 0825     REF    4  LAST 1170   12,2241   00015 0                     XMIN
 0826     REF    5  LAST 1170   12,2242   00025 0                     X
 0827                           12,2243   52075 1           DMPR      GOTO          TO FORCE MPAC +2 TO ZERO
 0828     REF    1              12,2244   11015 0                     DP9/10
 0829     REF    2  LAST 1171   12,2245   24260 0                     NEWDELX


 0830                           12,2246   77745 1  POSDELX  DLOAD
 0831     REF    6  LAST 1171   12,2247   00025 0                     X
 0832     REF    5  LAST 1171   12,2250   00015 0           STORE     XMIN          MOVE MIN BOUND IN
 0833                           12,2251   45221 1           BDSU      DSU                                     PL AT 0
 0834     REF    6  LAST 1170   12,2252   00013 0                     XMAX
 0835                           12,2253   50000 1           BOV       BMN
 0836     REF    1              12,2254   24274 0                     PDXCHNGE
 0837     REF    2  LAST 1171   12,2255   24274 0                     PDXCHNGE
 0838                           12,2256   77745 1           DLOAD
 0839                           12,2257   00001 0                     0D
 0840     REF    4  LAST 1170   12,2260   02643 1  NEWDELX  STORE     DELX
 0841                           12,2261   43254 0           BZE       DAD
 0842     REF    2  LAST 1170   12,2262   24333 1                     KEPCONVG
 0843     REF    7  LAST 1171   12,2263   00025 0                     X
 0844     REF    8  LAST 1171   12,2264   14025 0           STODL     X
 0845     REF    4  LAST 1170   12,2265   00037 0                     T
 0846     REF    3  LAST 1170   12,2266   01551 1           STORE     TC
 0847                           12,2267   46034 1  BRNCHCTR RTB       BHIZ
 0848     REF    1              12,2270   24644 1                     CHECKCTR
 0849     REF    3  LAST 1171   12,2271   24333 1                     KEPCONVG
 0850                           12,2272   77650 1           GOTO
 0851     REF    1              12,2273   24166 0                     KEPLOOP       ITERATE


 0852                           12,2274   45345 1  PDXCHNGE DLOAD     DSU
 0853     REF    7  LAST 1171   12,2275   00013 0                     XMAX
 0854     REF    9  LAST 1171   12,2276   00025 0                     X
 0855                           12,2277   52075 1           DMPR      GOTO          TO FORCE MPAC +2 TO ZERO
 0856     REF    2  LAST 1171   12,2300   11015 0                     DP9/10
 0857     REF    3  LAST 1171   12,2301   24260 0                     NEWDELX


 0858                           12,2302   70545 1  BACK     DLOAD     SR1
 0859     REF    8  LAST 1171   12,2303   00013 0                     XMAX
 0860                           12,2304   77765 0           SIGN
 0861     REF    9  LAST 1170   12,2305   02074 0                     TAU.
 0862     REF   10  LAST 1171   12,2306   00025 0           STORE     X
 0863                           12,2307   77650 1           GOTO
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0864    REF   1              12,2310   24140 1                    STORBNDS
0879                         12,2311   50145 1  TIMEOVFL DLOAD   BMN              X WAS TOO BIG
0880    REF  11  LAST 1171   12,2312   00025 0                    X
08805   REF   1              12,2313   24330 1                    NEGTOVFL
0881    REF   9  LAST 1171   12,2314   00013 0           STORE    XMAX
0882                         12,2315   70545 1  CMNTOVFL DLOAD    SR1
0883    REF   5  LAST 1171   12,2316   02643 1                    DELX
0884    REF   6  LAST 1172   12,2317   02643 1           STORE    DELX
0885                         12,2320   44254 1           BZE      BDSU
08855   REF   1              12,2321   02112 1                    KEPRTN
0886    REF  12  LAST 1172   12,2322   00025 0                    X
0887    REF  13  LAST 1172   12,2323   14025 0           STODL    X
0888    REF   4  LAST 1171   12,2324   01551 1                    TC
0889    REF   5  LAST 1171   12,2325   00037 0           STORE    T
0890                         12,2326   77650 1           GOTO
0891    REF   1              12,2327   24267 1                    BRNCHCTR
08911   REF   6  LAST 1171   12,2330   00015 0  NEGTOVFL STORE    XMIN
08912                        12,2331   77650 1           GOTO
08913   REF   1              12,2332   24315 0                    CMNTOVFL
0892                         12,2333   44545 0  KEPCONVG DLOAD    SR4R
0893    REF   8  LAST 1168   12,2334   00041 1                    R1
0894                         12,2335   74225 1           DSU      VXSC
0895    REF   1              12,2336   00035 1                    XSQC(XI)
0896    REF   3  LAST 1168   12,2337   02647 0                    URRECT
0897                         12,2340   65372 1           VSL1     PDDL            00=(R1-XSQC(XI))URRECT (+33 OR +31)
0898    REF  14  LAST 1172   12,2341   00025 0                    X
0899                         12,2342   60316 0           DSQ      NORM
0900    REF  40  LAST 1170   12,2343   00047 1                    X1
0901                         12,2344   57275 0           DMPR     DMPR
0902    REF   3  LAST 1169   12,2345   00023 0                    1/ROOTMU
0903    REF  15  LAST 1172   12,2346   00025 0                    X
0904                         12,2347   53605 1           DMP      SRR*
0905    REF   1              12,2350   00033 1                    S(XI)
0906                         12,2351   21572 1                    0 -7,1
0907                         12,2352   77621 1           BDSU
0908    REF   6  LAST 1172   12,2353   00037 0                    T
0909                         12,2354   74352 0           SL1      VXSC
0910    REF   5  LAST 1168   12,2355   01511 0                    VRECT
0911                         12,2356   53372 1           VSL1     VAD                                  PL AT 0
0912                         12,2357   77712 0           VSL4
0913    REF  15  LAST 1150   12,2360   01535 0           STORE    RCV             RCV (+29 OR +27)


0914                         12,2361   60246 1           ABVAL    NORM
0915    REF  25  LAST 1170   12,2362   00050 1                    X2
0916    REF   1              12,2363   14043 0           STODL    RCNORM
0917    REF   2  LAST 1170   12,2364   00031 0                    XI
0918                         12,2365   45275 0           DMPR     DSU
0919    REF   2  LAST 1172   12,2366   00033 1                    S(XI)
0920    REF   1              12,2367   10777 1                    D1/128
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 0921                          12,2370   76405 1          DMP     SL1R
 0922     REF   1              12,2371   00021 1                  ROOTMU
 0923                          12,2372   53605 1          DMP     SLR*
 0924     REF  16   LAST 1172  12,2373   00025 0                  X
 0925                          12,2374   56601 0                  0 -3,2
 0926                          12,2375   74271 0          DDV     VXSC
 0927     REF   2   LAST 1172  12,2376   00043 0                  RCNORM
 0928     REF   4   LAST 1172  12,2377   02647 0                  URRECT
 0929                          12,2400   65272 1          VSL1    PDDL                0D=URRECT(XI S(XI)-1)X ROOTMU/RCV (+15
 0930     REF   2   LAST 1172  12,2401   00035 1                  XSQC(XI)            OR +13)                          PL AT 6
 0931                          12,2402   56257 1          SLR*    DDV
 0932                          12,2403   56602 0                  0 -4,2
 0933     REF   3   LAST 1173  12,2404   00043 0                  RCNORM
 0934                          12,2405   74221 0          BDSU    VXSC
 0935     REF   1              12,2406   11013 0                  D1/256
 0936     REF   6   LAST 1172  12,2407   01511 0                  VRECT
 0937                          12,2410   42455 0          VAD     VSL8                                               PL AT 0
 0938                          12,2411   77626 0          STADR
 0939     REF  13   LAST 1150  12,2412   62234 0          STODL   VCV                 VCV (+7 OR +5)
 0940     REF   7   LAST 1172  12,2413   00037 0                  T
 0943     REF   5   LAST 1172  12,2414   15551 1          STODL   TC
 0944     REF  17   LAST 1173  12,2415   00025 0                  X
 0947     REF   2   LAST 1170  12,2416   01553 0          STORE   XPREV
 0948                          12,2417   77650 1          GOTO
 0949     REF   2   LAST 1172  12,2420   02112 1                  KEPRTN
 0950                         12,2421   77776 1  DELTIME  EXIT                       MPAC=XI (+6), 0D=XSC (+34 OR +32 -N1)
 0951    REF    4  LAST 1079  12,2422  0 7225 0           TC      POLY
 0952                         12,2423   00010 0           DEC     8
 0953                         12,2424   02525 1           2DEC    .083333334
 0953                         12,2425   12526 0
 0954                         12,2426   67356 0           2DEC    -.266666684
 0954                         12,2427   75666 0
 0955                         12,2430   15001 1           2DEC    .406349155
 0955                         12,2431   23771 1
 0956                         12,2432   64342 0           2DEC    -.361158675
 0956                         12,2433   43674 0
 0957                         12,2434   06563 1           2DEC    .210153242
 0957                         12,2435   04645 1
 0958                         12,2436   75173 0           2DEC    -.086221951
 0958                         12,2437   52672 0
 0959                         12,2440   00656 1           2DEC    .026268812
 0959                         12,2441   14331 0
 0960                         12,2442   77633 1           2DEC    -.006163316
 0960                         12,2443   40512 0
 0961                         12,2444   00023 0           2DEC    .001177342
 0961                         12,2445   11210 1
 0962                         12,2446   77774 0           2DEC    -.000199055
 0962                         12,2447   67506 0
 0963    REF  221  LAST 1149  12,2450  0 6042 1           TC      INTPRET
 0964    REF    3  LAST 1172  12,2451   14033 1           STODL   S(XI)
 0965    REF    3  LAST 1172  12,2452   00031 0                   XI
 0966                         12,2453   77776 1           EXIT
 0967    REF    5  LAST 1174  12,2454  0 7225 0           TC      POLY
 0968                         12,2455   00010 0           DEC     8
 0969                         12,2456   01000 0           2DEC    .031250001
 0969                         12,2457   00000 1
 0970                         12,2460   72525 0           2DEC    -.166666719
 0970                         12,2461   52506 0
 0971                         12,2462   13301 1           2DEC    .355555413
 0971                         12,2463   15337 1
 0972                         12,2464   62776 0           2DEC    -.406347410
 0972                         12,2465   54733 1
 0973                         12,2466   11176 1           2DEC    .288962094
 0973                         12,2467   13267 0
 0974                         12,2470   73410 0           2DEC    -.140117894
 0974                         12,2471   51674 0
 0975                         12,2472   01446 0           2DEC    .049247387
 0975                         12,2473   33641 1
 0976                         12,2474   77451 1           2DEC    -.013081923
 0976                         12,2475   65233 0
 0977                         12,2476   00055 1           2DEC    .002806389
 0977                         12,2477   37266 1
 0978                         12,2500   77767 1           2DEC    -.000529414
 0978                         12,2501   52336 0
 0979    REF  222  LAST 1174  12,2502  0 6042 1           TC      INTPRET
 0980                              12,2503   53605 1        DMP     SRR*                                           PL AT 0
 0981                              12,2504   00001 0                00
 0982                              12,2505   21574 1                0 -5,1
 0983  REF   3  LAST 1173          12,2506   00035 1        STORE   XSQC(X1)        XSQC(XI) (+33 OR +31)
 0984                              12,2507   72405 0        DMP     SL1
 0985  REF   2  LAST 1168          12,2510   00043 0                KEPC1
 0986                              12,2511   65234 1        RTB     PDDL
 0987  REF   9  LAST 1144          12,2512   21634 0                TPMODE          XCH WITH PL. 00=C1 XSQ C(XI) (+49 OR +46
 0988                              12,2513   53605 1        DMP     SRR*                                           PL AT 0,3
 0989  REF   4  LAST 1174          12,2514   00033 1                S(X1)
 0990                              12,2515   21574 1                0 -5,1
 0991                              12,2516   72405 0        DMP     SL1
 0992  REF   2  LAST 1168          12,2517   00045 0                KEPC2
 0993                              12,2520   65234 1        RTB     PDDL            30=C2 XSQ S(XI) (+35 OR +33)  PL AT 6
 0994  REF  10  LAST 1175          12,2521   21634 0                TPMODE
 0995  REF   9  LAST 1172          12,2522   00041 1                R1
 0996                              12,2523   76261 0        SR      TAO
 0997                              12,2524   20607 1                6                                              PL AT 3
 0998                              12,2525   41301 0        NORM    DMP             TO PRESERVE SIGNIF.
 0999  REF  41  LAST 1172          12,2526   00047 1                X1
 1000  REF  18  LAST 1173          12,2527   00025 0                X
 1001                              12,2530   76257 0        SR*     TAO             X(C2 XSQ S(XI) +R1) (+49 OR +46) PL AT 0
 1002                              12,2531   20576 1                0 -3,1
 1003                              12,2532   57232 0        SL4R    DMPR
 1004  REF   4  LAST 1172          12,2533   00023 0                1/ROOTMU
 1005  REF   8  LAST 1173          12,2534   00037 0        STORE   T
 1006                              12,2535   77616 0        RVQ
 1007                          12,2536   71214 0  ITERATOR BONCLR DLOAD
 1008   REF   1                12,2537   00614 1                  SLOPESW
 1009   REF   1                12,2540   24606 1                  FIRSTIME
 1010   REF   1                12,2541   00037 0                  DEP
 1011                          12,2542   60225 1           DSU    NORM
 1012   REF   3  LAST  126     12,2543   02762 0                  DEPREV
 1013   REF  42  LAST 1175     12,2544   00047 1                  X1
 1014                          12,2545   60325 0           PDDL   NORM
 1015   REF   1                12,2546   00015 0                  DELINDEP
 1016   REF  26  LAST 1172     12,2547   00050 1                  X2
 1017                          12,2550   41260 0           XSU,1  DMP
 1018   REF  27  LAST 1176     12,2551   00047 1                  X2
 1019   REF   3  LAST  126     12,2552   02760 1                  DELDEP
 1020                          12,2553   56257 1           SLR*   DDV                 PL UP 2
 1021                          12,2554   21202 1                  1,1
 1022                          12,2555   43142 1           SR1    BOFF
 1023   REF   1                12,2556   04351 1                  ORDERSW
 1024   REF   1                12,2557   24562 0                  SGNCHECK
 1025                          12,2560   75246 0           ABS    SIGN       IN CASE 2ND DERIV. CHANGED SIGN, MUST
 1026   REF   4  LAST 1176     12,2561   02760 1                  DELDEP     DISREGARD IT TO FIND MIN.

 1027                          12,2562   51006 0  SGNCHECK PUSH   BPL        TRIAL DELINDEP               PL DOWN 2
 1028   REF   1                12,2563   24620 0                  POSDEL
 1029                          12,2564   43145 0           DLOAD  BON
 1030   REF   1                12,2565   02766 1                  INDEP
 1031   REF   2  LAST 1176     12,2566   04311 0                  ORDERSW
 1032   REF   1                12,2567   24571 1                  MINCHECK
 1033   REF   1                12,2570   00017 1           STORE  MAX        IF NOT 2ND ORDER, CAN MOVE MAX BOUND IN.

 1034                          12,2571   45221 1  MINCHECK BDSU   DSU
 1035   REF   1                12,2572   00011 1                  MIN
 1036                          12,2573   51000 0           BOV    BPL
 1037   REF   1                12,2574   24600 1                  MODNGDEL
 1038   REF   2  LAST 1176     12,2575   24600 1                  MODNGDEL
 1039                          12,2576   77650 1           GOTO
 1040   REF   1                12,2577   24632 0                  DELCK


 1041                          12,2600   45345 1  MODNGDEL DLOAD  DSU        TRIAL DELINDEP WOULD EXCEED MIN BOUND
 1042   REF   2  LAST 1176     12,2601   00011 1                  MIN
 1043   REF   2  LAST 1176     12,2602   02766 1                  INDEP
 1044                          12,2603   52005 0           DMP    GOTO
 1045   REF   3  LAST 1171     12,2604   11015 0                  DP9/10
 1046   REF   1                12,2605   24634 0                  NEWDEL


 1047                          12,2606   41345 0  FIRSTIME DLOAD  DMP
 1048   REF   3  LAST 1176     12,2607   00011 1                  MIN
 1049   REF   1                12,2610   00051 0                  TWEEKIT    DLOAD TWEEKIT(40D) SENSITIVE TO CHANGE.
 1050                          12,2611   41325 0           PDDL   DMP        S2(41D) SHOULDNT CONTAIN HI ORDER ONES
 1051   REF   2  LAST 1176   12,2612   00017 1                      MAX
 1052   REF   2  LAST 1176   12,2613   00C51 0                      TWEEKIT
 1053                        12,2614   77625 0           OSU
 1054                        12,2615   52165 1           SIGN       GOTO
 1055   REF   5  LAST 1176   12,2616   C2760 1                      OELOEP
 1056   REF   2  LAST 1176   12,2617   24562 0                      SGNCHECK


 1057                        12,2620   43145 0  FOSDEL   DLCAD      BON
 1058   REF   3  LAST 1176   12,2621   C2766 1                      INOEP
 1059   REF   3  LAST 1176   12,2622   04311 0                      ORDERSW
 1060   REF   1              12,2623   24625 0                      MAXCHECK
 1061   REF   4  LAST 1176   12,2624   00011 1           STORE      MIN              IF NOT 2NO CROER, CAN MOVE MIN 8OUNO IN.

 1062                        12,2625   45221 1  MAXCHECK 8OSU       OSU
 1063   REF   3  LAST 1177   12,2626   00C17 1                      MAX
 1064                        12,2627   50000 1           BOV        BMN
 1065   REF   1              12,2630   24636 1                      MODPSOEL
 1066   REF   2  LAST 1177   12,2631   24636 1                      MODPSOEL
 1067                        12,2632   77745 1  DELOK    DLOAO
 1068                        12,2633   00001 0                      OO
 1069   REF   2  LAST 1176   12,2634   00015 0  NEWOEL   STORE      DELINOEP
 1070                        12,2635   77616 0           RVQ


 1071                        12,2636   45345 1  MODPSOEL OLCAO      OSU
 1072   REF   4  LAST 1177   12,2637   00017 1                      MAX
 1073   REF   4 .LAST 1177   12,2640   C2766 1                      INDEP
 1074                        12,2641   52005 0           OMP        GOTC
 1075   REF   4  LAST 1176   12,2642   11015 0                      DP9/10
 1076   REF   2  LAST 1176   12,2643   24634 0                      NEWOEL


 1077   REF 125  LAST 1121   12,2644  4 4753 C  CHECKCTR CS         ONE
 1078   REF  56  LAST 1102   12,2645  5C 120 1           INCEX      FIXLCC
 1079   REF   3  LAST 1168   12,2646  6 CC26 0           AO         ITERCTR
 1080   REF  57  LAST 1177   12,2647  50 120 1           INOEX      FIXLOC
 1081   REF   4  LAST 1177   12,2650  54 026 1           TS         ITERCTR
 1082   REF 735  LAST 1145   12,2651  54 154 0           TS         MPAC
 1083   REF  55  LAST 1088   12,2652  0 6064 0           TC         DANZIG
 1084                            12,2653   44545 0  NEWSTATE DLOAD   SR4R
 1085   REF  10  LAST 1175       12,2654   00041 1                   R1
 1089                            12,2655   74225 1           DSU     VXSC
 1090   REF   4  LAST 1175       12,2656   00035 1                   XSQC(XI)
 1091   REF   3  LAST 1168       12,2657   02722 1                   UR1
 1092                            12,2660   65372 1           VSL1    PDDL              0D=(R1-XSQC(XI))UR1 (+33 OR 31) PL AT 6
 1093   REF  19  LAST 1175       12,2661   00025 0                   X
 1094                            12,2662   60316 0           DSQ     NORM
 1095   REF  43  LAST 1176       12,2663   00047 1                   X1
 1096                            12,2664   57275 0           DMPR    DMPR
 1097   REF   5  LAST 1175       12,2665   00023 0                   1/ROOTMU
 1098   REF  20  LAST 1178       12,2666   00025 0                   X
 1099                            12,2667   53605 1           DMP     SRR*
 1100   REF   5  LAST 1175       12,2670   00033 1                   S(XI)
 1101                            12,2671   21572 1                   0 -7,1
 1102                            12,2672   77621 1           BDSU
 1103   REF   9  LAST 1175       12,2673   00037 0                   T
 1104                            12,2674   74352 0           SL1     VXSC
 1105   REF  10  LAST  697       12,2675   02744 1                   VVEC
 1106                            12,2676   53372 1           VSL1    VAD                                         PL AT 0
 1107                            12,2677   41512 1           VSL4    PUSH
 1108                            12,2700   77646 0           ABVAL
 1109                            12,2701   77701 1  LAMENTER NORM
 1110   REF  44  LAST 1178       12,2702   00047 1                   X1
 1111   REF   1                  12,2703   16720 0           STODL   R2
 1112   REF   4  LAST 1174       12,2704   00031 0                   XI
 1113                            12,2705   45205 1           DMP     DSU
 1114   REF   6  LAST 1178       12,2706   00033 1                   S(XI)
 1115   REF   2  LAST 1172       12,2707   10777 1                   D1/128
 1116                            12,2710   76405 1           DMP     SL1R
 1117   REF   2  LAST 1173       12,2711   00021 1                   ROOTMU
 1118                            12,2712   53605 1           DMP     SLR*
 1119   REF  21  LAST 1178       12,2713   00025 0                   X
 1120                            12,2714   21176 1                   0 -3,1
 1121                            12,2715   74271 0           DDV     VXSC
 1122   REF   2  LAST 1178       12,2716   02720 0                   R2
 1123   REF   4  LAST 1178       12,2717   02722 1                   UR1
 1124                            12,2720   65372 1           VSL1    PDDL              6D=V2VEC PART (+15 OR 13)      PL AT 12
 1125   REF   5  LAST 1178       12,2721   00035 1                   XSQC(XI)
 1126                            12,2722   56257 1           SLR*    DDV
 1127                            12,2723   21175 1                   0 -4,1
 1128   REF   3  LAST 1178       12,2724   02720 0                   R2
 1129                            12,2725   77621 1           BDSU
 1130   REF   2  LAST 1173       12,2726   11013 0                   D1/256
 1131                            12,2727   53361 0           VXSC    VAD                                         PL AT 6
 1132   REF  11  LAST 1178       12,2730   02744 1                   VVEC
 1133                            12,2731   43412 1           VSL8    RVO
R1134
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 1135   REF   3  LAST   45    04,2000                       SETLOC CONICS1
 1136                         04,2773                       BANK

 1137   REF   2 LAST   45 TO   46:    16     16*            COUNT* $$/CONIC
R1138   DO NOT DISTURB THE ORDER OF THESE CDS, OVERLAYS HAVE BEEN MADE.
 1139                         04,2773   00000 1  BEE17      DEC     0                  KEEP WITH D1/8 2DEC 1.0B-17 (0000004000)
 1140                         04,2774   04000 0  D1/8       2DEC    1.0 B-3
 1140                         04,2775   00000 1
 1141                         04,2776   00200 0  D1/128     2DEC    1.0 B-7
 1141                         04,2777   00000 1
 1142                         04,3000   00400 0  D1/64      2DEC    1.0 B-6
 1142                         04,3001   00000 1
 1143                         04,3002   10000 0  D1/4       2DEC    1.0 B-2
 1143                         04,3003   00000 1
 1144                         04,3004   02000 0  D1/16      2DEC    1.0 B-4
 1144                         04,3005   00000 1
 1145                         04,3006   01000 0  D1/32      2DEC    1.0 B-5
 1145                         04,3007   00000 1
 1146                         04,3010   00020 0  D1/1024    2DEC    1.0 B-10
 1146                         04,3011   00000 1
 1147                         04,3012   00100 0  D1/256     2DEC    1.0 B-8
 1147                         04,3013   00000 1
 1148                         04,3014   34631 1  DP9/10     2DEC    .9
 1148                         04,3015   23146 0
 1149   REF   5  LAST 1141    12,2006                KEPZERO    EQUALS LO6ZEROS
 1150                         04,3016   77467 1  -50SC      2DEC    -50.0 B-12
 1150                         04,3017   77777 0
 1151                         04,3020   03110 1  2PISC      2DEC    6.28318530 B-6
 1151                         04,3021   17665 1
 1152   REF   1               04,3005                BEE19      EQUALS D1/32 -1        2DEC 1.0 B-19 (00000 01000)
 1153   REF   3  LAST 1178    04,3011                BEE22      EQUALS D1/256 -1       2DEC 1.0 B-22 (00000 00100)
 1154                         04,3022   00000 1  ONEBIT     2DEC    1.0 B-28
 1154                         04,3023   00001 0
 1155                         04,3024   37767 0  COGUPLIM 2DEC    .999511597
 1155                         04,3025   37737 0
 1156                         04,3026   40010 1  COGLOLIM 2DEC    -.999511597
 1156                         04,3027   40040 1
R1157
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 1158    REF    2  LAST 1167    12,2000                        SETLOC CONICS
 1159                           12,2732                        BANK

 1160    REF    2 LAST 1168 TO  1179:    455   455*            COUNT* $$/CONIC
 1161                           12,2732   43220 0  TIMETHET STQ    SETPD                                          PL AT 0
 1162    REF    1               12,2733   02710 0                  RTNTT
 1163                           12,2734   00001 0                  0
 11635                          12,2735   77600 1           BOV
 11636                          12,2736   24737 1                  +1
 1164                           12,2737   63375 0           VLOAD  PDVL          SETUP FOR PARAM CALL         PL AT 6
 1165    REF    8  LAST  697    12,2740   02655 0                  PVEC
 1166    REF   12  LAST 1178    12,2741   02744 1                  VVEC
 1167                           12,2742   77624 1           CALL
 1168    REF    1               12,2743   11030 1                  PARAM
 1169                           12,2744   45000 0           BOV    CALL                                           PL AT 0
 1170    REF    1               12,2745   24764 1                  COGAOVFL
 1171    REF    1               12,2746   24767 1                  GETX
 1172                           12,2747   43145 0  COMMNOUT DLOAD  BON
 1173    REF    5  LAST 1178    12,2750   00031 0                  XI
 1174    REF    1               12,2751   04310 1                  INFINFLG
 1175    REF    1               12,2752   25752 0                  ABTCONIC
 1176                           12,2753   45014 0           CLEAR  CALL
 1177    REF    1               12,2754   04273 0                  COGAFLAG
 1178    REF    2  LAST 1170    12,2755   24421 0                  DELTIME
 1179                           12,2756   45014 0           BON    CALL
 1180    REF    7  LAST  664    12,2757   03706 0                  RVSW
 1181    REF    2  LAST 1180    12,2760   02710 0                  RTNTT
 1182    REF    1               12,2761   24653 1                  NEWSTATE
 1183                           12,2762   77650 1           GOTO
 1184    REF    3  LAST 1180    12,2763   02710 0                  RTNTT


 1185                           12,2764   77614 1  COGAOVFL SETGO
 1186    REF    2  LAST 1180    12,2765   04033 0                  COGAFLAG
 1187    REF    2  LAST 1180    12,2766   25752 0                  ABTCONIC
 11872                          04,3030                     BANK   4
 11874   REF    4  LAST 1179    04,2000                     SETLOC CONICS1
 11876                          04,3030                     BANK
 11878   REF    3 LAST 1179 TO  1180:     29    45*         COUNT* $$/CONIC
 1188                           04,3030   43020 1  PARAM    STQ    CLEAR         MPAC=V1VEC, 0D=R1VEC         PL AT 6
 1189    REF    2  LAST  126    04,3031   02753 1                  RTNPRM
 1190    REF    7  LAST  773    04,3032   03665 1                  NORMSW
 11901                          04,3033   77614 1           CLEAR
 11902   REF    3  LAST 1180    04,3034   04273 0                  COGAFLAG
 1191                           04,3035   45131 0           SSP    CALL
 1192    REF    7  LAST  774    04,3036   02673 1                  GEOMSGN
 1193                           04,3037   27777 0                  37777         GAMMA ALWAYS LESS THAN 180DEG
 1194    REF    1               04,3040   11074 1                  GEOM          MPAC=SNGA (+1), 0D=CSGA (+1) PL AT 2
 1195                           04,3041   14045 0           STODL  36D           36D=SIN GAMMA (+1)           PL AT 0
 1196                           04,3042   56261 1           SR     DDV
 1197                           04,3043   20606 0                  5

 1198                           04,3044   00045 0                  36D
 1199   REF   2  LAST  126      04,3045   32766 1         STOVL*   COGA
 1200   REF   5  LAST 1168      04,3046   10005 0                  MUTABLE,1
 1201   REF   2  LAST 1168      04,3047   14017 1         STODL    1/MU
 1202   REF   3  LAST  126      04,3050   02720 0                  MAGVEC2
 1203                           04,3051   60316 0         DSQ      NORM
 1204   REF  45  LAST 1178      04,3052   00047 1                  X1
 1205                           04,3053   41275 1         DMPR     DMP
 1206   REF   3  LAST 1181      04,3054   00017 1                  1/MU
 1207   REF  11  LAST 1178      04,3055   00041 1                  P1
 1208                           04,3056   77657 0         SRR*
 1209                           04,3057   21576 0                  0 -3,1
 1210                           04,3060   44206 0         PUSH     80SU              0D=R1 V1SQ/MU (+6)           PL AT 2
 1211   REF   2  LAST 1179      04,3061   11007 0                  01/32
 1212   REF   4  LAST  692      04,3062   16742 1         STODL    R1A               R1A (+6)                     PL AT 0

 1213                           04,3063   60205 0         DMP      NORM
 1214                           04,3064   00045 0                  36D
 1215   REF  46  LAST 1181      04,3065   00047 1                  X1
 1216                           04,3066   53605 1         DMP      SR*
 1217                           04,3067   00045 0                  36D
 1218                           04,3070   20575 1                  0 -4,1
 1219   REF   4  LAST  640      04,3071   02740 0         STORE    P                 P (+4)
 1220                           04,3072   77650 1         GOTO
 1221   REF   3  LAST 1180      04,3073   02753 1                  RTNPRM
 1225                              04,3074   77656 1  GEOM     UNIT                MPAC=V2VEC, 00=R1VEC          PL AT 6
 1226    REF    2  LAST  126       04,3075   16712 1           STODL    U2         U2  (+1)
 1227                              04,3076   00045 0                    360
 1228    REF    4  LAST 1181       04,3077   26720 0           STOVL    MAGVEC2                                  PL AT 0
 1229                              04,3100   77656 1           UNIT
 1230    REF    5  LAST 1178       04,3101   02722 1           STORE    UR1        UR1 (+1)
 1231                              04,3102   72441 0           DOT      SL1
 1232    REF    3  LAST 1182       04,3103   02712 1                    U2
 1233                              04,3104   77725 1           PDDL                00=CSTH (+1)                  PL AT 2
 1234                              04,3105   00045 0                    360
 1235    REF   12  LAST 1181       04,3106   24041 1           STOVL    R1         R1 (+29 OR +27)
 1236    REF    6  LAST 1182       04,3107   02722 1                    UR1
 1237                              04,3110   76435 1           VXV      VSL1
 1238    REF    4  LAST 1182       04,3111   02712 1                    U2
 1239                              04,3112   75214 1           BON      SIGN
 1240    REF    8  LAST 1180       04,3113   03705 0                    NORMSW
 1241    REF    1                  04,3114   11126 1                    HAVENORM
 1242    REF    8  LAST 1180       04,3115   02673 1                    GEOMSGN
 1243                              04,3116   40056 0           UNIT     BOV
 1244    REF    1                  04,3117   11124 0                    COLINEAR
 1245    REF    6  LAST  774       04,3120   16674 0  UNITNORM STODL    UN         UN (+1)
 1246                              04,3121   00045 0                    360
 1247                              04,3122   43565 0           SIGN     RVQ        MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
 1248    REF    9  LAST 1182       04,3123   02673 1                    GEOMSGN


 1249                              04,3124   52162 0  COLINEAR VSR1     GOTO
 1250    REF    1                  04,3125   11120 1                    UNITNORM


 1251                              04,3126   75246 0  HAVENORM ABVAL    SIGN
 1252    REF   10  LAST 1182       04,3127   02673 1                    GEOMSGN
 1253                              04,3130   77616 0           RVQ                 MPAC=SNTH (+1), 34D=SNTH.SNTH (+2)
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1254                         12,2767                      BANK    12
1255   REF    3  LAST 1180   12,2000                      SETLOC  CONICS
1256                         12,2767                      BANK

12565  REF    3 LAST 1180 TO 1180:     25   484*          COUNT*  $$/CONIC
1257                         12,2767   66374 1  GETX      AXT,2   SSP               ASSUMES P (+4) IN MPAC
1258                         12,2770   00003 1                    3
1259   REF   26  LAST 1149   12,2771   00052 0                    S2
1260                         12,2772   00001 0                    1
1261                         12,2773   77614 1            CLEAR
1262   REF    1              12,2774   04276 0                    360SW
1263                         12,2775   65366 1            SQRT    PDDL              0D=SQRT(P)                      PL AT 2
1264   REF    5  LAST  664   12,2776   02732 0                    CSTH
1265                         12,2777   44342 1            SR1     BDSU
1266   REF    2  LAST   37   12,3000   11003 1                    D1/4
1267                         12,3001   54325 1            PDDL    SRR                                           PL AT 4D
1268   REF    7  LAST  664   12,3002   02730 1                    SNTH
1269                         12,3003   21607 0                    6
1270                         12,3004   77671 1            DDV                                                   PL AT 2
1271                         12,3005   77600 1            BOV
1272   REF    1              12,3006   25122 1                    360CHECK
1273                         12,3007   41225 1            DSU     DMP
1274   REF    3  LAST 1181   12,3010   02766 1                    COGA                                              PL AT 0
1275                         12,3011   40132 0            SL2R    BOV
1276   REF    2  LAST 1183   12,3012   25122 1                    360CHECK
1277                         12,3013   63406 0  WLOOP     PUSH    DSQ               0D=W (+5)                         PL AT 2
1278                         12,3014   65351 0            TLOAD   PDDL              2D=WSQ (+10)                      PL AT 5
1279   REF  736  LAST 1177   12,3015   00155 0                    MPAC
1280   REF    5  LAST 1181   12,3016   02742 1                    R1A
1281                         12,3017   76202 0            SR4     TAD                                           PL AT 2
1282                         12,3020   75440 0            BMN     SQRT
1283   REF    1              12,3021   25205 1                    INFINITY
1284                         12,3022   43306 0            ROUND   DAD                                           PL AT 0D
1285                         12,3023   61000 0            BOV     TIX,2
1286   REF    1              12,3024   25120 0                    RESETX2
1287   REF    1              12,3025   25013 1                    WLOOP


1288                         12,3026   40065 0            BDDV    BOV
1289   REF    3  LAST 1178   12,3027   10777 1                    D1/128
1290   REF    2  LAST 1183   12,3030   25205 1                    INFINITY
1291                         12,3031   41440 1  POLYCOEF  BMN     PUSH              0D=1/W (+2) OR 16/W (+6)    PL AT 2
1292   REF    3  LAST 1183   12,3032   25205 1                    INFINITY
1293                         12,3033   77716 1            DSQ
1294                         12,3034   41301 0            NORM    DMP
1295   REF   47  LAST 1181   12,3035   00047 1                    X1
1296   REF    6  LAST 1183   12,3036   02742 1                    R1A
1297                         12,3037   77457 1            SRR*    EXIT
1298                         12,3040   21567 0                    0 -10D,1
1299   REF    6  LAST 1174   12,3041   07225 0            TC      POLY
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 1300                             12,3042   00005 1            DEC     5
 1301                             12,3043   20000 0            2DEC    .5
 1301                             12,3044   00000 1
 1302                             12,3045   72525 0            2DEC    -.166666770
 1302                             12,3046   52471 1
 1303                             12,3047   03146 1            2DEC    .100000392
 1303                             12,3050   15003 0
 1304                             12,3051   75556 0            2DEC    -.071401086
 1304                             12,3052   45210 0
 1305                             12,3053   01615 1            2DEC    .055503292
 1305                             12,3054   15553 0
 1306                             12,3055   76371 0            2DEC    -.047264098
 1306                             12,3056   63777 0
 1307                             12,3057   01232 0            2DEC    .040694204
 1307                             12,3060   27367 0
 1308  REF 223  LAST 1174         12,3061   0 6042 1           TC      INTPRET
 1309                             12,3062   76405 1            DMP     SL1R                                 PL AT 00
 1310                             12,3063   43006 0            PUSH    BON
 1311  REF   2  LAST 1183         12,3064   04316 1                    360SW
 1312  REF   1                    12,3065   25172 1                    TRUE360X
 1313                             12,3066   60316 0   XCOMMON  DSQ     NORM
 1314  REF  48  LAST 1183         12,3067   00047 1                    XI
 1315                             12,3070   53605 1            DMP     SRR*
 1316  REF   7  LAST 1163         12,3071   02742 1                    R1A
 1317                             12,3072   21565 1                    0 -12D,1
 1318  REF   6  LAST 1180         12,3073   14031 0            STODL   XI             XI (+6)

 1319  REF  13  LAST 1182         12,3074   00041 1                    R1
 1320                             12,3075   75542 0            SR1     SQRT
 1321                             12,3076   41306 1            ROUND   DMP
 1322                             12,3077   77632 0            SL4R                                         PL AT 0
 1323  REF  22  LAST 1178         12,3100   00025 0            STORE   X              X (+17 OR +16)

 1324                             12,3101   60316 0            DSQ     NORM
 1325  REF  49  LAST 1184         12,3102   00047 1                    XI
 1326                             12,3103   41325 0            PDDL    DMP            00=XSQ (+34 OR +32 -N1)       PL AT 2
 1327  REF   5  LAST 1181         12,3104   02740 0                    P
 1328  REF  14  LAST 1184         12,3105   00041 1                    R1
 1329                             12,3106   75452 0            SL3     SQRT
 1330                             12,3107   56405 0            DMP     SL3R
 1331  REF   4  LAST 1183         12,3110   02766 1                    COGA
 1332  REF   3  LAST 1175         12,3111   14043 0            STODL   KEPC1
 1333  REF   8  LAST 1184         12,3112   02742 1                    R1A
 1334                             12,3113   43021 0            BDSU    CLEAR
 1335  REF   3  LAST 1168         12,3114   11001 0                    D1/64
 1336  REF   2  LAST 1180         12,3115   04270 0                    INFINFLG
 1337  REF   3  LAST 1175         12,3116   00045 0            STORE   KEPC2
 1338                             12,3117   77616 0            RVQ
 1339                           12,3120    77774 0  RESETX2  AXT,2
 1340                           12,3121    00003 1                  3


 1341                           12,3122    51001 1  360CHECK SETPD  BPL
 1342                           12,3123    00001 0                  00D
 1343     REF   1               12,3124    25127 1                  INVRSEQN
 1344                           12,3125    77614 1           SET
 1345     REF   3  LAST 1184    12,3126    04076 1                  360SW


 1346                           12,3127    75545 1  INVRSEQN DLOAD  SQRT
 1347     REF   6  LAST 1184    12,3130    02740 0                  P
 1348                           12,3131    41325 0           PDDL   DMP                 00=SQRT(P)  (+2)                PL AT 2
 1349     REF   8  LAST 1183    12,3132    02730 1                  SNTH
 1350     REF   5  LAST 1184    12,3133    02766 1                  COGA
 1351                           12,3134    65352 0           SL1    PDDL                2D=SNTH COGA (+5)               PL AT 4
 1352     REF   6  LAST 1183    12,3135    02732 0                  CSTH
 1353                           12,3136    43202 0           SR4    DAD
 1354     REF   3  LAST 1181    12,3137    11007 0                  D1/32
 1355                           12,3140    41225 1           DSU    DMP                                         PL AT 2,D
 1356                           12,3141    55301 0           NORM   BDDV
 1357     REF  50  LAST 1184    12,3142    00047 1                  X1
 1358     REF   9  LAST 1185    12,3143    02730 1                  SNTH
 1359                           12,3144    51457 0           SLR*   ABS                 NOTE: NEAR 360 CASE TREATED DIFFERENTLY
 1360                           12,3145    21174 D                  0 -5,1
 1361                           12,3146    63406 0           PUSH   DSQ                 00=1/W (-1)                 PL AT 2
 1362                           12,3147    14043 0           STODL  34D
 1363     REF   1               12,3150    11005 1                  D1/16
 1364                           12,3151    63406 D  1/WLOOP  PUSH   DSQ                 2D=G (+4)                       PL AT 4
 1365                           12,3152    65234 1           RTB    PDDL                                        PL AT 7
 1366     REF  11  LAST 1175    12,3153    21634 0                  TPMODE
 1367     REF   9  LAST 1184    12,3154    02742 1                  R1A
 1368                           12,3155    40405 1           DMP    SR4
 1369                           12,3156    00043 0                  34D
 1370                           12,3157    77771 0           TAD                                                    PL AT 4
 1371                           12,3160    75440 0           BMN    SQRT
 1372     REF   4  LAST 1183    12,3161    25205 1                  INFINITY
 1373                           12,3162    77615 0           DAD                                         PL AT 2
 1374                           12,3163    60304 0           TIX,2  NORM
 1375     REF   1               12,3164    25151 D                  1/WLOOP
 1376     REF  51  LAST 1185    12,3165    00047 1                  X1
 1377                           12,3166    77665 1           BDDV                                                   PL AT 0
 1378                           12,3167    52057 1           SLR*   GOTO
 1379                           12,3170    21172 D                  0 -7,1
 1380     REF   1               12,3171    25031 1                  POLYCOEF


 1381                           12,3172    50145 1  TRUE360X DLOAD  BMN
 1382     REF  10  LAST 1185    12,3173    02742 1                  R1A
 1383   REF   5  LAST 1185   12,3174    25205 1                     INFINITY
 1384                        12,3175    60366 1              SQRT   NORM
 1385   REF  52  LAST 1185   12,3176    00047 1                     X1
 1386                        12,3177    53665 1              BODV   SL*
 1387   REF   2  LAST 1169   12,3200    11021 1                     2PISC
 1388                        12,3201    20176 0                     0 -3,1
 1389                        12,3202    41425 1              DSU    PUSH         00=2PI/SQRT(R1 A) -X         PL AT 0,2
 1390                        12,3203    77650 1              GOTO
 1391   REF   1              12,3204    25066 0                     XCOMMON
 1392                        12,3205    40001 1   INFINITY   SETPD  BOV          NO SOLUTION EXISTS SINCE CLOSURE THROUGH
 1393                        12,3206    00001 0                     0            INFINITY IS REQUIRED
 1394   REF   1              12,3207    25210 0                     OVFLCLR
 1395                        12,3210    43414 1   OVFLCLR    SET    RVQ
 1396   REF   3  LAST 1184   12,3211    04070 1                     INFINFLG
 1397                          12,3212  40220 0  LAMBERT  STQ     SETPD
 1398   REF    5  LAST  126    12,3213  02710 0                   RTNLAMB
 1399                          12,3214  00001 0                   0D
13995                          12,3215  77600 1           BOV
13996                          12,3216  25217 1                   +1
 1400                          12,3217  76614 0           CLEAR   VLOAD*
 1401   REF    1               12,3220  02674 0                   SOLNSW
 1403   REF    6  LAST 1181    12,3221  10005 0                   MUTABLE,1
 1404   REF    4  LAST 1181    12,3222  14017 1           STODL   1/MU
 1405   REF    3  LAST  689    12,3223  02671 0                   TDESIRED
 1406                          12,3224  77675 0           DMPR
 1407   REF    1               12,3225  11006 1                   BEE19
 1408   REF    2  LAST  126    12,3226  02764 0           STORE   EPSILONL
 1409                          12,3227  77214 0           SET     VLOAD
 1410   REF    2  LAST 1176    12,3230  00474 0                   SLOPESW
 1411   REF    6  LAST  691    12,3231  02655 0                   R1VEC
 1412                          12,3232  45115 0           PDVL    CALL            0D=R1VEC (+29 OR +27)        PL AT 6
 1413   REF   10  LAST  691    12,3233  02663 0                   R2VEC           MPAC=R2VEC (+29 OR +27)
 1414   REF    2  LAST 1180    12,3234  11074 1                   GEOM
 1415   REF   10  LAST 1185    12,3235  16730 1           STODL   SNTH            0D=CSTH (+1)                 PL AT 2
 1416   REF    5  LAST 1182    12,3236  02720 0                   MAGVEC2
 1417                          12,3237  65301 0           NORM    PDDL                                         PL AT 4
 1418   REF   53  LAST 1186    12,3240  00047 1                   X1
 1419   REF   15  LAST 1184    12,3241  00041 1                   R1
 1420                          12,3242  56342 1           SR1     DDV                                          PL AT 2
 1421                          12,3243  65257 1           SL*     PDDL            0XCH WITH 0D, 0D=R1/R2 (+7)  PL AT 0,2
 1422                          12,3244  20173 0                   0 -6,1
 1423                          12,3245  77626 0           STADR
 1424   REF    7  LAST 1165    12,3246  75045 1           STORE   CSTH            CSTH (+1)
 1425                          12,3247  44342 1           SR1     BDSU
 1426   REF    3  LAST 1183    12,3250  11003 1                   D1/4
 1427   REF    2  LAST  126    12,3251  02734 0           STORE   1-CSTH          1-CSTH (+2)

 1428                          12,3252  53106 0           ROUND   BZE
 1429   REF    1               12,3253  25473 0                   360LAMB
 1430                          12,3254  65301 0           NORM    PDDL                                         PL AT 4
 1431   REF   54  LAST 1187    12,3255  00047 1                   X1
 1432                          12,3256  00001 0                   0D
 1433                          12,3257  56342 1           SR1     DDV                                          PL AT 2
 1434                          12,3260  75457 0           SL*     SQRT
 1435                          12,3261  20176 0                   0 -3,1
 1436                          12,3262  54325 1           PDDL    SR              2D=SQRT(2R1/R2(1-CSTH)) (+5) PL AT 4
 1437   REF   11  LAST 1187    12,3263  02730 1                   SNTH
 1438                          12,3264  20607 1                   6
 1439                          12,3265  43271 1           DDV     DAD                                          PL AT 2
 1440   REF    3  LAST 1187    12,3266  02734 0                   1-CSTH
14401                          12,3267  77626 0           STADR
14402   REF    1               12,3270  77760 0           STORE   COGAMAX
 1441                          12,3271  50000 1           BOV     BMN             IF OVFL, COGAMAX=COGUPLIM
 1442   REF    1               12,3272  25277 1                   UPLIM           IF NEG, USE EVEN IF LT COGLOLIM, SINCE
 14421  REF   1              12,3273   25302 1                    MAXCOGA          THIS WOULD BE RESET IN LAMBLOOP
 14422                       12,3274   50025 0           DSU      BMN             IF COGAMAX GT COGUPLIM, COGAMAX=COGUPLIM
 14423  REF   1              12,3275   11025 0                    COGUPLIM
 14424  REF   2  LAST 1188   12,3276   25302 1                    MAXCOGA         OTHERWISE OK, SO GO TO MAXCOGA
 14425                       12,3277   77745 1  UPLIM     DLOAD
 14426  REF   2  LAST 1188   12,3300   11025 0                    COGUPLIM        COGUPLIM=.999511597 = MAX VALUE OF COGA
 14427  REF   2  LAST 1187   12,3301   00017 1           STORE    COGAMAX           NOT CAUSING OVFL IN R1A CALCULATION
 1443                        12,3302   77745 1  MAXCOGA   DLOAD
 1444   REF   8  LAST 1187   12,3303   02732 0                    CSTH
 1445                        12,3304   45261 0           SR       DSU                                            PL AT 0
 1446                        12,3305   20607 1                    6
 1447                        12,3306   77626 0           STADR
 1448   REF   2  LAST  126   12,3307   61041 0           STODL    CSTH-RHO
 1449   REF  11  LAST 1182   12,3310   02673 1                    GEOMSGN
 1450                        12,3311   71240 1           BMN      DLOAD
 1451   REF   1              12,3312   25513 1                    LOLIM
 1452   REF   3  LAST 1188   12,3313   02736 1                    CSTH-RHO
 1453                        12,3314   56352 0           SL1      DDV
 1454   REF  12  LAST 1187   12,3315   02730 1                    SNTH
 1455                        12,3316   77600 1           BOV
 1456   REF   2  LAST 1188   12,3317   25513 1                    LOLIM
 1457   REF   1              12,3320   00011 1  MINCOGA   STORE    COGAMIN         COGAMIN (+5)
 1458                        12,3321   66214 0           BON      SSP
 1459   REF   3  LAST  690   12,3322   00715 1                    GUESSW
 1460   REF   1              12,3323   25477 1                    NOGUESS
 1461   REF   3  LAST 1177   12,3324   00051 0                    TWEEKIT
 1462                        12,3325   00001 0                    00001
 1463                        12,3326   77745 1           DLOAD
 1464   REF   6  LAST 1185   12,3327   02766 1                    COGA


 1465                        12,3330   77605 1  LAMBLOOP  DMP
 1466   REF  13  LAST 1188   12,3331   02730 1                    SNTH
 1467                        12,3332   45342 0           SR1      DSU
 1468   REF   4  LAST 1188   12,3333   02736 1                    CSTH-RHO
 1469                        12,3334   65301 0           NORM     DCOMP           DD=SNTH COGA-(CSTH-RHO) (+7+C(X1)) PL=2
 1470   REF  55  LAST 1187   12,3335   00047 1                    X1
 1471   REF   4  LAST 1187   12,3336   02734 0                    1-CSTH
 1472                        12,3337   56257 1           SL*      DDV             1-CSTH  (+2)                   PL AT 0
 1473                        12,3340   20170 0                    0 -90,1
 1474                        12,3341   53040 0           BMN      BZE
 1475   REF   1              12,3342   25427 1                    NEGP
 1476   REF   2  LAST 1188   12,3343   25427 1                    NEGP
 1477   REF   7  LAST 1185   12,3344   16740 0           STODL    P               P=(1-CSTH)/(SNTH COGA-(CSTH-RHO)) (+4)
 1478   REF   7  LAST 1188   12,3345   02766 1                    COGA
 1479                        12,3346   43316 1           DSQ      DAD
 1480   REF   1              12,3347   11011 1                    D1/1024
 1481                        12,3350   41301 0           NORM     DMP
 1482   REF  56  LAST 1188   12,3351   00047 1                    X1
 1483   REF   8  LAST 1188   12,3352   02740 0                    P
 1484                          12,3353   44257 1               SR*    BOSU
 1485                          12,3354   20571 0                      0 -80,1
 1486   REF   4  LAST 1185     12,3355   11007 0                      D1/22
 1487   REF  11  LAST 1185     12,3356   16742 1               STODL  R1A             R1A=2-P(1+COGA COGA) (+6)

 1488   REF   9  LAST 1188     12,3357   02740 0                      P
 1489                          12,3360   45000 0               BDV    CALL
 1490   REF   1                12,3361   25432 0                      HIENERGY
 1491   REF   2  LAST 1180     12,3362   24767 1                      GETX
 1492                          12,3363   77745 1               DLOAD
 1493   REF  10  LAST 1178     12,3364   00037 0                      T
 1494   REF   1                12,3365   16762 0               STODL  TPREV
 1495   REF   7  LAST 1184     12,3366   00031 0                      XI
 1496                          12,3367   45014 0               BDN    CALL
 1497   REF   4  LAST 1186     12,3370   04310 1                      INFINFLG
 1498   REF   3  LAST 1188     12,3371   25427 1                      NEGP            HAVE EXCEEDED THEORETICAL BOUNDS
 1499   REF   3  LAST 1180     12,3372   24421 0                      DELTIME
 1500                          12,3373   44200 0               BOV    BOSU
 1501   REF   1                12,3374   25447 1                      BIGTIME
 1502   REF   4  LAST 1187     12,3375   02671 0                      TDESIRED
 1503   REF   1                12,3376   02760 1               STORE  TERRLAMB
 1504                          12,3377   44246 1               ABS    BDSU
 1505   REF   3  LAST 1187     12,3400   02764 0                      EPSILONL
 1506                          12,3401   47044 1               BPL    RTB
 1507   REF   1                12,3402   25516 1                      INITV
 1508   REF   2  LAST 1171     12,3403   24644 1                      CHECKCTR
 1509                          12,3404   43030 0               BHIZ   BDN
15091   REF   1                12,3405   25460 1                      SUFFCHEK
15092   REF   3  LAST 1187     12,3406   00714 0                      SLOPESW
15093   REF   1                12,3407   25415 0                      GOITER
15094                          12,3410   45345 1               DLOAD  DSU
15095   REF  11  LAST 1189     12,3411   00037 0                      T
15096   REF   2  LAST 1189     12,3412   02762 0                      TPREV
15097                          12,3413   77654 0               BZE
 1510   REF   2  LAST 1189     12,3414   25460 1                      SUFFCHEK
15105                          12,3415   77624 1   GOITER      CALL
 1511   REF   1                12,3416   24536 1                      ITERATOR
 1512                          12,3417   53145 1               DLOAD  BZE
 1513   REF 737  LAST 1183     12,3420   00155 0                      MPAC
 1514   REF   3  LAST 1189     12,3421   25460 1                      SUFFCHEK
 1515                          12,3422   77615 0               DAD
 1516   REF   8  LAST 1188     12,3423   02766 1                      COGA
 1517   REF   9  LAST 1189     12,3424   02766 1               STORE  COGA
 1518                          12,3425   77650 1               GOTO
 1519   REF   1                12,3426   25330 0                      LAMBLOOP


 1520                          12,3427   51145 0   NEGP        DLOAD  BPL             IMPOSSIBLE TRAJECTORY DUE TO INACCURATE
 1521   REF   1                12,3430   00015 0                      DCOGA           BOUND CALCULATION. TRY NEW COGA.
 1522   REF   1                12,3431   25452 0                      LOENERGY
 1523                               12,3432    71201 1  HIENERGY SETPD   DLOAD           HIGH ENERGY TRAJECTORY RESULTED
 1524                               12,3433    00001 0                   0
 1525   REF  10   LAST 1189         12,3434    02766 1                   COGA            IN OVFL OF P OR RIA, OR XI EXCEEDING 50.
 1526   REF   2   LAST 1188         12,3435    00011 1           STORE   COGAMIN         THIS IS THE NEW BOUND.
 1527                               12,3436    70545 1  COMMONLM DLOAD   SR1
 1528   REF   2   LAST 1189         12,3437    00015 0                   DCOGA
 1529   REF   3   LAST 1190         12,3440    00015 0           STORE   DCOGA           USE DCOGA/2 AS DECREMENT
 1530                               12,3441    44254 1           BZE     BDSU
 15301  REF   4   LAST 1189         12,3442    25460 1                   SUFFCHEK
 1531   REF  11   LAST 1190         12,3443    02766 1                   COGA
 1532   REF  12   LAST 1190         12,3444    02766 1           STORE   COGA
 1533                               12,3445    77650 1           GOTO                    RESTART THIS LOOP
 1534   REF   2   LAST 1189         12,3446    25330 0                   LAMBLOOP


 1535                               12,3447    77745 1  EIGTIME  DLOAD
 1536   REF   3   LAST 1189         12,3450    02762 0                   TPREV
 1537   REF  12   LAST 1189         12,3451    00037 0           STORE   T


 1538                               12,3452    71201 1  LOENERGY SETPD   DLOAD           LOW ENERGY TRAJECTORY RESULTED
 1539                               12,3453    00001 0                   0
 1540   REF  13   LAST 1190         12,3454    02766 1                   COGA            IN OVERFLOW OF TIME.
 1541   REF   3   LAST 1188         12,3455    00017 1           STORE   COGAMAX         THIS IS THE NEW BOUND.
 1542                               12,3456    77650 1           GOTO
 1543   REF   1                     12,3457    25436 1                   COMMONLM


 1544                               12,3460    51545 1  SUFFCHEK DLOAD   ABS
 1545   REF   2   LAST 1189         12,3461    02760 1                   TERRLAMB
 1546                               12,3462    41325 0           PDDL    DMP                                             PL AT 20
 1547   REF   5   LAST 1189         12,3463    02671 0                   TDESIRED
 1548   REF   1                     12,3464    10774 1                   BEE17
 1549                               12,3465    45215 0           DAD     DSU                                             PL AT 00
 1550   REF   1                     12,3466    11023 0                   ONEBIT
 1551                               12,3467    43044 0           BPL     SETGO
 1552   REF   2   LAST 1189         12,3470    25516 1                   INITV
 1553   REF   2   LAST 1187         12,3471    02434 0                   SOLNSW
 1554   REF   3   LAST 1190         12,3472    25516 1                   INITV
 1555                               12,3473    43001 1  36CLAMB  SETPD   SETGO           LAMBERT CANNOT HANDLE CSTH=1
 1556                               12,3474    00001 0                   0
 1557   REF   3   LAST 1190         12,3475    02434 0                   SOLNSW
 1558   REF   6   LAST 1187         12,3476    02710 0                   RTNLAMB


 1559                               12,3477    71331 0  NOGUESS  SSP     DLOAD
 1560   REF   4   LAST 1188         12,3500    00051 0                   TWEEKIT
 1561                               12,3501    10000 0                   20000
 1562   REF   3   LAST 1190         12,3502    00011 1                   COGAMIN
 1563                               12,3503    65342 1           SR1     PDDL                                            PL AT 2
 1564   REF    4  LAST 1190    12,3504    00017 1                       COGAMAX
 1565                          12,3505    43342 0             SR1       DAD
 1566                          12,3506    77626 0             STADR                                              PL AT 0
 1567   REF   14  LAST 1190    12,3507    75011 0             STORE     COGA
 1568   REF    4  LAST 1190    12,3510    00015 0             STORE     DCOGA
 1569                          12,3511    77650 1             GOTO
 1570   REF    3  LAST 1190    12,3512    25330 0                       LAMBLOOP


 1574                          12,3513    52145 0  LOLIM      DLOAD     GOTO
 1575   REF    1               12,3514    11027 1                       COGLOLIM        COGLOLIM=-.999511597
 1576   REF    1               12,3515    25320 1                       MINCOGA


 1577                          12,3516    60345 0  INITV      DLOAD     NORM
 1578   REF   16  LAST 1187    12,3517    00041 1                       R1
 1579   REF   57  LAST 1188    12,3520    00047 1                       X1
 1580                          12,3521    70525 1             PDDL      SR1                                        PL AT 2
 1581   REF   10  LAST 1189    12,3522    02740 0                       P
 1582                          12,3523    77671 1             DDV                                                  PL AT 0
 1583                          12,3524    75457 0             SL*       SQRT
 1584                          12,3525    20175 0                       0 -4,1
 1585                          12,3526    72405 0             DMP       SL1
 1586   REF    3  LAST 1178    12,3527    00021 1                       ROOTMU
 1587                          12,3530    41206 0             PUSH      DMP             00=VTAN (+7)               PL AT 2
 1588   REF   15  LAST 1191    12,3531    02766 1                       COGA
 1589                          12,3532    74261 1             SL        VXSC
 1590                          12,3533    20206 1                       5
 1591   REF    7  LAST 1182    12,3534    02722 1                       UR1
 1592                          12,3535    77725 1             PDDL                      XCH WITH 00                PL AT 0,6
 1593                          12,3536    76561 1             VXSC      VSL1
 1594   REF    7  LAST 1182    12,3537    02674 0                       UN
 1595                          12,3540    53235 0             VXV       VAD                                        PL AT 0
 1596   REF    8  LAST 1191    12,3541    02722 1                       UR1
 1597                          12,3542    77772 0             VSL1
 1599   REF   13  LAST 1180    12,3543    02744 1             STORE     VVEC
 1600                          12,3544    53135 0             SLOAD     BZE
 1601   REF    5  LAST  691    12,3545    02702 0                       VTARGTAG
 1602   REF    1               12,3546    25551 1                       TARGETV
 1603                          12,3547    77650 1             GOTO
 1604   REF    7  LAST 1190    12,3550    02710 0                       RTNLAMB


 1605                          12,3551    45145 0  TARGETV    DLOAD     CALL
 1606   REF    6  LAST 1187    12,3552    02720 0                       MAGVEC2
 1607   REF    1               12,3553    24701 1                       LAMENTER
 1608   REF    4  LAST  692    12,3554    02703 1             STORE     VTARGET
 1609                          12,3555    77650 1             GOTO
 1610   REF    8  LAST 1191    12,3556    02710 0                       RTNLAMB
 1611                          12,3557   40220 0  TIMERAD  STQ     SETPD                                      PL AT 0
 1612   REF   1                12,3560   02710 0                   RTNTR
 1613                          12,3561   00001 0                   0
 16135                         12,3562   77600 1           BOV
 16136                         12,3563   25564 1                   +1
 1614                          12,3564   63375 0           VLOAD   PDVL                                       PL AT 6
 1615   REF   9  LAST 1180     12,3565   02655 0                   RVEC
 1616   REF  14  LAST 1191     12,3566   02744 1                   VVEC
 1617                          12,3567   77624 1           CALL
 1618   REF   2  LAST 1180     12,3570   11030 1                   PARAM
 1619                          12,3571   71200 0           BOV     DLOAD                                      PL AT 0
 1620   REF   2  LAST 1180     12,3572   24764 1                   COGAOVFL
 1621   REF   5  LAST 1189     12,3573   11007 0                   D1/32
 1622                          12,3574   41225 1           DSU     DMP
 1623   REF  12  LAST 1189     12,3575   02742 1                   R1A
 1624   REF  11  LAST 1191     12,3576   02740 0                   P
 1625                          12,3577   41366 1           SQRT    DMP
 1626   REF  16  LAST 1191     12,3600   02766 1                   COGA
 1627                          12,3601   74212 0           SL4     VXSC
 1628   REF   5  LAST 1182     12,3602   02712 1                   U2
 1629                          12,3603   45325 1           PDDL    DSU                                        PL AT 6
 1630   REF   4  LAST 1184     12,3604   11001 0                   D1/64
 1631   REF  13  LAST 1192     12,3605   02742 1                   R1A
 1632                          12,3606   52361 1           VXSC    VSU                                        PL AT 0
 1633   REF   9  LAST 1191     12,3607   02722 1                   UR1
 1634                          12,3610   53512 1           VSL4    UNIT
 16345                         12,3611   77600 1           BOV
 16346  REF   1                12,3612   25670 1                   CIRCULAR
 1635                          12,3613   60325 0           PDDL    NORM      0D=UNIT(ECC) (+3)                PL AT 6
 1636   REF   3  LAST  627     12,3614   02756 1                   RDESIRED  36D=ECC (+3)
 1637   REF  58  LAST 1191     12,3615   00047 1                   X1
 1638                          12,3616   41325 0           PDDL    DMP                                  PL AT 8
 1639   REF  17  LAST 1191     12,3617   00041 1                   R1
 1640   REF  12  LAST 1192     12,3620   02740 0                   P
 1641                          12,3621   56257 1           SL*     DDV                                  PL AT 6
 1642                          12,3622   20201 0                   0,1
 1643                          12,3623   56225 1           DSU     DDV
 1644   REF   2  LAST 1185     12,3624   11005 1                   D1/16
 1645                          12,3625   00045 0                   36D       36D=ECC (+3)
 1646   REF   1                12,3626   00031 0           STORE   COSF
 1647                          12,3627   63400 0           BOV     DSQ
 1648   REF   1                12,3630   25674 0                   BADR2
 1649                          12,3631   50021 1           BDSU    BMN
 1650   REF   4  LAST 1187     12,3632   11003 1                   D1/4
 16505  REF   2  LAST 1192     12,3633   25674 0                   BADR2
 1651                          12,3634   75366 0           SQRT    SIGN
 1652   REF   2  LAST  126     12,3635   02755 1                   SGNRDOT
 16525                         12,3636   77614 1           CLEAR
 1653   REF   1                12,3637   04272 1                   APSESW
 1654                           12,3640   76561 1  TERMNVEC VXSC    VSL1
 1655   REF    8  LAST 1191     12,3641   02674 0                   UN
 1656                           12,3642   63235 0           VXV     POVL               VXCH WITH 00                PL AT 0,6
 1657                           12,3643   00001 0                   00
 1658                           12,3644   53361 0           VXSC    VAO                                            PL AT 0
 1659   REF    2  LAST 1192     12,3645   00031 0                   COSF
 1660                           12,3646   41572 1           VSL1    PUSH               00=U2                       PL AT 6

 1661                           12,3647   56241 0           DOT     ODV                LIMITS RESULT TO POSMAX OR NEGMAX
 1662   REF   10  LAST 1192     12,3650   02722 1                   UR1
 16622  REF    1                12,3651   25766 1                   DP1/4
 16624                          12,3652   40142 1           SR1     BOV                SCALE BACK DOWN TO NORMAL
 16625                          12,3653   25654 1                   +1                 CLEAR OVFIND IF SET
 1663   REF    9  LAST 1188     12,3654   26732 0           STCVL   CSTH               CSTH (+1)
 1664   REF   11  LAST 1193     12,3655   02722 1                   UR1
 1665                           12,3656   76435 1           VXV     VSL1
 1666                           12,3657   72441 0           DOT     SL1
 1667   REF    9  LAST 1193     12,3660   02674 0                   UN
 1668   REF   14  LAST 1188     12,3661   16730 1           STCDL   SNTH               SNTH (+1)
 1669   REF   13  LAST 1192     12,3662   02740 0                   P
 1670                           12,3663   77624 1           CALL
 1671   REF    3  LAST 1189     12,3664   24767 1                   GETX
 1672                           12,3665   77614 1           CLRGO
 16725  REF    4  LAST 1190     12,3666   02634 1                   SOLNSW
 1673   REF    1                12,3667   24747 0                   COMMNCUT


 16734                          12,3670   43001 1  CIRCULAR SETPD   SETGO
 16735                          12,3671   00001 0                   0
 16736  REF    5  LAST 1193     12,3672   02434 0                   SOLNSW
 16737  REF    3  LAST 1180     12,3673   25752 0                   ABTCONIC


 1674                           12,3674   75345 1  8ACR2    DLCAO   SIGN
 16741  REF    3  LAST  325     12,3675   24005 1                   LOOPHALF
 16742  REF    3  LAST 1193     12,3676   00031 0                   COSF
 16743  REF    4  LAST 1193     12,3677   14031 0           STCOL   COSF
 1675   REF    3  LAST 1169     12,3700   24007 0                   KEPZERO
 16755                          12,3701   77614 1           SETGO
 1676   REF    2  LAST 1192     12,3702   04032 1                   APSESW
 1677   REF    1                12,3703   25640 1                   TERMNVEC
 1678                         12,3704   40220 0  APSIDES  STC    SETPD                                        PL AT  0
 1679    REF   1              12,3705   02710 0                  RTNAPSE
 1680                         12,3706   00001 0                  0D
 16805                        12,3707   77600 1           BOV
 16806                        12,3710   25711 1                  +1
 1681                         12,3711   63375 0           VLOAD  PDVL                                         PL AT  6
 1682    REF  10  LAST 1192   12,3712   02655 0                  RVEC
 1683    REF  15  LAST 1192   12,3713   02744 1                  VVEC
 1684                         12,3714   77624 1           CALL
 1685    REF   3  LAST 1192   12,3715   11030 1                  PARAM
 1686                         12,3716   77600 1           BOV                                                 PL AT  0
 1687    REF   1              12,3717   25720 0                  GETECC
 1688                         12,3720   42405 0  GETECC   DMP    SL4
 1689    REF  14  LAST 1192   12,3721   02742 1                  R1A
 1690                         12,3722   75421 1           BDSU   SQRT
 1691    REF   5  LAST 1192   12,3723   11001 0                  D1/64
 1692    REF   3  LAST  640   12,3724   02752 0           STORE  ECC
 1693                         12,3725   65215 1           DAD    PDDL                                         PL AT  2
 1694    REF   1              12,3726   10775 0                  D1/8
 1695    REF  18  LAST 1192   12,3727   00041 1                  R1
 1696                         12,3730   72405 0           DMP    SL1
 1697    REF  14  LAST 1193   12,3731   02740 0                  P
 1698                         12,3732   77671 1           DDV                                                 PL AT  0
 1699                         12,3733   60325 0           PDDL   NORM            0D=RP (+29 OR +27)           PL AT  2
 1700    REF  15  LAST 1194   12,3734   02742 1                  R1A
 1701    REF  59  LAST 1192   12,3735   00047 1                  X1
 1702                         12,3736   53725 1           PDDL   SL*                                          PL AT  4
 1703    REF  19  LAST 1194   12,3737   00041 1                  R1
 1704                         12,3740   20174 1                  0 -5,1
 1705                         12,3741   45271 1           DDV    DSU                                          PL AT 2,0
 1706                         12,3742   50000 1           BOV    BMN
 1707    REF   1              12,3743   25747 1                  INFINAPO
 1708    REF   2  LAST 1194   12,3744   25747 1                  INFINAPO
 1709                         12,3745   77650 1           GOTO
 1710    REF   2  LAST 1194   12,3746   02710 0                  RTNAPSE
 1711                         12,3747   52145 0  INFINAPO DLOAD  GOTO            RETURNS WITH APOAPSIS IN MPAC,PERIAPSIS
 1712    REF   1              12,3750   24020 0                  LDPOSMAX
 1713    REF   3  LAST 1194   12,3751   02710 0                  RTNAPSE         THAT PL IS AT 0.
 17136                      12,3752   77776 1  RETCONIC EXIT
 17137  REF   4  LAST  821  12,3753  C 5642 1           TC      POODOO
 17138                      12,3754   20607 1           OCT     20607

 1725   REF   3  LAST  704  12,2017            LOPOSMAX EQUALS LOOPMAX         OPPOSMAX IN LOW MEMORY.

R1727   ERASABLE ASSIGNMENTS


R1728   KEPLER SUBROUTINE

R1729       INPUT -
R1730   RRECT      ERASE  +5
R1731   VRECT      ERASE  +5
R1732   TAU.       ERASE  +1
R1733   XKEP       ERASE  +1
R1734   TC         ERASE  +1
R1735   XPREV      ERASE  +1
 1736                       0016               1/MU      EQUALS 14D
 1737                       0020               ROOTMU    EQUALS 16D
 1738                       0022               1/ROOTMU  EQUALS 18D
R1739       OUTPUT -
R1740   RCV        ERASE  +5
R1741   VCV        ERASE  +5
R1742   RC         ERASE  +1
R1743   XPREV      ERASE  +1

R1744   DEBRIS -
 1745                       0010               ALPHA     EQUALS 8D
 1746                       0012               XMAX      EQUALS 10D
 1747                       0014               XMIN      EQUALS 12D
 1748                       0024               X         EQUALS 20D
 1749                       0030               XI        EQUALS 24D
 1750                       0032               S(XI)     EQUALS 26D
 1751                       0034               XSQC(XI)  EQUALS 28D
 1752                       0036               T         EQUALS 30D
 1753                       0040               R1        EQUALS 32D
 1754                       0042               KEPC1     EQUALS 34D
 1755                       0044               KEPC2     EQUALS 36D
R1756   DELX       ERASE  +1
R1757   DELT       ERASE  +1
R1758   URRECT     ERASE  +5
R1759   RCNORM     ERASE  +1
R1760   XPREV      EQUALS XKEP


R1761   LAMBERT SUBROUTINE

R1762       INPUT-
R1763   R1VEC      ERASE  +5
```

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R1764   R2VEC     ERASE  +5
R1765   TDESIRED  ERASE  +1
R1766   GEOMSGN   ERASE  +0
R1767   GUESSW                                         0 IF COGA GUESS AVAILABLE, 1 IF NOT
R1768   COGA      ERASE  +1                            INPUT ONLY IF GUESSW IS ZERO.
R1769   NORMSW                                         0 IF UN TO BE COMPUTED, 1 IF UN INPUT
R1770   UN        ERASE  +5                            ONLY USED IF NORMSW IS 1
R1771   VTARGTAG  ERASE  +0
R1772   TWEEKIT   EQUALS 40D                           ONLY USED IF GUESSW IS 0

R1773      OUTPUT -
R1774   VTARGET   ERASE  +5                            AVAILABLE ONLY IF VTARGTAG IS ZERO.
R1775   V1VEC     EQUALS MPAC

R1776      DEBRIS -
R1777   RTNLAMB   ERASE  +0
R1778   U2        ERASE  +5
R1779   MAGVEC2   ERASE  +1
R1780   UR1       ERASE  +5
R1781   R1        EQUALS 31D
R1782   UN        ERASE  +5
R1783   SNTH      ERASE  +1
R1784   CSTH      ERASE  +1
R1785   1-CSTH    ERASE  +1
R1786   CSTH-RHO  ERASE  +1
 1787                          0016          COGAMAX  EQUALS 14D          CLOBBERS 1/MU
 1788                          0010          COGAMIN  EQUALS 8D
 1789                          0014          DCOGA    EQUALS 12D
R1790   TWEEKIT   EQUALS 40D
R1791   P         ERASE  +1
R1792   COGA      ERASE  +1
R1793   R1A       ERASE  +1
R1794   X         EQUALS 20D
R1795   XSQ       EQUALS 22D
R1796   XI        EQUALS 24D
R1797   S(XI)     EQUALS 26D
R1798   XSQC(XI)  EQUALS 28D
R1799   T         EQUALS 30D
R1800   KEPC1     EQUALS 34D
R1801   KEPC2     EQUALS 36D
R1802   SLOPESW
R1803   SOLNSW
R1804   OTHERS -

R1805   RVEC      EQUALS R1VEC
R1806   VVEC      ERASE  +5
R1807   COGAFLAG
R1808   RVSW
R1809   INFINFLG
R1810   APSESW
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R1811   36DSW
R1812   RTNTT    EQUALS RTNLAMB
R1813   ECC      ERASE  +1
R1814   RTNTR    EQUALS RTNLAMB
R1815   RTNAPSE  EQUALS RTNLAMB.
R1816   R2       EQUALS MAGVEC2
 1817                             0030          COSF     EQUALS 24D
R1818   RTNPRM   ERASE  +0
R1819   SGNRDOT  ERASE  +0
R1820   RDESIRED ERASE  +1


R1821   ITERATOR SUBROUTINE

R1822   CFDERSW
 1823                             0016          MAX      EQUALS 14D                CLOBBERS 1/MU
 1824                             0010          MIN      EQUALS 8D
R1825   INDEP    ERASE  +1
 1826                             0014          DELINDEP EQUALS 12D
 1827                             0026          ITERCTR  EQUALS 22D
 1828                             0036          DEP      EQUALS 30D
R1829   DELDEP   ERASE  +1
R1830   DEPREV   ERASE  +1
 1831                             0050          TWEEKIT  EQUALS 40D


R1832   MORE KEPLER

R1833   EPSILONT ERASE  +1


R1834   MORE LAMBERT

R1835   TERRLAMB EQUALS DELDEP
R1836   TPREV    EQUALS DEPREV


R1837   EPSILONL EQUALS EPSILONT +2     DOUBLE PRECISION WORD
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R0006    1.0 INTRODUCTION
R0007    ----------------
R0008
R0009    FROM A USERS POINT OF VIEW, ORBITAL INTEGRATION IS ESSENTIALLY THE SAME AS THE 278 INTEGRATION
R0011    PROGRAM. THE SAME ENTRANCES TO THE PROGRAM WILL BE MAINTAINED, THE SAME STALLING ROUTINE WILL BE USED AND
R0013    OUTPUT WILL STILL BE VIA THE PUSHLIST. THE PRIMARY DIFFERENCES TO A USER INVOLVE THE ADDED CAPABILITY OF
R0015    TERMINATING INTEGRATION AT A SPECIFIC FINAL RADIUS AND THE DIFFERENCE IN STATE VECTOR SCALING INSIDE AND OUT-
R0017    SIDE THE LUNAR SPHERE OF INFLUENCE.
R0018
R0019    IN ORDER TO MAKE THE CSM(LEM)PREC AND CSM(LEM)CONIC ENTRANCES SIMILAR TO FLIGHT 278, THE INTEGRATION PROGRAM
R0021    WILL ITSELF SET THE FINAL RADIUS (RFINAL) TO 0 SO THAT REACHING THE DESIRED TIME ONLY WILL TERMINATE
R0023    INTEGRATION. THE DP REGISTER RFINAL MUST BE SET BY USERS OF INTEGRVS AND INTEGRV, AND MUST BE DONE AFTER THE
R0025    CALL TO INTSTALL.
R0026
R0027    WHEN THE LM IS ON THE LUNAR SURFACE (INDICATED BY LUNAR SURFACE FLAG SET) CALLS TO LEMCONIC, LEMPREC, AND
R0029    INTEGRV WITH VINFLAG = 0 WILL RESULT IN THE USE OF THE PLANETARY INERTIAL ORIENTATION SUBROUTINES TO PROVIDE
R0031    BOTH THE LMS POSITION AND VELOCITY IN THE REFERENCE COORDINATE  SYSTEM.
R0032    THE PROGRAM WILL PROVIDE OUTPUT AS IF INTEGRATION WAS USED. THAT IS, THE PUSHLIST WILL BE SET AS NOTED BELOW AND
R0034    THE PERMANENT STATE VECTOR UPDATED WHEN SPECIFIED BY AN INTEGRV CALL.
R0035
R0036    USERS OF INTEGRVS DESIRING INTEGRATION (INTYPFLG = 0) SHOULD NOTE THAT THE OBLATENESS PERTURBATION COMPUTATION
R0038    IN LUNAR ORBIT IS TIME DEPENDENT. THEREFORE, THE USER SHOULD SUPPLY AN INITIAL STATE VECTOR VALID AT SOME REAL
R0040    TIME AND THE DESIRED TIME (TDEC1) ALSO AT SOME REAL TIME. FOR CONIC ,,INTEGRATION,, THE USER MAY STILL USE ZERO
R0042    AS THE INITIAL TIME AND DELTA TIME AS THE DESIRED TIME.
R0043
R0044    2.0 GENERAL DESCRIPTION
R0045    -----------------------
R0046
R0047    THE INTEGRATION PROGRAM OPERATES AS A CLOSED INTERPRETIVE SUBROUTINE AND PERFORMS THESE FUNCTIONS---
R0049       1) INTEGRATES (PRECISION OR CONIC) EITHER CSM OR LM STATE VECTOR
R0050       2) INTEGRATES THE W-MATRIX
R0051       3) PERMANENT OR TEMPORARY UPDATE OF THE STATE VECTOR
R0052
R0053    THERE ARE SIX ENTRANCES TO THE INTEGRATION PROGRAM. FOUR OF THESE (CSMPREC, LEMPREC, CSMCONIC, LEMCONIC) SET
R0055    ALL THE FLAGS REQUIRED IN THE INTEGRATION PROGRAM ITSELF TO CAUSE THE PRECISION OR CONIC INTEGRATION (KEPLER) OF
R0057    THE LM OR CSM STATE VECTOR, AS THE NAMES SUGGEST. ONE ENTRANCE (INTEGRVS) PERMITS THE CALLING PROGRAM TO
R0059    PROVIDE A STATE VECTOR TO BE INTEGRATED. THE CALLING PROGRAM MUST SET THE FLAGS INDICATING (1) PRECISION OR
R0061    CONIC INTEGRATION, (2) IN OR OUT OF LUNAR SPHERE, (3) MIDCOURSE OR NOT, AND THE INTEGRATION PROGRAM COMPLETES
R0063    THE FLAG SETTING TO BYPASS W-MATRIX INTEGRATION. THE LAST ENTRANCE (INTEGRV, USED IN GENERAL BY THE
R0065    NAVIGATION PROGRAMS) PERMITS THE CALLER TO SET FIVE FLAGS (NOT MOONFLAG OR MIDFLAG) BUT NOT TO INPUT A STATE
R0067    VECTOR. ANY PROGRAM WHICH CALLS INTEGRVS OR INTEGRV MUST CALL INTSTALL BEFORE IT SETS THE INTEGRATION FLAGS
R0069    AND/OR STATE VECTOR.
R0070
R0071    THREE SETS OF 42 REGISTERS AND 2 FLAGS ARE USED FOR THE STATE VECTORS. TWO SETS, WHICH MAY NOT BE OVERLAYED, ARE
R0073    USED FOR THE PERMANENT STATE VECTORS FOR THE CSM AND LM. THE THIRD SET, WHICH MAY BE OVERLAYED WHEN INTEGRATION
R0075    IS NOT BEING DONE, IS USED IN THE COMPUTATIONS.
R0076
R0077    THE PERMANENT STATE VECTORS WILL BE PERIODICALLY UPDATED SO THAT THE VECTORS WILL NOT BE OLDER THAN 4 TIMESTEPS.
R0079    THE PERMANENT STATE VECTORS WILL ALSO BE UPDATED WHENEVER THE W-MATRIX IS INTEGRATED OR WHEN A CALLER OF INTEGRV
R0081    SETS STATEFLG (THE NAVIGATION PROGRAMS P20, P22.)
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APPENDIX B OF THE USERS GUIDE LISTS THE STATE VECTOR QUANTITIES.

2.1 RESTARTS

PHASE CHANGES WILL BE MADE IN THE INTEGRATION PROGRAM ONLY FOR THE INTEGRV ENTRANCE (I.E., WHEN THE W-MATRIX IS
INTEGRATED OR PERMANENT STATE VECTOR IS UPDATED.) THE GROUP NUMBER USED WILL BE THAT FOR THE P20-25 PROGRAMS
(I.E., GROUP2) SINCE THE INTEGRV ENTRANCE WILL ONLY BE USED BY THESE PROGRAMS. IF A RESTART OCCURS DURING AN
INTEGRATION OF THE STATE VECTOR ONLY, THE RECOVERY WILL BE TO THE LAST PHASE IN THE CALLING PROGRAM. CALLING
PROGRAMS WHICH USE THE INTEGRV OR INTEGRVS ENTRANCE OF INTEGRATION SHOULD ENSURE THAT IF PHASE CHANGING IS DONE
THAT IT IS PRIOR TO SETTING THE INTEGRATION INPUTS IN THE PUSHLIST.
THIS IS BECAUSE THE PUSHLIST IS LOST DURING A RESTART.

2.2 SCALING

THE INTEGRATION ROUTINE WILL MAINTAIN THE PERMANENT MEMORY STATE VECTORS IN THE SCALING AND UNITS DEFINED IN
APPENDIX B OF THE USERS GUIDE. THE SCALING OF THE OUTPUT POSITION VECTORDEPENDS ON THE ORIGIN OF THE COORDINATE
 SYSTEM AT THE DESIRED INTEGRATION TIME. THE COORDINATE SYSTEM TRANSFORMATION WILL BE DONE AUTOMATICALLY ON
MULTIPLE TIMESTEP ENCKE INTEGRATION ONLY. THUS IT IS POSSIBLE TO HAVE OUTPUT FROM SUCCESSIVE INTEGRATIONS IN
DIFFERENT SCALING.
HOWEVER, RATT, VATT WILL ALWAYS BE SCALED THE SAME.

3.0 INPUT/OUTPUT
----------------

PROGRAM INPUTS ARE THE FLAGS DESCRIBED IN APPENDIX A AND THE PERMANENT STATE VECTOR QUANTITIES DESCRIBED IN AP-
PENDIX B OF THE USERS GUIDE, PLUS THE DESIRED TIME TO INTEGRATE TO IN TDEC1 (A PUSH LIST LOCATION).
FOR INTEGRVS, THE RCV,VCV, TET OF THE TEMPORARY STATE VECTOR MUST BE SET, PLUS MOONELAG AND MIDFLAG

FOR SIMULATION THE FOLLOWING QUANTITIES MUST BE PRESET ---

                                                            EARTH  MOON
                                                             29     27
   RRECTCSM(LEM)  - RECTIFIED POSITION VECTOR       METERS  2      2

                                                             7      5
   VRECTCSM(LEM)  - RECTIFIED VELOCITY VECTOR       M/CSEC  2    2

                                                             28     28
   TETCSM(LEM)    - TIME STATE VECTOR IS VALID      CSEC    2      2
                    CUSTOMARILY 0, BUT NOTE LUNAR
                    ORBIT DEPENDENCE ON REAL TIME.

                                                             22     18
   DELTAVCSM(LEM) - POSITION DEVIATION              METERS  2      2
                    0 IF TCCSM(LEM) = 0

                                                             3     -1
   NUVCSM(LEM)    - VELOCITY DEVIATION              M/CSEC  2      2
                    0 IF TCCSM(LEM) = 0

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R0144                                                      29        27
R0145     RCVCSM(LEM)    - CONIC POSITION         METERS  2         2
R0146                      EQUALS RRECTCSM(LEM) IF
R0147                      TCCSM(LEM) = 0
R0148
R0149                                                      7         5
R0150     VCVCSM(LEM)    - CONIC VELOCITY         M/CSEC  2         2
R0151                      EQUALS VRECTCSM(LEM) IF
R0152                      TCCSM(LEM) = 0
R0153
R0154                                                      28        28
R0155     TCCSM(LEM)     - TIME SINCE RECTIFICATION CSECS  2         2
R0156                      CUSTOMARILY 0
R0157
R0158                                             1/2      17        16
R0159     XKEPCSM(LEM)   - ROOT OF KEPLERS EQUATION M      2         2
R0160                      0 IF TCCSM(LEM) = 0
R0161
R0162     CMOONFLG       - PERMANENT FLAGS CORRESPONDING   0         0
R0163     CMIDFLAG         TO MOONFLAG AND MIDFLAG         0,1       0,1
R0164     LMOONFLG         C = CSM, L = LM                 0         0
R0165     LMIDFLG                                          0,1       0,1
R0166
R0167     SURFFLAG       - LUNAR SURFACE FLAG              0,1       0,1
R0168
R0169   IN ADDITION, IF (L)CMIDFLAG IS SET, THE INITIAL INPUT VALUES FOR LUNAR
R0170   SOLAR EPHEMERIDES SUBROUTINE AND PLANETARY INERTIAL ORIENTATION SUB-
R0171   ROUTINE MUST BE PRESET.
R0172
R0173   OUTPUT
R0174   AFTER EVERY CALL TO INTEGRATION
R0175                                                      EARTH     MOON
R0176                                                       29        29
R0177      0D   RATT    POSITION                  METERS  2         2
R0178                                                       7         7
R0179      6D   VATT    VELOCITY                  M/CSEC  2         2
R0180                                                       28        28
R0181     12D   TAT     TIME                              2         2
R0182                                                       29        27
R0183     14D   RATT1   POSITION                  METERS  2         2
R0184                                                       7         5
R0185     20D   VATT1   VELOCITY                  M/CSEC  2         2
R0186                                              3   2    36        30
R0187     26D   MU(P)   ML                        M /CS   2         2
R0188
R0189     X1            MUTABLE ENTRY                     -2        -100
R0190
R0191     X2            COORDINT
R0192     X2            COORDINATE SYSTEM ORIGIN          0         2
R0193                   (THIS, NOT MOONFLAG, SHOULD BE
R0194                     USED TO DETERMINE ORIGIN.)
R0195
R0196    IN ADDITION TO THE ABOVE, THE PERMANENT STATE VECTOR IS UPDATED WHENEVER
R0197    STATEFLG WAS SET AND WHENEVER A W-MATRIX IS TO BE INTEGRATED. THE PUSH
R0198    COUNTER IS SET TO 0 AND OVERFLOW IS CLEARED BEFORE RETURNING TO THE
R0199    CALLING PROGRAM.
R0200
R0201    4.0 CALLING SEQUENCES AND SAMPLE CODE
R0202    ------------------------------------
R0203
R0204        A) PRECISION ORBITAL INTEGRATION. CSMPREC,LEMPREC ENTRANCES
R0205            L-X     STORE TIME TO 95T5791T5 T  95 PUS  L9ST (T4531)
R0206            L       CALL
R0207            L+1             CSMPREC (OR LEMPREC)
R0208            L+2     RETURN
R0209          INPUT                                                        28
R0210            TDEC1 (PD 32D) TIME TO INTEGRATE TO...CENTISECONDS SCALED 2
R0211          OUTPUT
R0212            THE DATA LISTED IN SECTION 3.0 PLUS
R0213            RQVV   POSITION VECTOR OF VEHICLE WITH RESPECT TO SECONDARY
R0214            BODY... METERS B-29 ONLY IF MIDFLAG = DIMOFLAG = 1
R0215        B) CONIC INTEGRATION. CSMCONIC, LEMCONIC ENTRANCES
R0216            L-X     STORE TIME IN PUSH LIST (TDEC1)
R0217          . L       CALL
R0218            L+1             CSMCONIC (OR LEMCONIC)
R0219          INPUT/OUTPUT
R0220            SAME AS PRECISION INTEGRATION, EXCEPT RQVV NOT SET
R0221        C) INTEGRATE GIVEN STATE VECTOR. INTEGRVS ENTRANCE
R0222                    CALL
R0223                            INTSTALL
R0224                    VLOAD
R0225                            POSITION VECTOR
R0226                    STOVL   RCV
R0227                            VELOCITY VECTOR
R0228                  . STODL   VCV
R0229                            TIME STATE VECTOR VALID
R0230                    STODL   TET
R0231                            FINAL RADIUS
R0232                    STORE   RFINAL
R0233                    SET(CLEAR)  SET(CLEAR)
R0234                                INTYPFLAG
R0235                                MOONFLAG
R0236                    SET(CLEAR)  DLOAD
R0237                                DESIRED TIME
R0238                    STCALL      TDEC1
R0239                                INTEGRVS
R0240          INPUT
R0241            RCV     POSITION VECTOR                   METERS
R0242            VCV     VELOCITY VECTOR                   M/CSEC
R0243            TET     TIME OF STATE VECTOR(MAY = 0)     CSEC B-28
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R0244              TDEC1  TIME TO INTEGRATE TO                CSEC 8-28 (PD 320)
R0245                     (MAY BE INCREMENT IF TET=0)
R0246          OUTPUT
R0247              SAME AS FOR PRECISION OR CONIC INTEGRATION,
R0248              DEPENDING ON INTYPFLG.
R0249       D) INTEGRATE STATE VECTOR.INTGRV ENTRANCE
R0250              L-X    STORE TIME IN PUSH LIST (TDEC1)(MAY BE DONE AFTER CALL TO INTSTALL)
R0252              L-8    CALL
R0253              L-7
R0254              L-6    SET(CLEAR) SET(CLEAR)
R0255              L-5               VINTFLAG   1=CSM, 0=LM
R0256              L-4               INTYPFLAG  1=CONIC, 0=PRECISION
R0257              L-3    SET(CLEAR) SET(CLEAR)
R0258              L-2               DIMOFLAG   1=W-MATRIX, 0=NO W-MATRIX
R0259              L-1               D6OR9FLG   1=9X9, 0=6X6
R0260              L      SET        OLCAO
R0261              L+1               STATEFLG   DESIRE PERMANENT UPDATE
R0262              L+2               FINAL RAD. OF STATE VECTOR
R0263              L+3    STCALL     RFINAL
R0264              L+4               INTEGRV
R0265              L      CALL                  NORMAL USE-- WILL UPDATE STATE
R0266              L+1               INTEGRV    VECTOR IF DIMOFLAG=1.(STATEFLG IS
R0267              L+2    RETURN                ALWAYS RESET IN INTEGRATION AFTER
R0268                                           IT IS USED.)
R0269          INPUT
R0270              TDEC1 (PD 320) TIME TO INTEGRATE TO    CSEC 8-28
R0271          OUTPUT
R0272              SAME AS FOR PRECISION OR CONIC INTEGRATION
R0273          THE PROGRAM WILL SET MOONFLAG, MIDFLAG DEPENDING ON
R0274          THE PERMANENT STATE VECTOR REPRESENTATION.

 02741                       11,2404                        BANK    11
 02742  REF   3  LAST  237   13,2000                        SETLOC  INTINIT
 02743                       13,2602                        BANK
 02744  REF   7  LAST  977   E3,1554                        EBANK=  RRECTCSM
 02745  REF   3 LAST  238 TO  240:     34    36*            COUNT*  $$/INTIN
 0275   REF 104  LAST 1147   13,2602  0 5353 1  STATEINT TC      PHASCHNG
 0276                        13,2603   00052 0           OCT     00052
 0277   REF  10  LAST  776   13,2604  3 5017 1           CAF     PRIO5
 0278   REF  41  LAST  961   13,2605  0 5105 0           TC      FINDVAC
 0279   REF   8  LAST 1202   E3,1554                     EBANK=  RRECTCSM
 0280   REF   2  LAST  241   13,2606   02611 0           2CADR   STATINT1
 0280                        13,2607   26063 0
 0281   REF  72  LAST 1126   13,2610  0 5261 1           TC      TASKOVER
 0282   REF 224  LAST 1184   13,2611  0 6042 1  STATINT1 TC      INTPRET
 0283                        13,2612   47014 1           BON     RTB
 02831  REF   2  LAST  300   13,2613   04712 1                   QUITFLAG        KILL INTEGRATION UNTIL NEXT P00.
 02832  REF   1              13,2614   26652 1                   NOINT
 0284   REF  31  LAST  973   13,2615   21574 1                   LOADTIME
 0286   REF  50  LAST  970   13,2616   00041 1           STORE   TDEC1
 0323                                13,2617   77624 1            CALL
 0324   REF  28  LAST 1147           13,2620   27410 1                     INTSTALL
 0325                                13,2621   45014 0            SET      CALL
 03251  REF   6  LAST  713           13,2622   01076 1                     NODOFLAG
 0326   REF   7  LAST  589           13,2623   26643 1                     SETIFLGS
 0327                                13,2624   52014 0            SET      GOTO
 0328   REF   2  LAST  231           13,2625   01460 1                     P00HFLAG
 03282  REF   1                      13,2626   26026 1                     STATEUP
 0356                                13,2627   00003 1  600SECS   2DEC     60000
 0356                                13,2630   25140 0
 0404                                13,2631   77414 0  ENDINT    CLEAR    EXIT
 0405   REF   4  LAST  589           13,2632   01672 0                     STATEFLG
 0408   REF 105  LAST 1202           13,2633  0 5353 1            TC       PHASCHNG
 0409                                13,2634   20032 1            OCT      20032
 0411                                13,2635  0 0006 1            EXTEND
 0412   REF   2  LAST  240           13,2636  3 2630 0            DCA      600SECS
 0413   REF   4  LAST  728           13,2637  0 5277 0            TC       LONGCALL
 0414   REF   4  LAST  299           E3,1626                      EBANK=   RRECTHIS
 0415   REF   3  LAST  241           13,2640   02602 1            2CADR    STATEINT
 0415                                13,2641   26063 0
 0416   REF 143  LAST  969           13,2642  0 5155 0            TC       ENDOFJOB
 0426                                13,2643   43014 0  SETIFLGS  SET      CLEAR
 0427   REF   5  LAST 1203           13,2644   01472 1                     STATEFLG
 0428   REF  15  LAST  782           13,2645   01673 1                     INTYPFLG
 0429                                13,2646   43014 0            CLEAR    CLEAR
 0430   REF  14  LAST  658           13,2647   01676 1                     DIM0FLAG
 04301  REF   8  LAST  589           13,2650   01675 1                     D6OR9FLG
 04302                               13,2651   77616 0            RVQ
 04303                               13,2652   77776 1  NOINT     EXIT
 04304  REF 106  LAST 1203           13,2653  0 5353 1            TC       PHASCHNG
 04305                               13,2654   00002 0            OCT      00002

 04306  REF  98  LAST  974           13,2655  0 5516 0            TC       DOWNFLAG
 04307  REF   3  LAST 1202           13,2656   00221 0            ADRES    QUITFLAG
 04308  REF 144  LAST 1203           13,2657  0 5155 0            TC       ENDOFJOB

R0431   ATOPCSM TRANSFERS RRECT TO RRECT +41 TO RRECTCSM TO RRECTCSM +41

R0432   CALLING SEQUENCE
R0433      L   CALL
R0434      L+1         ATOPCSM

R0435   NORMAL EXIT AT L+2

 0436                                13,2660   47020 0  ATOPCSM   STQ      RTB
 0437   REF  27  LAST 1183           13,2661   00051 0                     S2
 0438   REF   2  LAST 1151           13,2662   26673 1                     MOVEACSM
 0439                                13,2663   45014 0            SET      CALL
 0440   REF   7  LAST  713           13,2664   04063 0                     CMOONFLG
 0441   REF   3  LAST 1151           13,2665   26114 1                     SVDWN1
 0442                              13,2666    43014 0               BON     CLRGC
 0443    REF  14  LAST  782       13,2667    00303 1                       MOONFLAG
 0444    REF  28  LAST 1203       13,2670    00051 0                       S2
 0445    REF   8  LAST 1203       13,2671    04223 0                       CMOONFLG
 0446    REF  29  LAST 1204       13,2672    00051 0                       S2
 0447    REF   1                  13,2673   0 3035 1   MOVEACSM TC      SETBANK
 0448    REF   2  LAST  111       13,2674   55'500 1            TS      DIFEQCNT          INITIALIZE INDEX
 0449    REF   3  LAST 1204       13,2675   51'500 0            INDEX   DIFEQCNT
 0450    REF   6  LAST 1168       13,2676   3 1502 1            CA      RRECT
 0451    REF   4  LAST 1204       13,2677   51'500 0            INDEX   DIFEQCNT
 0452    REF   9  LAST 1202       13,2700   55'554 0            TS      RRECTCSM
 0453    REF   5  LAST 1204       13,2701   11'500 1            CCS     DIFEQCNT          IS TRANSFER COMPLETE
 0454    REF   3  LAST 1203       13,2702   1 2674 1            TCF     MOVEACSM +1       NO-LOOP
 0455    REF  56  LAST 1177       13,2703   0 6064 0            TC      DANZIG            COMPLETE- RETURN

R0456    PTOACSM TRANSFERS RRECTCSM TO RRECTCSM +41 TO RRECT TO RRECT +41

R0457    CALLING SEQUENCE
R0458        L    CALL
R0459                  PTOACSM

R0460    NORMAL EXIT AT L+2
 0461                             13,2704    43034 1   PTOACSM  RTB     BON
 0462    REF   2  LAST 1151       13,2705    26722 1                    MOVEPCSM
 0463    REF   9  LAST 1204       13,2706    04303 0                    CMOONFLG
 0464    REF   1                  13,2707    26715 0                    SETMOON
 0465                             13,2710    66214 0   CLRMOON  CLEAR   SSP
 0466    REF  15  LAST 1204       13,2711    00263 0                    MOONFLAG
 0467    REF   5  LAST 1150       13,2712    02031 1                    PBODY
 0468                             13,2713    00000 1                    0
 0469                             13,2714    77616 0            RVQ
 0470                             13,2715    66214 0   SETMOON  SET     SSP
 0471    REF  16  LAST 1204       13,2716    00063 1                    MOONFLAG
 0472    REF   6  LAST 1204       13,2717    02031 1                    PBODY
 0473                             13,2720    00002 0                    2
 0474                             13,2721    77616 0            RVQ
 0475    REF   2  LAST 1204       13,2722   0 3035 1   MOVEPCSM TC      SETBANK
 0476    REF   6  LAST 1204       13,2723   55'500 1            TS      DIFEQCNT
 0477    REF   7  LAST 1204       13,2724   51'500 0            INDEX   DIFEQCNT
 0478    REF  10  LAST 1204       13,2725   3 1554 1            CA      RRECTCSM
 0479    REF   8  LAST 1204       13,2726   51'500 0            INDEX   DIFEQCNT
 0480    REF   7  LAST 1204       13,2727   55'502 0            TS      RRECT
 0481    REF   9  LAST 1204       13,2730   11'500 1            CCS     DIFEQCNT
 0482    REF   3  LAST 1204       13,2731   1 2723 1            TCF     MOVEPCSM +1
 0483    REF  57  LAST 1204       13,2732   0 6064 0            TC      DANZIG

R0484    ATOPLEM  TRANSFERS RRECT TO RRECT +41 TO RRECTLEM TO RRECTLEM +41
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 0485                              13,2733    47020 0   ATOPLEM  STQ      RTB
 0486    REF  30   LAST 1204       13,2734    00051 0                     S2
 0487    REF   3   LAST 1150       13,2735    26746 0                     MOVEALEM
 0488                              13,2736    45014 0            SET      CALL
 0489    REF   3   LAST  582       13,2737    04064 1                     LMOONFLG
 0490    REF   2   LAST 1150       13,2740    26070 1                     SVDWN2
 0491                              13,2741    43014 0            BON      CLRGO
 0492    REF  17   LAST 1204       13,2742    00303 1                     MOONFLAG
 0493    REF  31   LAST 1205       13,2743    00051 0                     S2
 0494    REF   4   LAST 1205       13,2744    04224 1                     LMOONFLG
 0495    REF  32   LAST 1205       13,2745    00051 0                     S2
 0496    REF   3   LAST 1204       13,2746    0 3035 1  MOVEALEM TC       SETBANK
 0497    REF  10   LAST 1204       13,2747    55'500 1           TS       DIFEQCNT
 0498    REF  11   LAST 1205       13,2750    51'500 0           INDEX    DIFEQCNT
 0499    REF   8   LAST 1204       13,2751    3 1502 1           CA       RRECT
 0500    REF  12   LAST 1205       13,2752    51'500 0           INDEX    DIFEQCNT
 0501    REF   2   LAST  112       13,2753    55'626 0           TS       RRECTLEM
 0502    REF  13   LAST 1205       13,2754    11'500 1           CCS      DIFEQCNT
 0503    REF   4   LAST 1205       13,2755    1 2747 0           TCF      MOVEALEM +1
 0504    REF  58   LAST 1204       13,2756    0 6064 0           TC       DANZIG


R0505    PTOALEM   TRANSFERS RRECTLEM TO RRECTLEM +41 TO RRECT TO RRECT +41

 0506                              13,2757    47014 1   PTOALEM  BON      RTB
 0507    REF  16   LAST  836       13,2760    04307 1                     SURFFLAG
 0508    REF   1                   13,2761    27000 1                     USEPIOS
 0509    REF   2   LAST 1150       13,2762    26767 0                     MOVEPLEM
 0510                              13,2763    52014 0            BON      GOTO
 0511    REF   5   LAST 1205       13,2764    04304 1                     LMOONFLG
 0512    REF   2   LAST 1204       13,2765    26715 0                     SETMOON
 0513    REF   1                   13,2766    26710 0                     CLRMOON
 0514    REF   4   LAST 1205       13,2767    0 3035 1  MOVEPLEM TC       SETBANK
 0515    REF  14   LAST 1205       13,2770    55'500 1           TS       DIFEQCNT
 0516    REF  15   LAST 1205       13,2771    51'500 0           INDEX    DIFEQCNT
 0517    REF   3   LAST 1205       13,2772    3 1626 1           CA       RRECTLEM
 0518    REF  16   LAST 1205       13,2773    51'500 0           INDEX    DIFEQCNT
 0519    REF   9   LAST 1205       13,2774    55'502 0           TS       RRECT
 0520    REF  17   LAST 1205       13,2775    11'500 1           CCS      DIFEQCNT
 0521    REF   3   LAST 1205       13,2776    1 2770 1           TCF      MOVEPLEM +1
 0522    REF  59   LAST 1205       13,2777    0 6064 0           TC       DANZIG


 0523                              13,3000    77201 1   USEPIOS  SETPD    VLOAD
 0524                              13,3001    00001 0                     0
 0525    REF  15   LAST 1133       13,3002    02023 1                     RLS
 0526                              13,3003    41525 0            PDDL     PUSH
 0527    REF  51   LAST 1202       13,3004    00041 1                     TDEC1
 0528    REF  13   LAST  782       13,3005    15517 0            STODL    TET
 0529    REF   1                   13,3006    27733 0                     5/8
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0530                        13,3007   77624 1            CALL
0531   REF   7  LAST 1129   13,3010   55716 1                    RP-TO-R
0532   REF  16  LAST 1172   13,3011   25535 0            STOVL   RCV
0533   REF   2  LAST   37   13,3012   24001 0                    ZUNIT
0534                        13,3013   14001 0            STODL   0D
0535   REF  14  LAST 1205   13,3014   01517 0                    TET
0536                        13,3015   14007 0            STODL   6D
0537   REF   2  LAST 1205   13,3016   27733 0                    5/8
0538                        13,3017   45014 0            SET     CALL            NEEDED FOR SETTING X1 ON EXIT
05381  REF  18  LAST 1205   13,3020   00063 1                    MOONFLAG
0539   REF   8  LAST 1206   13,3021   55716 1                    RP-TO-R
0540                        13,3022  `74235 0            VXV     VXSC
0541   REF  17  LAST 1206   13,3023   01535 0                    RCV
0542   REF   1              13,3024   26001 1                    OMEGMOON
0543   REF  14  LAST 1173   13,3025   25543 1            STOVL   VCV
0544   REE   8  LAST 1129   13,3026   24007 0                    ZEROVEC
0545   REF   6  LAST 1150   13,3027   01521 0            STORE   TDELTAV
0546                        13,3030   67174 1            AXT,2   SXA,2
0547                        13,3031   00002 0                    2
0548   REF   7  LAST 1204   13,3032   02030 0                    PBODY
0549   REF   6  LAST 1150   13,3033   35527 1            STCALL  TNUV
0550   REF   1              13,3034   27156 0                    A-PCHK
0552   REF   1              13,3035   3 3041 1  SETBANK  CAF     INTBANK
0553   REF  40  LAST 1123   13,3036  54 0006 0           TS      BBANK
0554   REF   1              13,3037   3 3446 1           CAF     FORTYONE
0555   REF 328  LAST 1125   13,3040   0 0002 0           TC      Q
0556   REF  11  LAST 1204   E3,1554                      EBANK=  RRECTCSM
0557   REF  10  LAST  657   13,3041   26063 0   INTBANK  BBCON   INTEGRV


R0558  SPECIAL PURPOSE ENTRIES TO ORBITAL INTEGRATION. THESE ROUTINES PROVIDE ENTRANCES TO INTEGRATION WITH
R0560  APPROPRIATE SWITCHES SET OR CLEARED FOR THE DESIRED INTEGRATION.

R0561  CSMPREC AND LEMPREC PERFORM ORBIT INTEGRATION BY THE ENCKE METHOD TO THE TIME INDICATED IN TDEC1
R0563  ACCELERATIONS DUE TO OBLATENESS ARE INCLUDED, NO W-MATRIX INT. IS DONE,
R0564  THE PERMANENT STATE VECTOR IS NOT UPDATED.
R0565  CSMCONIC AND LEMCONIC PERFORM ORBIT INTEG. BY KEPLERS METHOD TO THE TIME INDICATED IN TDEC1
R0567  NO DISTURBING ACCELERATIONS ARE INCLUDED. IN THE PROGRAM FLOW THE GIVEN
R0568  STATE VECTOR IS RECTIFIED BEFORE SOLUTION OF KEPLERS EQUATION

R0569  THE ROUTINES ASSUME THAT THE CSM (LEM) STATE VECTOR IN P-MEM IS VALID.
R0570  SWITCHES SET PRIOR TO ENTRY TO THE MAIN INTEG, PROG ARE AS FOLLOWS
R0571               CSMPREC  CSMCONIC   LEMPREC  LEMCONIC
R0572  VINTFLAG       SET       SET       CLEAR    CLEAR
R0573  INTYPFLG      CLEAR      SET       CLEAR     SET
R0574  DIMOFLAG      CLEAR     CLEAR      CLEAR    CLEAR


R0575  CALLING SEQUENCE
R0576     L-X   STORE TDEC1
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R0577        L    CALL       (STCALL TOEC1)
R0578        L+1           CSMPREC (CSMCONIC, LEMPREC, LEMCONIC)

R0579     NORMAL EXIT TO L+2


R0580    SUBROUTINES CALLED
R0581      INTEGRV1
R0582      PRECOUT FOR CSMPREC AND LEMPREC
R0583      CONICOUT  FOR CSMCONIC AND LEMCONIC


R0584    OLTPLT - SEE PAGE 2 OF THIS LOG SECTION
R0585    INPUT
R0586     TOEC1    TIME TO INTEGRATE TO . CSECS B-28
 0587                              13,3042    45020 1  CSMPREC  STQ      CALL
 0588    REF  60  LAST 1194     13,3043    00046 0                    X1
 0589    REF. 29  LAST 1203     13,3044    27410 1                    INTSTALL
 0590                              13,3045    43130 1           SXA,1  SET
 0591    REF   2  LAST  115     13,3046    02102 0                    IRETURN
 0592    REF  19  LAST  657     13,3047    01474 1                    VINTFLAG

 0593                              13,3050    43014 0  IFLAGP   SET      CLEAR
 0594    REF   3  LAST  238     13,3051    01467 0                    PRECIFLG
 0595    REF  15  LAST 1203     13,3052    01676 1                    DIMOFLAG
 0596                              13,3053    77614 1           CLRGO
 05961   REF  16  LAST 1203     13,3054    01633 0                    INTYPFLG
 05962   REF   1                   13,3055    27135 0                    INTEGRV1
 0597                              13,3056    45020 1  LEMPREC  STQ      CALL
 0598    REF  61  LAST 1207     13,3057    00046 0                    X1
 0599    REF  30  LAST 1207     13,3060    27410 1                    INTSTALL
 0600                              13,3061    43130 1           SXA,1  CLRGO
 0601    REF   3  LAST 1207     13,3062    02102 0                    IRETURN
 0602    REF  20  LAST 1207     13,3063    01634 1                    VINTFLAG
 0603    REF   1                   13,3064    27050 1                    IFLAGP

 0604                              13,3065    45020 1  CSMCONIC STQ      CALL
 0605    REF  62  LAST 1207     13,3066    00046 0                    X1
 0606    REF  31  LAST 1207     13,3067    27410 1                    INTSTALL
 0607                              13,3070    43130 1           SXA,1  SET
 0608    REF   4  LAST 1207     13,3071    02102 0                    IRETURN
 0609    REF  21  LAST 1207     13,3072    01474 1                    VINTFLAG
 0610                              13,3073    43014 0  IFLAGC   CLEAR  SETGO
 0611    REF  16  LAST 1207     13,3074    01676 1                    DIMOFLAG
 0612    REF  17  LAST 1207     13,3075    01433 1                    INTYPFLG
 0613    REF   2  LAST 1207     13,3076    27135 0                    INTEGRV1
 0614                              13,3077    45020 1  LEMCONIC STQ      CALL
 0615    REF  63  LAST 1207     13,3100    00046 0                    X1
 0616    REF  32  LAST 1207     13,3101    27410 1                    INTSTALL
 0617                              13,3102    43130 1           SXA,1  CLRGO
 0618    REF   5  LAST 1207   13,3103   02102 0                     IRETURN
 0619    REF  22  LAST 1207   13,3104   01634 1                     VINTFLAG
 0620    REF   1              13,3105   27073 0                     IELAGC

 0621                         13,3106   66214 0  INTEGRVS SET       SSP
 0622    REF   4  LAST 1207   13,3107   01467 0                     PRECIFLG
 0623    REF   8  LAST 1206   13,3110   02031 1                     PBODY
 0624                         13,3111   00000 1                     0
 0625                         13,3112   66214 0           BOF       SSP
 0626    REF  19  LAST 1206   13,3113   00343 0                     MOONFLAG
 0627                         13,3114   27117 0                     +3
 0628    REF   9  LAST 1208   13,3115   02031 1                     PBODY
 06281                        13,3116   00002 0                     2
 0629                         13,3117   77220 1           STQ       VLOAD
 0630    REF   6  LAST 1206   13,3120   02102 0                     IRETURN
 0631    REF   9  LAST 1206   13,3121   24007 0                     ZEROVEC
 0632    REF   7  LAST 1206   13,3122   01521 0           STORE     TDELTAV
 0633    REF   7  LAST 1206   13,3123   35527 1           STCALL    TNUV
 0634    REF   2  LAST 1150   13,3124   27671 1                     RECTIFY
 0635                         13,3125   43014 0           CLEAR     SET
 0636    REF  17  LAST 1207   13,3126   01676 1                     DIMOFLAG
 0637    REF   1              13,3127   04062 1                     NEWIFLG
 06371                        13,3130   77614 1           SETGO
 06372   REF   1              13,3131   04020 1                     RPQFLAG
 0638    REF   1              13,3132   27147 0                     ALOADED
R0639    INTEGRV IS AN ENTRY TO ORBIT INTEGRATION WHICH PERMITS THE CALLER ,
R0640    NORMALLY THE NAVIGATION PROGRAM ,TO SET THE INTEG. FLAGS. THE ROUTINE
R0641    IS ENTERED AT INTEGRV1 BY CSMPREC ET.AL. AND AT ALOADED BY INTEGRVS.
R0642    THE ROUTINE SETS UP A-MEMORY IF ENTERED AT INTEGRV,1 AND SETS THE INTEG.
R0643    PROGRAM FOR PRECISION OR CONIC

R0644    THE CALLER MUST FIRST CALL INTSTALL TO CHECK IF INTEG. IS IN USE BEFORE
R0645    SETTING ANY FLAGS.
R0646    THE FLAGS WHICH SHOULD BE SET OR CLEARED ARE
R0647      VINTFLAG     (IGNORED WHEN ENTERED FROM INTEGRVS)
R0648      INTYPFLG
R0649      DIMOFLAG
R0650      D6OR9FLG
R0651    CALLING SEQUENCE
R0652      L-X     CALL
R0653      L-Y             INTSTALL
R0654      L-1     SET OR CLEAR ALL FOUR FLAGS. ALSO CAN SET STATEFLG IF DESIRED
R0655              AND DIMOFLAG IS CLEAR.
R0656      L       CALL
R0657      L+1             INTEGRV
R0658    INITIALIZATION
R0659      FLAGS AS ABOVE
R0660      STORE TIME TO INTEGRATE TO IN TDEC1
R0661    OUTPUT
R0662      RATT   AS
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R0663     VATT      DEFINED
R0664     TAT                  BEFORE


 0665                          13,3133   77620 0  INTEGRV   STQ
 0666   REF    7  LAST 1208    13,3134   02102 0                     IRETURN
 0667                          13,3135   43014 0  INTEGRV1  SET      SET
 0668   REF    2  LAST 1206    13,3136   04060 0                     RPQFLAG
 0669   REF    2  LAST 1208    13,3137   04062 1                     NEWIFLG
 0670                          13,3140   77731 1  INTEGRV2  SSP
 0671   REF   12  LAST 1151    13,3141   00053 1                     QPRET
 0672   REF    2  LAST 1208    13,3142   27147 0                     ALOADED
 0673                          13,3143   52014 0            BON      GOTO
 0674   REF   23  LAST 1208    13,3144   01714 1                     VINTFLAG
 0675   REF    1               13,3145   26704 0                     PTOACSM
 0676   REF    2  LAST  299    13,3146   26757 0                     PTOALEM
 0677                          13,3147   77745 1  ALOADED   DLOAD
 0678   REF   52  LAST 1205    13,3150   00041 1                     TDEC1
 0679   REF    2  LAST 1204    13,3151   01115 0            STORE    TDEC
 0680                          13,3152   52014 0            BOFF     GOTO
 0681   REF   18  LAST 1207    13,3153   01753 1                     INTYPFLG
 0682   REF    1               13,3154   27256 0                     TESTLOOP
 0683   REF    1               13,3155   27242 0                     RVQCON
 0684                          13,3156   77414 0  A-PCHK    BOF      EXIT
 0685   REF    6  LAST 1203    13,3157   01752 0                     STATEFLG
 0686   REF    1               13,3160   27177 0                     RECTOUT
 0687   REF  107  LAST 1203    13,3161  0 5353 1            TC       PHASCHNG
 0688                          13,3162   04022 0            OCT      04022
 0689   REF   68  LAST 1148    13,3163  0 5504 0            TC       UPFLAG           PHASE CHANGE HAS OCCURRED BETWEEN
 0690   REF    3  LAST 1148    13,3164   00236 0            ADRES    REINTFLG         INTSTALL AND INTWAKE
 0692   REF  225  LAST 1202    13,3165  0 6042 1            TC       INTPRET
 0693                          13,3166   77731 1            SSP
 0694   REF   13  LAST 1209    13,3167   00053 1                     QPRET
 0695   REF    1               13,3170   27175 1                     PHEXIT
 0696                          13,3171   52014 0            BON      GOTO
 0697   REF   24  LAST 1209    13,3172   01714 1                     VINTFLAG
 0698   REF    3  LAST  499    13,3173   26660 0                     ATOPCSM
 0699   REF    2  LAST   37    13,3174   26733 1                     ATOPLEM
 0700                          13,3175   77624 1  PHEXIT    CALL
 0701   REF   20  LAST 1151    13,3176   11210 1                     GRP2PC
 0702                          13,3177   45001 1  RECTOUT   SETPD    CALL
 0703                          13,3200   00001 0                     0
 0704   REF    3  LAST 1208    13,3201   27671 1                     RECTIFY
 0705                          13,3202   53775 1            VLOAD    VSL*
 0706   REF   10  LAST 1205    13,3203   01503 0                     RRECT
 0707                          13,3204   57576 1                     0,2
 0708                          13,3205   53715 1            PDVL     VSL*             RATT TO PD0
 0709   REF    7  LAST 1175    13,3206   01511 0                     VRECT
 0710                          13,3207   57576 1                     0,2
 0711                          13,3210   63325 0            PDDL     PDVL             VATT TO PD6    TAT TO PD12
 0712   REF  15  LAST 1206   13,3211   01517 0                   TET
 0713   REF  11  LAST 1209   13,3212   01503 0                   RRECT
 0714                        13,3213   64715 0            PDVL   PDDL*
 0715   REF   8  LAST 1209   13,3214   01511 0                   VRECT
 0716   REF   2  LAST  689   13,3215   51770 0                   MUEARTH,2
 0717                        13,3216   76006 0            PUSH   AXT,1
 0718                        13,3217   77765 0            DEC    -10
 0719                        13,3220   76014 0            BON    AXT,1
 0720   REF  20  LAST 1208   13,3221   00303 1                   MOONFLAG
 0721                        13,3222   27224 0                   +2
 0722                        13,3223   77775 1            DEC    -2
 0723                        13,3224   40001 1   INTEXIT  SETPD  BOV
 0724                        13,3225   00001 0                   0
 0725                        13,3226   27227 0                   +1
 07251                       13,3227   43014 0            CLEAR  CLEAR
 07252  REF   2  LAST  322   13,3230   04676 1                   AVEMIDSW        ALLOW UPDATE OF DOWNLINK STATE VECTOR
 07253  REF   5  LAST 1208   13,3231   01667 1                   PRECIFLG
 07254                       13,3232   77614 1            CLEAR
 07255  REF   7  LAST 1209   13,3233   01672 0                   STATEFLG
 0726                        13,3234   77535 1            SLOAD  EXIT
 0727   REF   8  LAST 1209   13,3235   02103 1                   IRETURN
 0728   REF 738  LAST 1189   13,3236   3 0154 1           CA     MPAC
 0729   REF  58  LAST 1177   13,3237   50 120 1           INDEX  FIXLOC
 0730   REF  14  LAST 1209   13,3240   54 052 1           TS     QPRET
 0731   REF   4  LAST 1151   13,3241   0 3421 0           TC     INTWAKE
R0732   RVCON SETS UP ORBIT INTEGRATION TO DO A CONIC SOLUTION FOR POSITION AND
R0733   VELOCITY FOR THE INTERVAL (TET-TDEC)

 0734                        13,3242   45345 1   RVCON    DLOAD  DSU
 0735   REF   3  LAST 1209   13,3243   01115 0                   TDEC
 0736   REF  16  LAST 1210   13,3244   01517 0                   TET
 0737   REF  10  LAST 1171   13,3245   36074 1            STCALL TAU.
 0738   REF   4  LAST 1209   13,3246   27671 1                   RECTIFY
 0739                        13,3247   77624 1            CALL
 0740   REF   1              13,3250   22404 1                   KEPPREP
 0741                        13,3251   43345 1            DLOAD  DAD
 0742   REF   6  LAST 1173   13,3252   01551 1                   TC
 0743   REF  17  LAST 1210   13,3253   01517 0                   TET
 0744   REF  18  LAST 1210   13,3254   35517 1            STCALL TET
 0745   REF   2  LAST 1209   13,3255   27177 0                   RECTOUT
```

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P07455          TESTLOOP

 0746                         13,3256   43014 0  TESTLOOP BOF      CLRGO
 07462  REF   4  LAST 1203    13,3257   04752 0                    QUITFLAG
 07463                        13,3260   27263 0                    +3
 07464  REF   8  LAST 1210    13,3261   01632 1                    STATEFLG
 07465  REF   1               13,3262   27224 0                    INTEXIT         STOP INTEGRATION
 07466                        13,3263   73001 1   +3       SETPD   LXA,2
 0747                         13,3264   00013 0                    10D
 0748   REF  10  LAST 1208    13,3265   02030 0                    PBODY
 0749                         13,3266   51575 1            VLOAD   ABVAL
 0750   REF  18  LAST 1206    13,3267   01535 0                    RCV
 0751                         13,3270   43006 0            PUSH    CLEAR           RC TO 10D
 0752   REF   1               13,3271   00262 1                    MIDFLAG
 0753                         13,3272   50023 0            DSU*    BMN             MIDFLAG=0 IF R G.T. RMP
 0754   REF   1               13,3273   53755 0                    RME,2
 0755                         13,3274   27277 0                    +3
 0756                         13,3275   77614 1            SET
 0757   REF   2  LAST 1211    13,3276   00062 0                    MIDFLAG
 0758                         13,3277   41345 0  NORFINAL  DLOAD   DMP
 0759                         13,3300   00013 0                    10D
 0760                         13,3301   00043 0                    34D
 0761                         13,3302   55762 1            SR1R    DDV*
 0762   REF   3  LAST 1210    13,3303   51770 0                    MUEARTH,2
 0763                         13,3304   41366 1            SQRT    DMP
 0764   REF   1               13,3305   25762 0                    .3D
 0765                         13,3306   40442 1            SR3     SR4             DT   IS TRUNCATED TO A MULTIPLE
 0766                         13,3307   54345 1            DLOAD   SL
 0767   REF 739  LAST 1210    13,3310   00155 0                    MPAC
 0768                         13,3311   20220 0                    15D                  OF 128 CSECS.
 0769                         13,3312   40006 0            PUSH    BOV
 0770   REF   1               13,3313   27340 0                    MAXDT
 0771                         13,3314   50021 1            BDSU    BMN
 0772   REF   1               13,3315   27407 1                    DT/2MAX
 0773   REF   2  LAST 1211    13,3316   27340 0                    MAXDT
 0774                         13,3317   45345 1  DT/2COMP  DLOAD   DSU
 0775   REF   4  LAST 1210    13,3320   01115 0                    TDEC
 0776   REF  19  LAST 1210    13,3321   01517 0                    TET
 0777                         13,3322   54234 0            RTB     SL
 0778   REF   5  LAST  941    13,3323   21613 0                    SGNAGREE
 0779                         13,3324   20211 1                    8D
 0780   REF   2  LAST  115    13,3325   02076 1            STORE   DT/2            B-19
 0781                         13,3326   51400 1            BOV     ABS
 0782   REF   1               13,3327   27344 1                    GETMAXDT
 0783                         13,3330   50025 0            DSU     BMN             IS TIME TO INTEG. TO GR THAN MAXTIME
 0784                         13,3331   00015 0                    12D
 0785   REF   1               13,3332   27350 1                    POOHCHK
 0786                         13,3333   75345 1  USEMAXDT  DLOAD   SIGN
 0787                         13,3334   00015 0                    12D
 0788   REF   3  LAST 1211    13,3335   02076 1                    DT/2
 0789   REF   4  LAST 1211   13,3336   36076 0             STCALL DT/2
 0790   REF   2  LAST 1211   13,3337   27350 1                    P00HCHK
 0791                        13,3340   65345 0  MAXDT    DLOAD  POOL           EXCHANGE DT/2MAX WITH COMPUTED MAX.
 0792   REF   2  LAST 1211   13,3341   27407 1                    DT/2MAX
 0793                        13,3342   77650 1           GOTO
 0794   REF   1              13,3343   27317 1                    DT/2COMP
 0795                        13,3344   77634 0  GETMAXDT RTB
 0796   REF  13  LAST  364   13,3345   21713 1                    SIGNMPAC
 0797   REF   5  LAST 1212   13,3346   36076 0           STCALL DT/2
 0798   REF   1              13,3347   27333 1                    USEMAXDT
 0799                        13,3350   51545 1  P00HCHK  DLOAD  ABS
 0800   REF   6  LAST 1212   13,3351   02076 1                    DT/2
 0801                        13,3352   50025 0           DSU    BMN
 0802   REF   1              13,3353   27405 0                    DT/2MIN
 0803   REF   2  LAST 1206   13,3354   27156 0                    A-PCHK
 0804                        13,3355   43014 0           BOFF   BON            NO BACKWARDS INTEGRATION
 0805   REF   3  LAST 1203   13,3356   01740 0                    P00HFLAG       WHEN IN P00
 0806   REF   1              13,3357   23311 0                    TIMESTEP
 0807   REF   6  LAST 1210   13,3360   01707 0                    PRECIFLG
 0808   REF   2  LAST 1212   13,3361   23311 0                    TIMESTEP
 0809                        13,3362   45345 1           DLOAD  DSU
 0810   REF   7  LAST 1212   13,3363   02076 1                    DT/2
 0811                        13,3364   00015 0                    12D
 0812                        13,3365   43040 1           BMN    BOFCLR
 0813   REF   3  LAST 1212   13,3366   27156 0                    A-PCHK
 0814   REF   3  LAST 1209   13,3367   04242 1                    NEWIFLG
 0815   REF   3  LAST 1212   13,3370   23311 0                    TIMESTEP
 0816                        13,3371   45345 1           DLOAD  DSU
 0817   REF   5  LAST 1211   13,3372   01115 0                    TDEC
 0818   REF  20  LAST 1211   13,3373   01517 0                    TET
 08181                       13,3374   77640 0           BMN                   NO BACKWARD INTEGRATION
 08182  REF   2  LAST 1211   13,3375   27224 0                    INTEXIT
 0819                        13,3376   40525 1           POOL   SR4
 0820   REF   8  LAST 1212   13,3377   02076 1                    DT/2           IS 4(DT) LS(TDEC - TET)
 0821                        13,3400   44322 1           SR2R   BDSU           NO
 0822                        13,3401   52040 1           BMN    GOTO
 0823   REF   3  LAST 1212   13,3402   27224 0                    INTEXIT
 0824   REF   4  LAST 1212   13,3403   23311 0                    TIMESTEP
 0825                        13,3404   00000 1  DT/2MIN  2DEC   3 B-20
 0825                        13,3405   01400 1
 0826                        13,3406   14152 1  DT/2MAX  2DEC   4000 E2 B-20
 0826                        13,3407   00000 1
 0828                        13,3410   77776 1  INTSTALL EXIT
 0831   REF   1              13,3411   3 0106 0          CA     RASFLAG
 0833   REF   1              13,3412   7 3462 0          MASK   INTBITAB       IS THIS STALL AREA FREE
 0834                        13,3413   0 0006 1          EXTEND
 0835   REF   1              13,3414   1 3454 0          BZE    OKTOGRAB       YES
 0837   REF   1              13,3415   3 3461 1          CAF    WAKESTAL
 0838   REF   4  LAST  468   13,3416   0 5133 0          TC     JOBSLEEP
 0839                        13,3417   77776 1  INTWAKE0 EXIT
 08395  REF   1                13,3420  1 3441 1            TCF     INTWAKE1

 0840   REF   2  LAST 1212     13,3421  4 0106 1  INTWAKE   CS      RASFLAG        IS THIS INTSTALLED ROUTINE TO BE
 0841   REF   1                13,3422  7 4745 1            MASK    REINTBIT             RESTARTED
 0842   REF 377  LAST 1125     13,3423  10 000 0            CCS     A
 0843   REF   2  LAST 1213     13,3424  0 3441 0            TC      INTWAKE1       NO

 0844   REF  59  LAST 1210     13,3425  50 120 1            INDEX   FIXLOC
 0845   REF  15  LAST 1210     13,3426  3 0052 0            CA      QPRET
 0848   REF   5  LAST  891     13,3427  55 054 0            TS      TBASE2         YES, DONT RESTART WITH SOMEONE ELSES Q

 0849   REF 108  LAST 1209     13,3430  0 5353 1            TC      PHASCHNG
 0850                          13,3431   04022 0            OCT     04022

 0851   REF   6  LAST 1213     13,3432  3 1054 1            CA      TBASE2
 0852   REF  60  LAST 1213     13,3433  50 120 1            INDEX   FIXLOC
 0853   REF  16  LAST 1213     13,3434  54 052 1            TS      QPRET

 0854   REF   2  LAST 1213     13,3435  3 4745 0            CAF     REINTBIT
 0855   REF   3  LAST 1213     13,3436  7 0106 1            MASK    RASFLAG
 0856                          13,3437  0 0006 1            EXTEND
 0857   REF   1                13,3440  1 3457 0            BZF     GOBAC          DONT INTWAKE IF WE CAME HERE VIA RESTART

 0861   REF   2  LAST 1212     13,3441  3 3461 1  INTWAKE1  CAF     WAKESTAL
 0862                          13,3442  0 0004 0            INHINT
 0863   REF   5  LAST  469     13,3443  0 5137 1            TC      JOBWAKE
 0864   REF  22  LAST 1105     13,3444  10 064 1            CCS     LOCCTR
 0865   REF   3  LAST 1213     13,3445  1 3441 1            TCF     INTWAKE1
 0866                          13,3446   00051 0  FORTYONE  DEC     41
 0868   REF   2  LAST 1212     13,3447  4 3462 0            CS      INTBITAB
 0869   REF   4  LAST 1213     13,3450  7 0106 1            MASK    RASFLAG
 0870   REF   5  LAST 1213     13,3451  54 106 1            TS      RASFLAG        RELEASE STALL AREA
 0871                          13,3452  0 0003 1            RELINT
 0872   REF   2  LAST 1213     13,3453  1 3457 0            TCF     GOBAC
 0874   REF   2  LAST  217     13,3454  3 4736 1  OKTOGRAB  CAF     INTFLBIT
 08745                         13,3455  0 0004 0            INHINT
 0875   REF   6  LAST 1213     13,3456  26 106 1            ADS     RASFLAG
 0876   REF 226  LAST 1209     13,3457  0 6042 1  GOBAC     TC      INTPRET
 0877                          13,3460   77616 0            RVQ
 0888   REF  33  LAST 1207     13,3461   27411 0  WAKESTAL  CADR    INTSTALL +1
 0892                          13,3462   20100 1  INTBITAB  OCT     20100
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P0895   AVETOMID

R0896   THIS ROUTINE PERFORMS THE TRANSITION FROM A THRUSTING PHASE TO THE COAST
R0897   PHASE BY INITIALIZING THIS VEHICLES PERMANENT STATE VECTOR WITH THE
R0898   VALUES LEFT BY THE AVERAGEG ROUTINE IN RN,VN,PIPTIME.

R0899   BEFORE THIS IS DONE THE W-MATRIX, IF ITS  VALID (ORBWFLAG OR RENDWFLG IS
R0900   SET) IS INTEGRATED FORWARD TO PIPTIME WITH THE PRE-THRUST STATE VECTOR.

R0901   IN ADDITION, THE OTHER VEHICLE IS INTEGRATED (PERMANENT) TO PIPTIME.

R0902   FINALLY TRKMKCNT IS ZEROED


 0903   REF   4  LAST 1202    13,2000                         SETLOC INTINIT
 0904                         13,3463                         BANK

 0905   REF   4 LAST 1202 TO 1214:   433   469*               COUNT* $$/INTIN
 0906                         13,3463   43020 1  AVETOMID STQ    BON
 0907   REF   6  LAST 1151    13,3464   02772 1                  EGRESS
 0908   REF  11  LAST  836    13,3465   02716 0                  RENDWFLG
 0909   REF   1               13,3466   27532 0                  INT/W           W-MATRIX VALID ,GO INTEGRATE IT
 0910                         13,3467   77614 1           BON
 0911   REF   1               13,3470   01711 1                  ORBWFLAG
 0912   REF   2  LAST 1214    13,3471   27532 0                  INT/W           W-MATRIX VALID ,GO INTEGRATE IT

 0913                         13,3472   45145 0  OTHERS   DLOAD  CALL            GET SET FOR OTHER VEHICLE INTEGRATION
 0914   REF  24  LAST  967    13,3473   01234 0                  PIPTIME         DESIRED TIME
 0915   REF  34  LAST 1213    13,3474   27410 1                  INTSTALL
 0916                         13,3475   45014 0           SET    CALL
 0917   REF  25  LAST 1209    13,3476   01474 1                  VINTFLAG        CM
 0918   REF   8  LAST 1203    13,3477   26643 1                  SETIFLGS        SETS UP NONE W-MAT. PERMANENT INTEG.
 0923   REF  53  LAST 1209    13,3500   34041 0           STCALL TDEC1
 0924   REF  11  LAST 1206    13,3501   27133 0                  INTEGRV

 0925                         13,3502   45174 1           AXT,2  CALL            NOW MOVE PROPERLY SCALE RN,VN AS WELL AS
 0926                         13,3503   00002 0                  2               PIPTIME TO INTEGRATION ERASABLES.
 0927   REF  35  LAST 1214    13,3504   27410 1                  INTSTALL
 0928                         13,3505   77014 1           BON    AXT,2
 0929   REF   6  LAST 1150    13,3506   04304 1                  MOONTHIS
 0930                         13,3507   27511 1                  +2
 0931                         13,3510   00000 1                  0
 0932                         13,3511   53775 1           VLOAD  VSR*
 0933   REF  16  LAST  967    13,3512   01220 0                  RN
 0934                         13,3513   57176 0                  0,2
 0935   REF  12  LAST 1210    13,3514   01503 0           STORE  RRECT
 0936   REF  19  LAST 1211    13,3515   15535 0           STODL  RCV
 0937   REF  25  LAST 1214    13,3516   01234 0                  PIPTIME
 0938   REF  21  LAST 1212    13,3517   25517 0           STOVL  TET
 0939   REF  10  LAST  874    13,3520   01226 0                  VN
 0940                          13,3521   45057 1           VSR*    CALL
 0941                          13,3522   57176 0                   0,2
 0942   REF    3  LAST  713    13,3523   27705 0                   MINIRECT       FINISH SETTING UP STATE VECTOR
 0943                          13,3524   66234 1           RTB     SSP
 0944   REF    1               13,3525   26746 0                   MOVATHIS       PUT TEMP STATE VECTOR INTO PERMANENT
 0945   REF   11  LAST  831    13,3526   03463 0                   TRKMKCNT
 0946                          13,3527   00000 1                   0
 0947                          13,3530   77650 1           GOTO
 0948   REF    2  LAST 1151    13,3531   47230 0                   FAZAB5

 0949                          13,3532   45145 0  INT/W    DLOAD   CALL
 0950   REF   26  LAST 1214    13,3533   01234 0                   PIPTIME        INTEGRATE W THRU BURN
 0951   REF   36  LAST 1214    13,3534   27410 1                   INTSTALL
 0952                          13,3535   43014 0           SET     SET
 0953   REF   18  LAST 1208    13,3536   01476 0                   DIM0FLAG       DO W-MATRIX
 0954   REF    3  LAST 1210    13,3537   04476 0                   AVEMIDSW       SO WONT CLOBBER RN,VN,PIPTIME
 0955                          13,3540   43014 0           SET     CLEAR
 0956   REF    9  LAST 1203    13,3541   01475 0                   D6OR9FLG       9X9 FOR LM
 0957   REF   26  LAST 1214    13,3542   01674 0                   VINTFLAG       LM
 0964   REF   54  LAST 1214    13,3543   34041 0           STCALL  TDEC1
 0965   REF   12  LAST 1214    13,3544   27133 0                   INTEGRV
 0966                          13,3545   77650 1           GOTO
 0967   REF    1               13,3546   27472 0                   OTHERS         NOW GO DO THE OTHER VEHICLE
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P0968    MIDTOAV1

R0969    THIS ROUTINE INTEGRATES (PRECISION) TO THE TIME SPECIFIED IN TDEC1.
R0970    IF, AT THE END OF AN INTEGRATION TIME STEP, CURRENT TIME PLUS A DELTA
R0971    TIME (SEE TIMEDELT.....BASED ON THE COMPUTATION TIME FOR ONE TIME STEP)
R0972    IS GREATER THAN THE DESIRED TIME, ALARM 1703 IS SET AND THE INTEGRATION
R0973    IS DONE TO THE CURRENT TIME.
R0974    RETURN IS IN BASIC TO THE RETURN ADDRESS PLUS ONE.

R0975    IF THE INTEGRATION IS FINISHED TO THE DESIRED TIME, RETURN IS IN BASIC
R0976    TO THE RETURN ADDRESS

R0977    IN EITHER CASE , BEFORE RETURNING, THE EXTRAPOLATED STATE VECTOR IS TRAN
R0978    FERRED FROM R,VATT TO R,VN1-PIPTIME1 IS SET TO THE FINISHING INTEGRA-
R0979    TION TIME AND MPAC IS SET TO THE DELTA TIME---
R0980                                              TAT MINUS CURRENT TIME.


R0981    MIDTOAV2

R0982    THIS ROUTINE INTEGRATES THIS VEHICLES STATE VECTOR TO THE CURRENT TIME.
R0983    NO INPUTS ARE REQUIRED OF THE CALLER. RETURN IS IN BASIC TO THE RETURN
R0984    ADDRESS WITH THE ABOVE TRANSFERS TO R,VN1-PIPTIME1-AND MPAC DONE

 0985    REF   2  LAST  154   E7,1744                     EBANK=  IRETURN1
 0986                         13,3547   43020 1  MIDTOAV2 STQ     CLRGO          INTEGRATE TO PRESENT TIME PLUS TIMEDELT
 0987    REF   3  LAST 1216   13,3550   03744 0                   IRETURN1
 0988    REF   1              13,3551   04634 1                   MID1FLAG
 0989    REF   1              13,3552   27566 1                   ENTMID2

 0990                         13,3553   43020 1  MIDTOAV1 STQ     SET             INTEGRATE TO TDEC1
 0991    REF   4  LAST 1216   13,3554   03744 0                   IRETURN1
 0992    REF   2  LAST 1216   13,3555   04474 1                   MID1FLAG
 0993                         13,3556   43234 0           RTB     DAD            INITIAL CHECK, IS TDEC1 IN THE FUTURE
 0994    REF  32  LAST 1202   13,3557   21574 1                   LOADTIME
 0995    REF   1              13,3560   27670 0                   TIMEDELT
 0996                         13,3561   51021 0           BDSU    BPL
 0997    REF  55  LAST 1215   13,3562   00041 1                   TDEC1
 0998    REF   1              13,3563   27572 1                   ENTMID1         YES
 0999                         13,3564   77624 1           CALL
 1000    REF   1              13,3565   27656 1                   NOTIME         NO, SET ALARM, SWITCH TO MIDTOAV2

 1001                         13,3566   43234 0  ENTMID2  RTB     DAD
 1002    REF  33  LAST 1216   13,3567   21574 1                   LOADTIME
 1003    REF   2  LAST 1216   13,3570   27670 0                   TIMEDELT
 1004    REF  56  LAST 1216   13,3571   00041 1           STORE   TDEC1

 1005                         13,3572   77624 1  ENTMID1  CALL
 1006    REF  37  LAST 1215   13,3573   27410 1                   INTSTALL
 1007                         13,3574   45014 0           CLEAR   CALL
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1008     REF  19  LAST 1215    13,3575   01676 1                         DIM0FLAG         NO W-MATRIX
1009     REF   1               13,3576   26066 0                         THISVINT
1010                           13,3577   43014 0                CLEAR    SET
1011     REF  19  LAST 1209    13,3600   01673 1                         INTYPFLG
1012     REF   1               13,3601   04475 0                         MIDAVFLG         LET INTEG. KNOW THE CALL IS FOR MIDTOAV.
1013                           13,3602   77624 1                CALL
1014     REF  13  LAST 1215    13,3603   27133 0                         INTEGRV           GO INTEGRATE
1015                           13,3604   77214 0                CLEAR    VLOAD
1016     REF   2  LAST 1217    13,3605   04675 1                         MIDAVFLG
1017     REF  33  LAST  970    13,3606   00001 0                         RATT
1018     REF   7  LAST  874    13,3607   27545 0                STOVL    RN1
1019     REF  23  LAST  949    13,3610   00007 0                         VATT
1020     REF   7  LAST  874    13,3611   17553 1                STODL    VN1
1021     REF  15  LAST  781    13,3612   00015 0                         TAT
1022     REF  11  LAST  886    13,3613   03561 0                STORE    PIPTIME1
10221                          13,3614   66134 1                SXA,2    SXA,1
10222    REF  17  LAST  873    13,3615   02777 1                         RTX2
10223    REF  13  LAST  761    13,3616   02776 0                         RTX1
1023                           13,3617   77776 1                EXIT

1024                           13,3620  0 0004 0                INHINT
1025                           13,3621  0 0006 1                EXTEND
1026     REF  30  LAST  986    13,3622  4 0025 1                DCS      TIME2
1027     REF 740  LAST 1211    13,3623  20 155 1                DAS      MPAC
1028     REF  14  LAST 1051    13,3624  0 7262 0                TC       TPAGREE

1029     REF   5  LAST 1216    13,3625  3 1744 1                CA       IRETURN1
1030     REF  15  LAST  889    13,3626  0 4640 1                TC       BANKJUMP
1031                           13,3627   47014 1  CKMID2        BOF      RTB
1032     REF   3  LAST 1216    13,3630   04754 0                         MID1FLAG
1033     REF   1               13,3631   27646 0                         MID2
1034     REF  34  LAST 1216    13,3632   21574 1                         LOADTIME
1035                           13,3633   44215 1                DAD      BDSU
1036     REF   3  LAST 1216    13,3634   27670 0                         TIMEDELT
1037     REF   6  LAST 1212    13,3635   01115 0                         TDEC
1038                           13,3636   45044 0                BPL      CALL
1039     REF   2  LAST 1209    13,3637   27256 0                         TESTLOOP            YES
1040     REF   2  LAST 1216    13,3640   27656 1                         NOTIME

1041                           13,3641   43234 0  TIMEINC       RTB      DAD
1042     REF  35  LAST 1217    13,3642   21574 1                         LOADTIME
1043     REF   4  LAST 1217    13,3643   27670 0                         TIMEDELT
1044     REF   7  LAST 1217    13,3644   35115 1                STCALL   TDEC
1045     REF   3  LAST 1217    13,3645   27256 0                         TESTLOOP

1046                           13,3646   45345 1  MID2          DLOAD    DSU
1047     REF   8  LAST 1217    13,3647   01115 0                         TDEC
1048     REF  22  LAST 1214    13,3650   01517 0                         TET
1049                           13,3651   45246 0                ABS      DSU
1050     REF   1               13,3652   27666 1                         30SECS
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L       INTEGRATION INITIALIZATION                                                      USER'S PAGE NO.  21       E7 S3

 1051                          13,3653   52040 1            BMN    GOTO
 1052    REF   4  LAST 1212    13,3654   27156 0                   A-PCHK
 1053    REF   1               13,3655   27641 1                   TIMEINC

 1054                          13,3656   77414 0  NOTIME    CLEAR  EXIT                  TOO LATE
 1055    REF   4  LAST 1217    13,3657   04674 0                   MID1FLAG
 1056    REF   6  LAST 1217    13,3660   25744 1            INCR   IRETURN1              SET ERROR EXIT  (CALLOC +2)
 1057    REF  41  LAST  977    13,3661  0 5567 0            TC     ALARM                 INSUFFICIENT TIME FOR INTEGRATION --
 1058                          13,3662   01703 1            OCT    1703                     TIG WILL BE SLIPPED...
 1059    REF 227  LAST 1213    13,3663  0 6042 1            TC     INTPRET
 1060                          13,3664   77616 0            RVQ

 1061                          13,3665   00000 1  3CSECS    2DEC   3
 1061                          13,3666   00003 1
 1062                          13,3667   00000 1  TIMEDELT  2DEC   2000
 1062                          13,3670   03720 1
 1063                          27,3361                      BANK   27
 1064    REF   1               04,2000                      SETLOC UPDATE2
 1065                          04,3131                      BANK
 1066    REF   1                  1166                      EBANK= INTWAKUQ


 1067    REF   1                                            COUNT* $$/INTIN

 1068    REF   1                  1166            INTWAKUQ =       INTWAK1Q              TEMPORARY UNTIL NAME OF INTWAK1Q IS CHNG

 1069                          04,3131  0 0003 1  INTWAKEU RELINT
 1070                          04,3132  0 0006 1            EXTEND
 1071    REF   2  LAST 1218    04,3133   23166 1            QXCH   INTWAKUQ              SAVE Q FOR RETURN

 1072    REF 228  LAST 1218    04,3134  0 6042 1            TC     INTPRET

 1073                          04,3135   53135 0            SLOAD  BZE                   IS THIS A CSM/LEM STATE VECTOR UPDATE
 1074    REF   3  LAST  214    04,3136   01502 1                   UPSVFLAG              REQUEST. IF NOT GO TO INTWAKUP.
 1075    REF   1               04,3137   11176 1                   INTWAKUP

 1076                          04,3140   77775 1            VLOAD                        MOVE RRECT(6) AND VRECT(6) INTO
 1077    REF  13  LAST 1214    04,3141   01503 0                   RRECT                    RCV(6)  AND VCV(6)   RESPECTIVELY.
 1078    REF  20  LAST 1214    04,3142   25535 0            STOVL  RCV
 1079    REF   9  LAST 1210    04,3143   01511 0                   VRECT                 NOW GO TO 'RECTIFY +13D' TO
 1080                          04,3144   77624 1            CALL                         STORE VRECT INTO VCV  AND ZERO OUT
 1081    REF   5  LAST 1210    04,3145   27706 0                   RECTIFY +13D          TDELTAV(6),TNUV(6),TC(2) AND XKEP(2)
 1082                          04,3146   51535 0            SLOAD  ABS                   COMPARE ABSOLUTE VALUE OF 'UPSVFLAG'
 1083    REF   4  LAST 1218    04,3147   01502 1                   UPSVFLAG              TO 'UPDATE MOON STATE VECTOR CODE'
 1084                          04,3150   53025 0            DSU    BZE                   TO DETERMINE WHETHER THE STATE VECTOR TO
 1085    REF   1               04,3151   11207 1                   UPMNSVCD              BE UPDATED IS IN THE EARTH OR LUNAR
 1086    REF   1               04,3152   11157 1                   INTWAKEM              SPHERE OF INFLUENCE.  .....
 1087                          04,3153   43174 1            AXT,2  CLRGO                 EARTH SPHERE OF INFLUENCE.
 1088                          04,3154   00000 1            DEC    0
 1089    REF  21  LAST 1210    04,3155   00223 1                   MOONFLAG
 1090   REF   1              04,3156   11162 1                     INTWAKEC
 1091                        04,3157   43174 1  INTWAKEM AXT,2     SET             LUNAR SPHERE OF INFLUENCE.
 1092                        04,3160   00002 0           DEC       2
 1093   REF  22  LAST 1218   04,3161   00063 1                     MOONFLAG
 1094                        04,3162   50135 0  INTWAKEC SLOAD     BMN             COMMON CODING AFTER X2 INITIALIZED AND
A1095                                                                              MOONFLAG SET(OR CLEARED).
 1096   REF   5  LAST 1218   04,3163   01502 1                     UPSVFLAG        IS THIS A REQUEST FOR A LEM OR CSM
 1097   REF   1              04,3164   11172 0                     INTWAKLM         STATE VECTOR UPDATE.......
 1098                        04,3165   77624 1           CALL                      UPDATE CSM STATE VECTOR
 1099   REF   4  LAST 1209   04,3166   26660 0                     ATOPCSM

 1100                        04,3167   52014 0           CLEAR     GOTO
 1101   REF   2  LAST 1214   04,3170   01671 0                     ORBWFLAG
 1102   REF   1              04,3171   11174 0                     INTWAKEX

 1103                        04,3172   77624 1  INTWAKLM CALL                      UPDATE  LM STATE VECTOR
 1104   REF   3  LAST 1209   04,3173   26733 1                     ATOPLEM

 1105                        04,3174   77614 1  INTWAKEX CLEAR
 1106   REF  12  LAST 1214   04,3175   02676 1                     RENDWFLG

 1107                        04,3176   45131 0  INTWAKUP SSP       CALL            REMOVE :UPDATE STATE VECTOR INDICATOR:
 1108   REF   6  LAST 1219   04,3177   01502 1                     UPSVFLAG
 1109                        04,3200   00000 1                     0
 1110   REF   3  LAST  713   04,3201   27417 0                     INTWAKE0        RELEASE :GRAB: OF ORBIT INTEG
 1111                        04,3202   77776 1           EXIT

 1112   REF 109  LAST 1213   04,3203   0 5353 1          TC        PHASCHNG
 1113                        04,3204   04026 1           OCT       04026
 1114   REF   3  LAST 1218   04,3205   0 1166 1          TC        INTWAKUQ

 1115                        04,3206   00002 0  LPMNSVCO OCT       2
 1116                        04,3207   00000 1           OCT       0


 1117                        04,3210   77420 1  GRP2PC   STQ       EXIT
 1118   REF   2  LAST  127   04,3211   02711 1                     GRP2SVC
 1119   REF 110  LAST 1219   04,3212   0 5353 1          TC        PHASCHNG
 1120                        04,3213   04022 0           OCT       04022
 1121   REF 229  LAST 1218   04,3214   0 6042 1          TC        INTPRET
 1122                        04,3215   77650 1           GOTO
 1123   REF   3  LAST 1219   04,3216   02711 1                     GRP2SVC
```

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RD001              DELETE
 0002                          13,3671                     8ANK    13
 0003  REF    1                11,2000                     SETLOC  ORBITAL
 DD04                          11,2404                     8ANK
 0005  REF    1                                            CCUNT*  $$/CRBIT
RDCD6              OELETE
 DCD7                          11,2404   40354 1  KERPREP  LXA,2   SETRD
 0DD8  REF   11    LAST 1211   11,2405   C2D3C 0                   PBCOY
 0009                         '11,2406   D0001 D                   0
 0010                          11,2407   75543 1           OLCAD*  SORT                SORT(MU) (+18 DR +15)  CD       RL   2D
 0011  REF    4    LAST 1211   11,2410   51770 0                   MUEARTH,2
 DD12                          11,;2411  53515 0           RDVL    UNIT                                                RL   8D
 0D13  REF   21    LAST 1218   11,2412   C1535 D                   RCV
 0014                          11,2413   60325 D           PDOL    NDRM                NDRM R (+29 DR +27 - N1) 2D     RL   4D
 D015                          11,2414   0CD45 0                   36D
 0016  REF   64    LAST 1207   11,2415   C0047 1                   X1
 D017                          11,2416   77715 1           RCVL
 0018                          11,2417   65241 0           DDT     PODL                F*SQRT(MU)(+7 DR+5) 4C        PL   6D
 0019  REF   15    LAST 1206   11,2420   D1543 1                   VCV
 0020  REF   11    LAST 1210   11,2421   02074 D                   TAU.                (+28)
 0021                          11,2422   60225 1           OSU     NDRM
 0022  REF    7    LAST 121D   11,2423   D1551 1                   TC
 D023  REF   19    LAST 1149   11,2424   00051 0                   SJ
 0024                          11,2425   77742 D           SR1
 0D25                          11,2426   65271 0           CDV     RDDL
 0026                          11,2427   DD003 1                   20
 0027                          11,243D   41405 0           OMP     PUSH                FS(+6 +N1-N2) 6C              RL   8D
 0028                          11,2431   00005 1                   40
 D029                          11,2432   65316 0           OSO     RODL                (FS)SO(+12 +2(N1-N2)) 80      PL 100
 0030                          11,2433   000D5 1                   4D
 0031                          11,2434   64716 0           DSO     RDCL*               SSQ/MU(-2OR +2(N1-N2)) 10D      RL 12D
 0032  REF    5    LAST 1220   11,2435   51770 0                   MUEARTH,2
 0033                          11,2436   40442 1           SR3     SR4
 0034                          11,2437   47515 D           PDVL    VSC                 PREALIGN MU (+43 DR +37) 120  PL 140
 0035  REF   16    LAST 1220   11,2440   01543 1                   VCV
 D036                          11,2441   44205 0           CMR     BDSU                                              RL 12D
 D037                          11,2442   C0045 0                   360
 0038                          11,2443   41271 0           OOV     DMP                                               RL 10D
 D039                          11,2444   00003 1                   2D                  -(1/R-ALPHA)(+12 +3N1-2N2)
 D040                          11,2445   53605 1           DMP     SL*
 D041  REF    1                11,2446   11230 0                   DP2/3
 0042                          11,2447   20176 C                   0 -3,1              10L(1/R-ALRHA)(+13 +2(N1-N2))
 0043                          11,2450   43260 1           XSU,1   DAD                 2(FS)SO - ETCETRA          RL 8D
 0044  REF   20    LAST 1220   11,2451   00D50 1                   S1                  X1 = N2-N1
 0045                          11,2452   45257 0           SL*     DSU                 -FS+2(FS)SQ ETC (+6 +N1-N2)   RL   6D
 D046                          11,2453   20211 1                   8D,1
 0047                          11,2454   41205 0           CMP     DMR
 D048                          11,2455   C0001 0                   0D
 D049                          11,2456   00005 1                   40
 D050                          11,2457   53657 0           SL*     SL*
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0051                          11,2460   20211 1                    8D,1
0052                          11,2461   20201 0                    0,1            S(-FS(1-2FS)-1/6...)(+17 OR +16)
0053                          11,2462   65215 1           DAD      PDDL                                          PL  60
0054    REF   2  LAST  126    11,2463   01553 0                    XKEP
0055                          11,2464   53605 1           DMP      SL*            S(+17 OR +16)
0056                          11,2465   00001 0                    00
0057                          11,2466   20202 0                    1,1
0058                          11,2467   43204 0           BOVB     DAD
0059    REF   3  LAST 1150    11,2470   57754 0                    TCOANZIG
0060                          11,2471   77626 0           STADR
0061    REF   3  LAST 1169    11,2472   75647 0           STORE    XKEPNEW
0062                          11,2473   74020 0           STQ      AXC,1
0063    REF   3  LAST 1173    11,2474   02112 1                    KEPRTN
0064                          11,2475   00012 1           DEC      10
0065                          11,2476   74014 1           BON      AXC,1
0066    REF  23  LAST 1219    11,2477   00303 1                    MOONFLAG
0067    REF   1               11,2500   24023 0                    KEPLERN
0068                          11,2501   00002 0           DEC      2
0069                          11,2502   77650 1           GOTO
0070    REF   2  LAST 1221    11,2503   24023 0                    KEPLERN
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 0071                         11,2504   66350 1  FBR3      LXA,1  SSP
 0072   REF  18  LAST 1205    11,2505   01500 0                   DIFEQCNT
 0073   REF  21  LAST 1220    11,2506   00051 0                   S1
 0074                         11,2507   77762 1            DEC    -13
 0075                         11,2510   54345 1            DLOAD  SR
 0076   REF   9  LAST 1212    11,2511   02076 1                   DT/2
 0077                         11,2512   20612 0                   9D
 0078                         11,2513   61500 0            TIX,1  ROUND
 0079                         11,2514   22515 0                   +1
 0080                         11,2515   43206 1            PUSH   DAD
 0081   REF   8  LAST 1220    11,2516   01551 1                   TC
 0082   REF  12  LAST 1220    11,2517   16074 0            STODL  TAU.
 0083                         11,2520   77615 0            DAD
 0084   REF  23  LAST 1217    11,2521   01517 0                   TET
 0085   REF  24  LAST 1222    11,2522   35517 1            STCALL TET
 0086   REF   2  LAST 1210    11,2523   22404 1                   KEPPREP
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R0087    AGC ROUTINE TO COMPUTE ACCELERATION COMPONENTS.


 0088                              11,2524    73150 1  ACCOMP    LXA,1   LXA,2
 0089   REF  12  LAST 1220         11,2525    02030 0                    PBODY
 0090   REF  13  LAST 1223         11,2526    02030 0                    PBODY
 0091                              11,2527    77775 1            VLOAD
 0092   REF  10  LAST 1208         11,2530    24007 0                    ZEROVEC
 0093   REF   2  LAST  115         11,2531    26062 1            STOVL   FV
 0094   REF  20  LAST 1130         11,2532    02032 1                    ALPHAV
 0095                              11,2533    53257 1            VSL*    VAD
 0096                              11,2534    57605 0                    0 -7,2
 0097   REF  22  LAST 1220         11,2535    01535 0                    RCV
 0098   REF   2  LAST  115         11,2536    02040 1            STORE   BETAV
 0099                              11,2537    65014 1            BOF     XCHX,2
 0100   REF  20  LAST 1217         11,2540    01756 1                    DIM0FLAG
 0101                              11,2541    22546 0                    +5
 0102   REF  19  LAST 1222         11,2542    01500 0                    DIFEQCNT
 0103   REF   8  LAST  116         11,2543    12132 1            STORE   VECTAB,2
 0104                              11,2544    77724 0            XCHX,2
 0105   REF  20  LAST 1223         11,2545    01500 0                    DIFEQCNT
 0106                              11,2546    53575 0            VLOAD   UNIT
 0107   REF  21  LAST 1223         11,2547    02032 1                    ALPHAV
 0108   REF  22  LAST 1223         11,2550    16032 1            STODL   ALPHAV
 0109                              11,2551    00045 0                    36D
 0110   REF   4  LAST 1128         11,2552    36070 0            STCALL  ALPHAM
 0111   REF   1                    11,2553    22655 1                    GAMCOMP
 0112                              11,2554    66175 1            VLOAD   SXA,1
 0113   REF   5  LAST 1223         11,2555    02040 1                    BETAV
 0114   REF  33  LAST 1205         11,2556    00051 0                    S2
 0115   REF  23  LAST 1223         11,2557    16032 1            STODL   ALPHAV
 0116   REF   2  LAST  115         11,2560    02072 0                    BETAM
 0117   REF   5  LAST 1223         11,2561    02070 1            STORE   ALPHAM
 0118                              11,2562    71214 0            BOF     DLOAD
 0119   REF   3  LAST 1211         11,2563    00342 1                    MIDFLAG
 0120   REF   1                    11,2564    23026 1                    OBLATE
 0121   REF  25  LAST 1222         11,2565    01517 0                    TET
 0122                              11,2566    77624 1            CALL
 0123   REF   3  LAST  979         11,2567    33647 1                    LSPOS
 0124                              11,2570    72174 0            AXT,2   LXA,1
 0125                              11,2571    00002 0                    2
 0126   REF  34  LAST 1223         11,2572    00051 0                    S2
 0127                              11,2573    77614 1            BOF
 0128   REF  24  LAST 1221         11,2574    00343 0                    MOONFLAG
 0129                              11,2575    22600 1                    +3
 0130                              11,2576    77076 0            VCOMP   AXT,2
 0131                              11,2577    00000 1                    0
 0132   REF   4  LAST 1223         11,2600    02040 1            STORE   BETAV
 0133   REF   3  LAST  116         11,2601    26105 1            STOVL   RPQV
 0134                              11,2602    00003 1                    2D
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0135   REF   2  LAST  115   11,2603   02122 1            STORE   RPSV
0136                        11,2604   45335 0            SLOAD   DSU
0137   REF  18  LAST  881   11,2605   01011 0                    MODREG
0138   REF   1              11,2606   11232 1                    OCT27
0139                        11,2607   43030 0            BHIZ    BOF
0140                        11,2610   22613 0                    +3
0141   REF  21  LAST 1223   11,2611   01756 1                    DIM0FLAG
0142   REF   1              11,2612   22627 1                    GETRPSV
0143                        11,2613   74375 0            VLOAD   VXSC
0144   REF  24  LAST 1223   11,2614   02032 1                    ALPHAV
0145   REF   6  LAST 1223   11,2615   02070 1                    ALPHAM
0146                        11,2616   52257 0            VSR*    VSU
0147                        11,2617   57175 0                    1,2
0148   REF   5  LAST 1223   11,2620   02040 1                    BETAV
0149                        11,2621   77724 0            XCHX,2
0150   REF  21  LAST 1223   11,2622   01500 0                    DIFEQCNT
0151   REF   9  LAST 1223   11,2623   12140 1            STORE   VECTAB +6,2
0152   REF   7  LAST  116   11,2624   02114 1            STORE   RQVV
0153                        11,2625   77724 0            XCHX,2
0154   REF  22  LAST 1224   11,2626   01500 0                    DIFEQCNT
0155                        11,2627   62175 0  GETRPSV   VLOAD   INCR,1
0156   REF   4  LAST 1223   11,2630   02105 1                    RPQV
0157                        11,2631   00004 0                    4
0158                        11,2632   43014 0            CLEAR   BOF
0159   REF   3  LAST 1209   11,2633   04260 1                    RPQFLAG
0160   REF  25  LAST 1223   11,2634   00343 0                    MOONFLAG
0161                        11,2635   22642 1                    +5
0162                        11,2636   53261 1            VSR     VAD
0163                        11,2637   20612 0                    90
0164   REF   3  LAST 1224   11,2640   02122 1                    RPSV
0165   REF   4  LAST 1224   11,2641   02122 1            STORE   RPSV
0166                        11,2642   77624 1            CALL
0167   REF   2  LAST 1223   11,2643   22655 1                    GAMCOMP
0168                        11,2644   62174 1            AXT,2   INCR,1
0169                        11,2645   00004 0                    4
0170                        11,2646   00004 0                    4
0171                        11,2647   77775 1            VLOAD
0172   REF   5  LAST 1224   11,2650   02122 1                    RPSV
0173   REF   6  LAST 1224   11,2651   36040 0            STCALL  BETAV
0174   REF   3  LAST 1224   11,2652   22655 1                    GAMCOMP
0175                        11,2653   77650 1            GOTO
0176   REF   2  LAST 1223   11,2654   23026 1                    OBLATE
0177                        11,2655   74575 0  GAMCOMP   VLOAD   VSR1
0178   REF   7  LAST 1224   11,2656   02040 1                    BETAV
0179                        11,2657   40236 1            VSQ     SETPD
0180                        11,2660   00001 0                    0
0181                        11,2661   61501 1            NORM    ROUND
0182                        11,2662   00040 0                    31D
0183                        11,2663   60325 0            PDDL    NORM              NORMED B SQUARED TO PD LIST
0184   REF   7  LAST 1224   11,2664   02070 1                    ALPHAM            NORMALIZE (LESS ONE) LENGTH OF ALPHA
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 0185                              11,2665   00041 1            320           SAVING NORM SCALE FACTOR IN X1
 0186                              11,2666   63342 1      SR1   POVL
 0187   REF   8  LAST 1224         11,2667   02040 1            BETAV         C(POL+2) = ALMOST NORMED ALPHA
 C188                              11,2670   77656 1      UNIT
 0189   REE   9  LAST 1225         11,2671   16040 1      STCOL BETAV
 0190                              11,2672   00045 0            360
 0191   REF   3  LAST 1223         11,2673   02072 0      STCRE BETAM
 0192                              11,2674   55301 C      NCRM  800V          EORM NORMALIZED QUCTIENT ALPHAM/8ETAM
 0193                              11,2675   00042 1            330
 0194                              11,2676   41562 C      SR1R  PUSH          C(POL+2) = ALMOST NORMALIZED RHO.
 0195                              11,2677   77743 1      OLOAO*
 0196   REF   1                    11,2700   27731 1            ASCALE,1
 0197   REF  22  LAST 1222         11,2701   00C51 0      STCRE S1
 0198                              11,2702   57124 1      XCHX,2 XAO,2
 0199   REE  23  LAST 1225         11,2703   00050 1            S1
 0200                              11,2704   C0040 0            320
 0201                              11,2705   71264 1      XSU,2 DLOAD
 0202                              11,2706   00041 1            330
 0203                              11,2707   00003 1            20
 C204                              11,2710   65057 0      SR*   XCHX,2
 0205                              11,2711   57177 1            0 -1,2
 0206   REF  24  LAST 1225         11,2712   00050 1            S1
 0207                              11,2713   74406 0      PUSH  SR1R          RHO/4 TO 40
 0208                              11,2714   50315 0      POVL  OCT
 0209   REF  25  LAST 1224         11,2715   02032 1            ALPHAV
 0210   REE  10  LAST 1225         11,2716   02040 1            8ETAV
 0211                              11,2717   44372 1      SL1R  8DSU          (RHO/4) - 2(ALPHAV/2.BETAV/2)
 0212                              11,2720   57206 1      PUSH  OMPR          TO POL+6
 0213                              11,2721   CCC05 1            4
 0214                              11,2722   77752 1      SL1
 0215                              11,2723   43206 1      PUSH  OAC
 0216   REF   1                    11,2724   25766 1            OQLARTER
 0217                              11,2725   75406 1      PUSH  SQRT
 0218                              11,2726   41475 1      CMPR  PUSH
 0219                              11,2727   00013 0            100
 0220                              11,2730   43352 1      SL1   0A0
 0221   REE   2  LAST 1225         11,2731   25766 1            OQUARTER
 0222                              11,2732   43325 1      POOL  DAO           (1/4)+2((0+1)/4)    TO PO+140
 0223                              11,2733   00013 0            100
 0224   REE   3  LAST  933         11,2734   24005 1            HALFDP
 0225                              11,2735   72475 1      CMPR  SL1
 0226                              11,2736   00011 1            8D
 0227                              11,2737   56215 1      OAD   00V
 0228   REF   1                    11,2740   25760 1            THREE/8
 0229                              11,2741   CC017 1            140
 0230                              11,2742   74275 1      OMPR  VXSC
 0231                              11,2743   00007 0            6
 0232   REF  11  LAST 1225         11,2744   C2C40 1            BFTAV                      -
 0233                              11,2745   64515 1      PDVL  VSR3          (G/2)(C(PD+4))8/2 TC PD+16D
 0234   REF  26  LAST 1225         11,2746   02032 1            ALPHAV
 0235                          11,2747   41455 0             VAD     PUSH           A12 + C(PD+16D) TO PD+16D
 0236                          11,2750   41345 0             DLOAD   DMP
 0237                          11,2751   00001 0                     0
 0238                          11,2752   00015 0                     12D            -
 0239                          11,2753   61501 1             NORM    ROUND
 0240                          11,2754   00037 0                     30D
 0241                          11,2755   40665 0             BDDV    DMP*
 0242                          11,2756   00003 1                     2
 0243   REF   6   LAST 1220    11,2757   51770 0                     MUEARTH,2
 0244                          11,2760   74276 1             OCOMP   VXSC
 0245                          11,2761   57124 1             XCHX,2  XAD,2
 0246   REF  25   LAST 1225    11,2762   00050 1                     S1
 0247   REF  35   LAST 1223    11,2763   00051 0                     S2
 0248                          11,2764   55064 0             XSU,2   XSU,2
 0249                          11,2765   00036 1                     30D
 0250                          11,2766   00037 0                     31D
 0252                          11,2767   53604 0             BDVB    VSR*
 0253   REF   4   LAST 1221    11,2770   57754 0                     TCDANZIG
 0254                          11,2771   57177 1                     0 -1,2
 0255                          11,2772   53324 1             XCHX,2  VAD
 0256   REF  26   LAST 1226    11,2773   00050 1                     S1
 0257   REF   3   LAST 1223    11,2774   02062 1                     FV
 0258   REF   4   LAST 1226    11,2775   02062 1             STORE   FV
 0259                          11,2776   43400 1             BOV     RVQ            RETURN IF NO OVERFLOW
 0260                          11,2777   23000 0                     +1
 0261                          11,3000   51575 1   GOBAQUE   VLOAD   ABVAL
 0262   REF   8   LAST 1208    11,3001   01521 0                     TDELTAV
 0263                          11,3002   77654 0             BZE
 0264   REF   1                11,3003   23023 1                     INT-ABRT
 0265                          11,3004   54345 1             DLOAD   SR
 0266   REF   2   LAST  115    11,3005   02100 1                     H
 0267                          11,3006   20612 0                     9D
 0268                          11,3007   44206 0             PUSH    BDSU
 0269   REF   9   LAST 1222    11,3010   01551 1                     TC
 0270   REF  13   LAST 1222    11,3011   16074 0             STODL   TAU.
 0271   REF  26   LAST 1223    11,3012   01517 0                     TET
 0272                          11,3013   45425 0             DSU     STADR
 0273   REF  27   LAST 1226    11,3014   42260 0             STCALL  TET
 0274   REF   3   LAST 1222    11,3015   22404 1                     KEPPREP
 0275                          11,3016   77624 1             CALL
 0276   REF   6   LAST 1218    11,3017   27671 1                     RECTIFY
 0277                          11,3020   77614 1             SETGO
 0278   REF   4   LAST 1224    11,3021   04020 1                     RPQFLAG
 0279   REF   4   LAST 1217    11,3022   27256 0                     TESTLOOP

 0280                          11,3023   77776 1   INT-ABRT  EXIT
 0281   REF   5   LAST 1195    11,3024   05642 1             TC      POODOO
 0282                          11,3025   20430 1             OCT     20430
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P0283   THE OBLATE ROUTINE COMPUTES THE ACCELERATION DUE TO OBLATENESS. IT USES THE UNIT OF THE VEHICLE
R0285   POSITION VECTOR FOUND IN ALPHAV AND THE DISTANCE TO THE CENTER IN ALPHAM, THIS IS ADDED TO THE SUM OF THE
R0287   DISTURBING ACCELERATIONS IN FV AND THE PROPER DIFEQ STAGE IS CALLED VIA X1.
 0289                             11,3026   71354 0  OBLATE   LXA,2   DLOAD
 0290   REF  14  LAST 1223        11,3027   02030 0                   PBODY
 0291   REF   6  LAST 1224        11,3030   02070 1                   ALPHAM
 0292                             11,3031   44601 0           SETPD   DSU*
 0293                             11,3032   00001 0                   0
 0294   REF   1                   11,3033   50032 0                   RDE,2
 0295                             11,3034   43044 0           BPL     BOF                GET URPV
 0296   REF   1                   11,3035   22264 0                   NBRANCH
 0297   REF  26  LAST 1224        11,3036   00343 0                   MOONFLAG
 0298   REF   1                   11,3037   23273 0                   COSPHIE
 0299                             11,3040   65375 0           VLOAD   PDDL
 0300   REF  27  LAST 1225        11,3041   02032 1                   ALPHAV
 0301   REF  28  LAST 1226        11,3042   01517 0                   TET
 0302                             11,3043   45125 0           PDDL    CALL
 0303   REF   1                   11,3044   25756 1                   3/5
 0304   REF   6  LAST 1127        11,3045   51700 1                   R-TO-RP
 0305   REF   1                   11,3046   24017 1           STOVL   URPV                 RP/R  B-1  IN PLANETARY COORDINATES
 0306   REF   3  LAST 1206        11,3047   24001 0                   ZUNIT
 0307                             11,3050   45006 0           PUSH    CALL                 ZUNIT B-1  IN PLANETARY COORDL  AT 00D
 0308   REF   1                   11,3051   23301 1                   MATRIX
 0309                             11,3052   77715 1           PDVL                         UZ    B-2  IN INERT COORD       AT 00D
 0310   REF   9  LAST 1130        11,3053   24005 1                   XUNIT
 0311                             11,3054   45006 0           PUSH    CALL                 XUNIT B-1  IN PLANETARY COORD.  AT 06D
 0312   REF   2  LAST 1227        11,3055   23301 1                   MATRIX
 0313                             11,3056   77772 0           VSL1
 0314                             11,3057   24041 1           STOVL   32D                  UX    B-1  IN INERT. COORD      AT 32D
 0315                             11,3060   77772 0           VSL1
 0316   REF   1                   11,3061   14025 0  COMTERM  STODL   UZ                   UZ  B-1 IN INERTIAL COORD           AT 20D
 0317   REF   1                   11,3062   00023 0                   COSPHI/2              '       Z-COMPONENT OF URPV
 0318                             11,3063   65275 1           DMPR    PDDL                 P   B-6    ,  3COSPHI/64              AT 00D
 0319   REF   1                   11,3064   25770 0                   3/32                  2
 0320   REF   2  LAST 1227        11,3065   00023 0                   COSPHI/2
 0321                             11,3066   57316 1           DSQ     DMPR
 0322   REF   1                   11,3067   25772 1                   15/16                 '                         2
 0323                             11,3070   41425 1           DSU     PUSH                 P   B-5    ,(1/2)(15COSPHI -3)      AT 02D
 0324   REF   1                   11,3071   25764 0                   3/64                  3
 0325                             11,3072   41275 1           DMPR    DMP
 0326   REF   3  LAST 1227        11,3073   00023 0                   COSPHI/2
 0327   REF   1                   11,3074   11222 0                   7/12
 0328                             11,3075   65372 1           SL1R    PDDL
 0329                             11,3076   00001 0                   00
 0330                             11,3077   44275 1           DMPR    BDSU
 0331   REF   1                   11,3100   11230 0                   2/3                   '                    '      '
 0332                             11,3101   57206 1           PUSH    DMPR                 P   B-7,(1/3)(7COSPHI P   -4P )    AT 04D
 0333   REF   4  LAST 1227        11,3102   00023 0                   COSPHI/2              4                    3      2
 0334                             11,3103   65275 1           DMPR    PDDL
 0335   REF   1                   11,3104   11224 0                   9/16
 0336                        11,3105   00003 1                  2D                 '                      '    '
 0337                        11,3106   44275 1           DMPR   BDSU              P   8-10,(1/4)(9COSPHI R  -5P )
 0338   REF   1              11,3107   11226 1                  5/128              5                      4    3
 0339                        11,3110   56203 0           DMR*   OOV                                   '
 0340   REF   1              11,3111   51764 0                  J4REQ/J3,2            8- , (J RR/J R)P
 0341   REF   9  LAST 1227   11,3112   02070 1                  ALPHAM                        4    3   5
 0342                        11,3113   56615 0           CAC    DMPR*
 0343                        11,3114   00005 1                  40                               2     2  '              '
 0344   REF   1              11,3115   51760 1                  2J3RE/J2,2            8  ,(2J RR /J2 R )P  +(2J RP/J2R)P
 0345                        11,3116   43271 1           DOV    0A0                           4           5     3        4
 0346   REF  10  LAST 1228   11,3117   02070 1                  ALPHAM               -        2 '  2         '        '
 0347                        11,3120   00003 1                  20                   (R/R)(J RP P /R + 2J RP R /  + J R )
 0348                        11,3121   77761 1           VXSC                                 4    5       2    4  2   2 3
 0349   REF  28  LAST 1227   11,3122   02032 1                  ALPHAV                       4       2  '           -
 0350   REF   1              11,3123   14033 1           STODL  TVEC                 8-6,(SUM((J /R )P   (COSPHI))UR)
 0351                        11,3124   70403 1           OMR*   SR1                            1=2   I     I+1
 0352   REF   2  LAST 1228   11,3125   51764 0                  J4REQ/J3,2                       '
 0353                        11,3126   43271 1           DOV    DAO                       (J RP/J P)R
 0354   REF  11  LAST 1228   11,3127   02070 1                  ALPHAM                      4    3   4
 0355                        11,3130   50473 1           DMPR*  SR3                               2    2  '              '
 0356   REF   2  LAST 1228   11,3131   51760 1                  2J3RE/J2,2              (2J RP /J R )P  +(2J RR/J R)P
 0357                        11,3132   43271 1           ODV    DAD                         4     2    4     3    2   3
 0358   REF  12  LAST 1228   11,3133   02070 1                  ALPHAM
 0359                        11,3134   76561 1           VXSC   VSL1                         4   '        -
 0360   REF   2  LAST 1227   11,3135   00025 0                  UZ                   8-6  SUM(P(COSPHI))UZ
 0361                        11,3136   77645 0           BVSU                                1=2  I
 0362   REF   2  LAST 1228   11,3137   00033 1                  TVEC                4              I-2    '          -
 0363   REF   3  LAST 1228   11,3140   14033 1           STODL  TVEC              SUM((MU J (RP/R)    )(P   (COSRHI)UR -
 0364   REF  13  LAST 1228   11,3141   02070 1                  ALPHAM              1=2      1             I+2
 0365                        11,3142   63501 0           NORM   OSQ                             R (CCSRHI)UZ))  8-6 AT 20D
 0366   REF  65  LAST 1228   11,3143   00047 1                  X1                               1
 0367                        11,3144   60316 0           DSQ    NORM
 0368   REF  27  LAST 1226   11,3145   00051 0                  S1                              4
 0369                        11,3146   54606 0           RUSH   BDDV*            NORMALIZED   R                    AT 000
 0370   REF   1              11,3147   51754 0                  J2REQSC,2
 0371                        11,3150   40161 0           VXSC   BOV
 0372   REF   4  LAST 1228   11,3151   00033 1                  TVEC
 0373                        11,3152   23153 1                  +1                B+38 FOR EARTH , 8+42 FOR MOON
 0374                        11,3153   56070 0           XAC,1  XAC,1
 0375   REF  66  LAST 1228   11,3154   00046 0                  X1
 0376   REF  67  LAST 1228   11,3155   00046 0                  X1
 0377                        11,3156   53670 0           XAC,1  VSL*
 0378   REF  28  LAST 1228   11,3157   00050 1                  S1
 0379                        11,3160   20153 1                  0 -22D,1
 0380                        11,3161   40055 0           VAD    BOV
 0381   REF   5  LAST 1226   11,3162   02062 1                  FV
 0382   REF   1              11,3163   23000 0                  GOBAQUE
 0383   REF   6  LAST 1228   11,3164   16062 1           STODL  FV                 8+16 FOR EARTH , B+20 FOR MOON
 0384   REF   2  LAST 1227   11,3165   00017 1                  URRV               8-1  X-COMPONENT OF POSITION  IN
 0385                        11,3166   41414 0           BCF    RUSH                         PLANETARY COORD.      AT 020
 0386  REF  27  LAST 1227   11,3167   00343 0                  MOONFLAG
 0387  REF   2  LAST 1227   11,3170   23264 0                  NBRANCH                         2
 0388                       11,3171   65316 0        DSQ       PDDL               B-2    X                            AT 040
 0389  REF   3  LAST 1228   11,3172   00021 1                  URPV +2            B-1  Y-COMPONENT
 0390                       11,3173   45316 1        DSQ       DSU
 0391                       11,3174   74205 0        DMP       VXSC
 0392  REF   3  LAST 1206   11,3175   27733 0                  5/B                       2  2 -
 0393  REF  29  LAST 1228   11,3176   02032 1                  ALPHAV             B-6  5(Y -X )UR     2  2 -
 0394                       11,3177   65332 0        VSL3      PDDL               B-3               5(Y -X )UR        AT 02D
 0395                       11,3200   53361 0        VXSC      VAD
 0396                       11,3201   00041 1                  32D                      2  2 -   2              -
 0397                       11,3202   47315 0        PDVL      VXV                 (5(Y.-X )UR/R  ) +(2X/R)UX        AT 02D
 0398                       11,3203   00041 1                  32D                   B-1    UX
 0399  REF   3  LAST 1228   11,3204   00025 0                  UZ                    B-2  -UY =(UX * UZ)
 0400                       11,3205   74372 1        VSL1      VXSC                  B-3   -(2Y/R)UY
 0401  REF   4  LAST 1229   11,3206   00021 1                  URPV +2                      2  2 -   2           -
 0402                       11,3207   41455 0        VAD       PUSH                  B-3 (5(X -Y )LR/R )+(2X/R)UX -(
 0403                       11,3210   77745 1        DLOAD                                        -
 0404  REF   5  LAST 1227   11,3211   00023 0                  COSPHI/2                  2Y/R)UY                      AT 02D
 0405                       11,3212   41516 0        DSQ       PUSH                  B-2 (Z.COMPONENT)                AT 0BD
 0406                       11,3213   65205 0        DMP       PDDL                                2
 0407  REF   4  LAST 1229   11,3214   27733 0                  5/8                   B-5  5COSPHI/2                   AT 0BD
 0408                       11,3215   43302 1        SR2       DAD
 0409                       11,3216   00011 1                  0B0
 0410                       11,3217   41221 0        BDSU      DMP                                     2
 0411  REF   6  LAST 1192   11,3220   11007 0                  D1/32                 B-5  (1 - 7COSPHI )
 0412  REF   5  LAST 1229   11,3221   00017 1                  URPV
 0413                       11,3222   74205 0        DMP       VXSC
 0414  REF   5  LAST 1229   11,3223   27733 0                  5/B
 0415  REF  30  LAST 1229   11,3224   02032 1                  ALPHAV                                   2 -
 0416                       11,3225   65272 0        VSL5      PDDL                  B-5 (5X/R)(1-7COSPHI )UR        AT 0BD
 0417                       11,3226   74225 1        DSU       VXSC
 0418  REF   7  LAST 1229   11,3227   11007 0                  D1/32
 0419                       11,3230   00041 1                  32D
 0420                       11,3231   53372 1        VSL1      VAD                                      2 -            -
 0421                       11,3232   41325 0        PDDL      DMP                   B-5 (5X/R)(1-7COSPHI )UR +(5COSPHI
 0422  REF   6  LAST 1229   11,3233   00017 1                  URPV                      -
 0423  REF   7  LAST 1229   11,3234   00023 0                  URPV +4               -1)UX                            AT 0B0
 0424                       11,3235   74205 0        DMP       VXSC
 0425  REF   6  LAST 1229   11,3236   27733 0                  5/B                   B-5   5X  Y
 0426  REF   4  LAST 1229   11,3237   00025 0                  UZ                            M  M
 0427                       11,3240   53352 0        VSL2      VAD                                      2 -             2
 0428                       11,3241   60325 0        PDDL      NORM                  B-5 (5X/R)(1-7COSPHI )UR +(5COSPHI
 0429  REF  14  LAST 1228   11,3242   02070 1                  ALPHAM                    -            2 -
 0430  REF  28  LAST 1176   11,3243   00050 1                  X2                    -1)UX +(10XZ/R )UZ               AT 0B0
 0431                       11,3244   67206 1        PUSH      SLOAD
 0432  REF   1              11,3245   01351 1                  E32C31RM
 0433                       11,3246   74271 0        DDV       VXSC
 0434                       11,3247   63257 1        VSL*      PDVL
 0435                       11,3250   57601 1                  0 -3,2
 0436                          11,3251   67206 1           PUSH     SLOAD
 0437   REF    1               11,3252   01350 0                    E3J22R2M
 0438                          11,3253   53361 0           VXSC     VAD
 0439                          11,3254   70257 0           VSL*     V/SC
 0440                          11,3255   20146 0                    0 -27D,1             B+16 DP B+2D (J   + C  )
 0441                          11,3256   40055 0           VAD      BOV                                22    31
 0442   REF    7  LAST 1228    11,3257   02062 1                    FV
 0443   REF    2  LAST 1228    11,3260   23000 0                    GOBAQUE
 0444   REF    8  LAST 1230    11,3261   02062 1           STORE    FV
 0445                          11,3262   77754 1           LXA,2
 0446   REF   15  LAST 1227    11,3263   02030 0                    PBODY
 0447                          11,3264   72135 0  NBRANCH  SLOAD    LXA,1
 0448   REF   23  LAST 1224    11,3265   01501 1                    DIFEQCNT
 0449   REF  741  LAST 1217    11,3266   00154 1                    MPAC
 0450                          11,3267   73205 1           DMP      CGOTO
 0451   REF    1               11,3270   27735 0                    -1/12
 0452   REF  742  LAST 1230    11,3271   00155 0                    MPAC
 0453   REF    1               11,3272   23306 0                    DIFEQTAB
 0454                          11,3273   77745 1  CDSPHIE  DLOAD
 0455   REF   31  LAST 1229    11,3274   02036 0                    ALPHAV +4
 0456   REF    6  LAST 1229    11,3275   24023 0           STOVL    COSPHI/2
 0457   REF    4  LAST 1227    11,3276   24001 0                    ZUNIT
 0458                          11,3277   77650 1           GOTO
 0459   REF    1               11,3300   23061 1                    CONTERM
 0428                          11,3301   57435 1  MATRIX   VXV      VCOMP
 0429   REF    3  LAST 1136    11,3302   02013 1                    504LM           ROUTINE TRANSLATES FROM PLANETARY
 0430                          11,3303   77655 1           VAD                      TO INERTIAL COORDINATES
 0431                          11,3304   43505 0           VXM      RVQ
 0432   REF    8  LAST 1139    11,3305   00025 0                    MMATRIX
 0433   REF    1               11,3306   23475 0  DIFEQTAB CADR     DIFEQ+0
 0434   REF    1               11,3307   23501 1           CADR     DIFEQ+1
 0435   REF    1               11,3310   23512 0           CADR     DIFEQ+2
 0436                          11,3311   77214 0  TIMESTEP BOF      VLOAD
 0437   REF    4  LAST 1223    11,3312   00342 1                    MIDFLAG
 0438   REF    1               11,3313   23342 0                    RECTEST
 0439   REF   23  LAST 1223    11,3314   01535 0                    RCV
 0440                          11,3315   41241 0           DOT      DMP
 0441   REF   17  LAST 1220    11,3316   01543 1                    VCV
 0442   REF   10  LAST 1222    11,3317   02076 1                    DT/2           (R.V) X (DELTA T)
 0443                          11,3320   77640 0           BMN
 0444   REF    2  LAST 1230    11,3321   23342 0                    RECTEST
 0445                          11,3322   43014 0           BON      BOF
 0446   REF   28  LAST 1229    11,3323   00303 1                    MOONFLAG
 0447   REF    1               11,3324   23417 1                    LUNSPH
 0448   REF    5  LAST 1226    11,3325   04340 1                    RPQFLAG
 0449   REF    1               11,3326   23414 1                    EARSPH
 0450                          11,3327   45145 0           DLOAD    CALL
 0451   REF   29  LAST 1227    11,3330   01517 0                    TET
 0452   REF    4  LAST 1223    11,3331   33647 1                    LSPOS          RPQV IN MPAC
 0453   REF    5  LAST 1224    11,3332   02105 1           STORE    RPQV           RPQV
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D454                          11,3333   77754 1                LXA,2
0455   REF  16  LAST 1230     11,3334   02030 0                        PBODY
0456                          11,3335   51445 0  INLUNCHK BVSU         ABVAL
0457   REF  24  LAST 1230     11,3336   01535 0                        RCV
0458                          11,3337   50025 0                DSU     BMN
0459   REF   1                11,3340   27741 0                        RSPHERE
D460   REF   1                11,3341   23434 0                        ODSWITCH
0461                          11,3342   51575 1  RECTEST  VLOAD        ABVAL               RECTIFY IF
D462   REF   9  LAST 1226     11,3343   01521 0                        TDELTAV
0463                          11,3344   77600 1                BOV
0464   REF   1                11,3345   23370 1                        CALLRECT
0465                          11,3346   51025 1                DSU     BPL                     1) EITHER TDELTAV OR TNUV EQUALS OR
0466   REF   2  LAST  953     11,3347   11220 1                        3/4                        EXCEEDS 3/4 IN MAGNITUDE
0467   REF   2  LAST 1231     11,3350   23370 1                        CALLRECT
0468                          11,3351   53615 0                DAD     SL*                                OR
0469   REF   3  LAST 1231     11,3352   11220 1                        3/4
.0470                         11,3353   57605 0                        0 -7,2                  2) ABVAL(TDELTAV) EQUALS OR EXCEEDS
D471                          11,3354   45271 1                DDV     DSU                        .01(ABVAL(RCV))
0472                          11,3355   00013 0                        10D
0473   REF   1                11,3356   27737 1                        RECRATIO
0474                          11,3357   77244 0                BPL     VLOAD
0475   REF   3  LAST 1231     11,3360   23370 1                        CALLRECT
0476   REF   8  LAST 1208     11,3361   01527 0                        TNUV
D477                          11,3362   45246 0                ABVAL   DSU
0478   REF   4  LAST 1231     11,3363   11220 1                        3/4
0479                          11,3364   77600 1                BOV
0480   REF   4  LAST 1231     11,3365   23370 1                        CALLRECT
0481                          11,3366   77640 0                BMN
0482   REF   1                11,3367   23372 0                        INTGRATE
0483                          11,3370   77624 1  CALLRECT CALL
0484   REF   7  LAST 1226     11,3371   27671 1                        RECTIFY
0485                          11,3372   77775 1  INTGRATE VLOAD
0486   REF   9  LAST 1231     11,3373   01527 0                        TNUV
0487   REF   1                11,3374   25134 0                STOVL   ZV
D488   REF  10. LAST 1231     11,3375   01521 0                        TDELTAV
0489   REF   2  LAST  104     11,3376   01126 0                STORE   YV
0490                          11,3377   77614 1                CLEAR
0491   REF   1                11,3400   00261 1                        JSWITCH
0492                          11,3401   66375 0  DIFEQ0   VLOAD        SSP
0493   REF   3  LAST 1231     11,3402   01126 0                        YV
0494   REF  24  LAST 1230     11,3403   01501 1                        DIFEQCNT
0495                          11,3404   00000 1                        0
0496   REF  32  LAST 1230     11,3405   16032 1                STODL   ALPHAV
D497   REF   3  LAST 1131     11,3406   24007 0                        DPZERO
D498   REF   3  LAST 1226     11,3407   02100 1                STORE   H                   START H AT ZERO. GOES 0(DELT/2)DELT.
0499                          11,3410   52014 0                BON     GOTO
0500   REF   2  LAST 1231     11,3411   00301 0                        JSWITCH
0501   REF   1                11,3412   23714 1                        DOW..
D502   REF   1                11,3413   22524 1                        ACCOMP
D503                          11,3414   52175 0  EARSPH   VLOAD        GOTO
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 0504   REF   6  LAST 1230   11,3415   02105 1                        RPQV
 0505   REF   1              11,3416   23335 0                        INLUNCHK
 0506                        11,3417   60545 0  LUNSPH   DLOAD        SR2
 0507                        11,3420   00013 0                        10D
 0508                        11,3421   50025 0           DSU          BMN
 0509   REF   2  LAST 1231   11,3422   27741 0                        RSPHERE
 0510   REF   3  LAST 1230   11,3423   23342 0                        RECTEST
 0511                        11,3424   71214 0           BOF          DLOAD
 0512   REF   6  LAST 1230   11,3425   04340 1                        RPQFLAG
 0513   REF   2  LAST 1231   11,3426   23434 0                        OOSWITCH
 0514   REF  30  LAST 1230   11,3427   01517 0                        TET
 0515                        11,3430   77624 1           CALL
 0516   REF   2  LAST  491   11,3431   23647 1                        LUNPOS
 0517                        11,3432   77676 0           VCOMP
 0518   REF   7  LAST 1232   11,3433   02105 1           STORE        RPQV
 0519                        11,3434   77624 1  OOSWITCH CALL
 0520   REF   1              11,3435   23440 0                        ORIGCHNG
 0521                        11,3436   77650 1           GOTO
 0522   REF   2  LAST 1231   11,3437   23372 0                        INTGRATE
 0523                        11,3440   45020 1  ORIGCHNG STQ          CALL
 0524   REF   3  LAST  115   11,3441   02112 1                        ORIGEX
 0525   REF   8  LAST 1231   11,3442   27671 1                        RECTIFY
 0526                        11,3443   53775 1           VLOAD        VSL*
 0527   REF  25  LAST 1231   11,3444   01535 0                        RCV
 0528                        11,3445   57576 1                        0,2
 0529                        11,3446   53651 0           VSU          VSL*
 0530   REF   8  LAST 1232   11,3447   02105 1                        RPQV
 0531                        11,3450   57574 0                        2,2
 0532   REF  14  LAST 1218   11,3451   01503 0           STORE        RRECT
 0533   REF  26  LAST 1232   11,3452   01535 0           STORE        RCV
 0537                        11,3453   57414 1           BOF          VCOMP
 0538   REF  29  LAST 1230   11,3454   00343 0                        MOONFLAG
 0539                        11,3455   23456 1                        +1
 0540                        11,3456   53715 1           PDVL         VSL*
 0541   REF  18  LAST 1230   11,3457   01543 1                        VCV
 0542                        11,3460   57576 1                        0,2
 0543                        11,3461   77651 0           VSU
 0544                        11,3462   77657 0           VSL*
 0545                        11,3463   57574 0                        0  +2,2
 0546   REF  10  LAST 1218   11,3464   01511 0           STORE        VRECT
 0547   REF  19  LAST 1232   11,3465   01543 1           STORE        VCV
 0548                        11,3466   67154 0           LXA,2        SXA,2
 0549   REF   4  LAST 1232   11,3467   02112 1                        ORIGEX
 0550   REF  17  LAST 1213   11,3470   00052 0                        QPRET
 0551                        11,3471   52014 0           BON          GOTO
 0552   REF  30  LAST 1232   11,3472   00303 1                        MOONFLAG
 0553   REF   2  LAST 1205   11,3473   26710 0                        CLRMOON
 0554   REF   3  LAST 1205   11,3474   26715 0                        SETMOON
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R0555   THE RECTIFY SUBROUTINE IS CALLED BY THE INTEGRATION PROGRAM AND OCCASIONALLY BY THE MEASUREMENT INCORPORATION
R0557   ROUTINES TO ESTABLISH A NEW CONIC.


 0558                        13,3671                          BANK    13
 0559   REF    2  LAST    46 13,2000                          SETLOC  ORBITAL2
 0560                        13,3671                          BANK

 0561                        13,3671    77354 0  RECTIFY LXA,2   VLOAD
 0562   REF   17  LAST 1231  13,3672    02030 0                       PBODY
 0563   REF   11  LAST 1231  13,3673    01521 0                       TDELTAV
 0564                        13,3674    53257 1          VSL*    VAD
 0565                        13,3675    57605 0                  0 -7,2
 0566   REF   27  LAST 1232  13,3676    01535 0                  RCV
 0567   REF   15  LAST 1232  13,3677    01503 0          STORE   RRECT
 0568   REF   28  LAST 1233  13,3700    25535 0          STOVL   RCV
 0569   REF   10  LAST 1231  13,3701    01527 0                  TNUV
 0570                        13,3702    53257 1          VSL*    VAD
 0571                        13,3703    57602 1                  0 -4,2
 0572   REF   20  LAST 1232  13,3704    01543 1                  VCV
 0573   REF   11  LAST 1232  13,3705    01511 0  MINIRECT STORE  VRECT
 0574   REF   21  LAST 1233  13,3706    25543 1          STOVL   VCV
 0575   REF   11  LAST 1233  13,3707    24007 0                  ZEROVEC
 0576   REF   12  LAST 1233  13,3710    01521 0          STORE   TDELTAV
 0577   REF   11  LAST 1233  13,3711    15527 0          STODL   TNUV
 0578   REF   12  LAST 1233  13,3712    24007 0                  ZEROVEC
 0579   REF   10  LAST 1226  13,3713    01551 1          STORE   TC
 0580   REF    3  LAST 1221  13,3714    01553 0          STORE   XKEP
 0581                        13,3715    77616 0          RVQ
 0582                        11,3475                     BANK    11
 0583   REF    2  LAST 1220  11,2000                     SETLOC  ORBITAL
 0584                        11,3475                     BANK
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P0585    THE THREE DIFEQ ROUTINES - DIFEQ+0, DIFEQ+12, AND DIFEQ+24 - ARE ENTERED TO PROCESS THE CONTRIBUTIONS AT THE
R0587    BEGINNING, MIDDLE, AND END OF THE TIMESTEP, RESPECTIVELY. THE UPDATING IS DONE BY THE NYSTROM METHOD.
 0589                               11,3475    64575 1  DIFEQ+0   VLOAD   VSR3
 0590    REF    9  LAST 1230        11,3476    02062 1                    FV
 0591    REF    2  LAST  115        11,3477    36046 0            STCALL  PHIV
 0592    REF    1                   11,3500    23655 0                    DIFEQCOM
 0593                               11,3501    74575 0  DIFEQ+1   VLOAD   VSR1
 0594    REF   10  LAST 1234        11,3502    02062 1                    FV
 0595                               11,3503    53206 0            PUSH    VAD
 0596    REF    3  LAST 1234        11,3504    02046 1                    PHIV
 0597    REF    2  LAST  115        11,3505    26054 1            STOVL   PSIV
 0598                               11,3506    53362 0            VSR1    VAD
 0599    REF    4  LAST 1234        11,3507    02046 1                    PHIV
 0600    REF    5  LAST 1234        11,3510    36046 0            STCALL  PHIV
 0601    REF    2  LAST 1234        11,3511    23655 0                    DIFEQCOM
 0602                               11,3512    57345 1  DIFEQ+2   DLOAD   DMPR
 0603    REF    4  LAST 1231        11,3513    02100 1                    H
 0604    REF    2  LAST 1220        11,3514    11230 0                    DP2/3
 0605                               11,3515    74206 0            PUSH    VXSC
 0606    REF    6  LAST 1234        11,3516    02046 1                    PHIV
 0607                               11,3517    53372 1            VSL1    VAD
 0608    REF    2  LAST 1231        11,3520    01134 0                    ZV
 0609                               11,3521    53361 0            VXSC    VAD
 0610    REF    5  LAST 1234        11,3522    02100 1                    H
 0611    REF    4  LAST 1231        11,3523    01126 0                    YV
 0612    REF    5  LAST 1234        11,3524    25126 0            STOVL   YV
 0613    REF   11  LAST 1234        11,3525    02062 1                    FV
 0614                               11,3526    53322 1            VSR3    VAD
 0615    REF    3  LAST 1234        11,3527    02054 1                    PSIV
 0616                               11,3530    76561 1            VXSC    VSL1
 0617                               11,3531    77655 1            VAD
 0618    REF    3  LAST 1234        11,3532    01134 0                    ZV
 0619    REF    4  LAST 1234        11,3533    01134 0            STORE   ZV
 0620                               11,3534    45014 0            BOFF    CALL
 0621    REF    3  LAST 1231        11,3535    00341 1                    JSWITCH
 0622    REF    1                   11,3536    23606 0                    ENDSTATE
 0623    REF   21  LAST 1209        11,3537    11210 1                    GRP2PC
 0624                               11,3540    77354 0            LXA,2   VLOAD
 0625    REF    2  LAST  104        11,3541    01116 0                    COLREG
 0626    REF    5  LAST 1234        11,3542    01134 0                    ZV
 0627                               11,3543    77732 1            VSL3                           ADJUST W-POSITION FOR STORAGE
 0628    REF   31  LAST 1149        11,3544    12467 1            STORE   W +54D,2
 0629                               11,3545    77775 1            VLOAD
 0630    REF    6  LAST 1234        11,3546    01126 0                    YV
 0631                               11,3547    40132 0            VSL3    BOV
 0632    REF    1                   11,3550    23700 1                    WMATEND
 0633    REF   32  LAST 1234        11,3551    12401 1            STORE   W,2

 0634                               11,3552    77624 1            CALL
 0635    REF   22  LAST 1234        11,3553    11210 1                    GRP2PC
 0636                          11,3554   60354 0              LXA,2  SSP
 0637    REF   3  LAST 1234    11,3555   01116 0                     COLREG
 0638    REF  36  LAST 1226    11,3556   00052 0                     S2
 0639                          11,3557   00000 1                     0
 0640                          11,3560   67114 1              INCR,2 SXA,2
 0641                          11,3561   00006 1                     6
 0642    REF   7  LAST 1234    11,3562   01125 0                     YV
 0643                          11,3563   45104 0              TIX,2  CALL
 0644    REF   1               11,3564   23651 1                     RELOADSV
 0645    REF  23  LAST 1234    11,3565   11210 1                     GRP2PC
 0646                          11,3566   67154 0              LXA,2  SXA,2
 0647    REF   8  LAST 1235    11,3567   01125 0                     YV
 0648    REF   4  LAST 1235    11,3570   01116 0                     COLREG

 0649                          11,3571   77624 1    NEXTCOL   CALL
 0650    REF  24  LAST 1235    11,3572   11210 1                     GRP2PC
 0651                          11,3573   76754 0              LXA,2  VLOAD*
 0652    REF   5  LAST 1235    11,3574   01116 0                     COLREG
 0653    REF  33  LAST 1234    11,3575   75376 1                     W,2
 0654                          11,3576   77722 0              VSR3                      ADJUST W-POSITION FOR INTEGRATION
 0655    REF   9  LAST 1235    11,3577   01126 0              STORE  YV
 0656                          11,3600   76173 0              VLOAD* AXT,1
 0657    REF  34  LAST 1235    11,3601   75310 1                     W +54D,2
 0658                          11,3602   00000 1                     0
 0659                          11,3603   77722 0              VSR3                      ADJUST W-VELOCITY FOR INTEGRATION
 0660    REF   6  LAST 1234    11,3604   35134 1              STCALL ZV
 0661    REF   1               11,3605   23401 0                     DIFEQ0

 0662                          11,3606   77200 0    ENDSTATE  BOV    VLOAD
 0663    REF   3  LAST 1230    11,3607   23000 0                     GOBAQUE
 0664    REF   7  LAST 1235    11,3610   01134 0                     ZV
 0665    REF  12  LAST 1233    11,3611   25527 0              STOVL  TNUV
 0666    REF  10  LAST 1235    11,3612   01126 0                     YV
 0667    REF  13  LAST 1233    11,3613   01521 0              STORE  TDELTAV
 0668                          11,3614   43014 0              BON    BOFF
 0669    REF   3  LAST 1217    11,3615   04715 0                     MIDAVFLG
 0670    REF   1               11,3616   27627 1                     CKMID2            CHECK FOR MID2 BEFORE GOING TO TIMEINC
 0671    REF  22  LAST 1224    11,3617   01756 1                     DIMOFLAG
 0672    REF   5  LAST 1226    11,3620   27256 0                     TESTLOOP
 0673                          11,3621   77776 1              EXIT
 0674    REF 111  LAST 1219    11,3622   0 5353 1             TC     PHASCHNG
 0675                          11,3623   04022 0              OCT    04022             PHASE 1
 0676    REF  69  LAST 1209    11,3624   0 5504 0             TC     UPFLAG            PHASE CHANGE HAS OCCURRED BETWEEN
 0677    REF   4  LAST 1209    11,3625   00236 0              ADRES  REINTFLG          INTSTALL AND INTWAKE
 0678    REF 230  LAST 1219    11,3626   0 6042 1             TC     INTPRET
 0679                          11,3627   77731 1              SSP
 0680    REF  18  LAST 1232    11,3630   00053 1                     QPRET
 0681    REF   1               11,3631   23636 0                     AMOVED
 0682                          11,3632   52014 0              BON    GOTO
 0683    REF  27  LAST 1215    11,3633   01714 1                     VINTFLAG
 0684    REF   5  LAST 1219   11,3634   26660 0                      ATOPCSM
 0685    REF   4  LAST 1219   11,3635   26733 1                      ATOPLEM
 0686                         11,3636   66214 0  AMOVED    SET       SSP
 0687    REF   4  LAST 1234   11,3637   00061 0                      JSWITCH
 0698    REF   6  LAST 1235   11,3640   01117 1                      COLREG
 0689                         11,3641   77741 0            DEC       -30
 0690                         11,3642   66214 0            BOFF      SSR
 0691    REF  10  LAST 1215   11,3643   01755 1                      D6OR9FLG
 0692    REF   1              11,3644   23571 0                      NEXTCOL
 0693    REF   7  LAST 1236   11,3645   01117 1                      COLREG
 0694                         11,3646   77717 0            DEC       -48
 0695                         11,3647   77650 1            GOTO
 0696    REF   2  LAST 1236   11,3650   23571 0                      NEXTCOL


 0697                         11,3651   77745 1  RELOADSV  DLOAD                             RELOAD TEMPORARY STATE VECTOR
 0698    REF   9  LAST 1217   11,3652   01115 0                      TDEC                    FROM PERMANENT IN CASE OF
 0699    REF  57  LAST 1216   11,3653   34041 0            STCALL    TDEC1
 0700    REF   1              11,3654   27140 1                      INTEGRV2                BY STARTING AT INTEGRV2.
 0701                         11,3655   43345 1  DIFEQCOM  DLOAD     DAD                     INCREMENT H AND DIFEQCNT.
 0702    REF  11  LAST 1230   11,3656   02076 1                      DT/2
 0703    REF   6  LAST 1234   11,3657   02100 1                      H
 0704                         11,3660   66110 1            INCR,1    SXA,1
 0705                         11,3661   77763 0            DEC       -12
 0706    REF  25  LAST 1231   11,3662   01500 0                      DIFEQCNT                DIFEQCNT SET FOR NEXT ENTRY.
 0707    REF   7  LAST 1236   11,3663   02100 1            STORE     H
 0708                         11,3664   74561 0            VXSC      VSR1
 0709    REF  12  LAST 1234   11,3665   02062 1                      FV
 0710                         11,3666   74255 0            VAD       VXSC
 0711    REF   8  LAST 1235   11,3667   01134 0                      ZV
 0712    REF   8  LAST 1236   11,3670   02100 1                      H
 0713                         11,3671   77655 1            VAD
 0714    REF  11  LAST 1235   11,3672   01126 0                      YV
 0715    REF  33  LAST 1231   11,3673   02032 1            STORE     ALPHAV
 0716                         11,3674   52014 0            BON       GOTO
 0717    REF   5  LAST 1236   11,3675   00301 0                      JSWITCH
 0718    REF   2  LAST 1231   11,3676   23714 1                      DOW..
 0719    REF   1              11,3677   22504 0                      FBR3


 0720                         11,3700   43014 0  WMATEND   CLEAR     CLEAR
 0721    REF  23  LAST 1235   11,3701   01676 1                      DIMOFLAG                DONT INTEGRATE W THIS TIME
 0722    REF   3  LAST 1219   11,3702   01671 0                      ORBWFLAG                INVALIDATE W
 0723                         11,3703   77614 1            CLEAR
 0724    REF  13  LAST 1219   11,3704   02676 1                      PENDWFLG
 0725                         11,3705   77414 0            SET       EXIT
 0726    REF   9  LAST 1211   11,3706   01472 1                      STATEFLG                PICK UP STATE VECTOR UPDATE
 0727    REF  42  LAST 1218   11,3707   0 5567 0           TC        ALARM
 0728                         11,3710   00421 0            OCT       421
 0729    REF 231  LAST 1235   11,3711   0 6042 1           TC        INTPRET
 0730                         11,3712   77650 1         GOTO
 0731   REF    6  LAST 1235   11,3713   27256 0                  TESTLOOP         FINISH INTEGRATING STATE VECTOR
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P0732    ORBITAL ROUTINE FOR EXTRAPOLATION OF THE W MATRIX. IT COMPUTES THE SECOND DERIVATIVE OF EACH COLUMN POSITION
R0734    VECTOR OF THE MATRIX AND CALLS THE NYSTROM INTEGRATION ROUTINES TO SOLVETHE DIFFERENTIAL EQUATIONS. THE PROGRAM
R0736    USES A TABLE OF VEHICLE POSITION VECTORS COMPUTED DURING THE INTEGRATION OF THE VEHICLES POSITION AND VELOCITY.
 0738                         11,3714   70754 0  DOW..     LXA,2  DLOAD*
 0739    REF  18  LAST 1233   11,3715   02030 0                   PBODY
 0740    REF   7  LAST 1226   11,3716   51770 0                   MUEARTH,2
 0741    REF   4  LAST 1225   11,3717   36072 1            STCALL BETAM
 0742    REF   1              11,3720   23742 1                   DOW..1
 0743    REF  13  LAST 1236   11,3721   02062 1            STORE  FV
 0744                         11,3722   62014 0            BOF    INCR,1
 0745    REF   5  LAST 1230   11,3723   00342 1                   MIDFLAG
 0746    REF   3  LAST 1229   11,3724   23264 0                   NBRANCH
 0747                         11,3725   77771 0            DEC    -6
 0748                         11,3726   70744 1            LXC,2  DLOAD*
 0749    REF  19  LAST 1238   11,3727   02030 0                   PBODY
 0750    REF   8  LAST 1238   11,3730   51772 1                   MUEARTH -2,2
 0751    REF   5  LAST 1238   11,3731   36072 1            STCALL BETAM
 0752    REF   2  LAST 1238   11,3732   23742 1                   DOW..1
 0753                         11,3733   50414 0            BON    VSR6
 0754    REF  31  LAST 1232   11,3734   00303 1                   MOONFLAG
 0755                         11,3735   23736 1                   +1
 0756                         11,3736   77655 1            VAD
 0757    REF  14  LAST 1238   11,3737   02062 1                   FV
 0758    REF  15  LAST 1238   11,3740   36062 0            STCALL FV
 0759    REF   4  LAST 1238   11,3741   23264 0                   NBRANCH
 0760                         11,3742   60575 0  DOW..1    VLOAD  VSR4
 0761    REF  34  LAST 1236   11,3743   02032 1                   ALPHAV
 0762                         11,3744   53513 0            PDVL*  UNIT
 0763    REF  10  LAST 1224   11,3745   02132 0                   VECTAB,1
 0764                         11,3746   46315 1            PDVL   VPROJ
 0765    REF  35  LAST 1238   11,3747   02032 1                   ALPHAV
 0766                         11,3750   52361 1            VXSC   VSU
 0767    REF   5  LAST 1231   11,3751   11220 1                   3/4
 0768                         11,3752   60325 0            PDDL   NORM
 0769                         11,3753   00045 0                   36D
 0770    REF  37  LAST 1235   11,3754   00052 0                   S2
 0771                         11,3755   63406 0            PUSH   DSQ
 0772                         11,3756   77605 1            DMP
 0773                         11,3757   65301 0            NORM   PDDL
 0774                         11,3760   00043 0                   34D
 0775    REF   6  LAST 1238   11,3761   02072 0                   BETAM
 0776                         11,3762   56342 1            SR1    DDV
 0777                         11,3763   77761 1            VXSC
 0778                         11,3764   57154 0            LXA,2  XAD,2
 0779    REF  38  LAST 1238   11,3765   00051 0                   S2
 0780    REF  39  LAST 1238   11,3766   00051 0                   S2
 0781                         11,3767   57074 0            XAD,2  XAD,2
 0782    REF  40  LAST 1238   11,3770   00051 0                   S2
 0783                         11,3771   00042 1                   34D
 0784                         11,3772   43457 0            VSL*   RVQ
 0785                         11,3773   57606 0                    0 -80,2          *************************************
 0787    REF    1             12,2000                      SETLOC ORBITAL1
 0788                         12,3755                      BANK

 0789                         12,3755   04631 1  3/5       2DEC   .6 B-2
 0789                         12,3756   23146 0
 0790                         12,3757   14000 1  THREE/8   2DEC   .375
 0790                         12,3760   00000 1
 0791                         12,3761   02314 0   .3D       2DEC   .3 B-2
 0791                         12,3762   31463 1
 0792                         12,3763   01400 1  3/64      2DEC   3 B-6
 0792                         12,3764   00000 1
 0793                         12,3765   10000 0  DP1/4     2DEC   .25
 0793                         12,3766   00000 1
 0794    REF    2  LAST 1193  12,3765            DQUARTER  EQUALS DP1/4
 0795    REF    3  LAST 1239  12,3765            POS1/4    EQUALS DP1/4
 0796                         12,3767   03000 1  3/32      2DEC   3 B-5
 0796                         12,3770   00000 1
 0797                         12,3771   36000 1  15/16     2DEC   15. B -4
 0797                         12,3772   00000 1
 07982                        05,3774                      BANK   05
 07983   REF    1             04,2000                      SETLOC ORBITAL3
 07984                        04,3217                      BANK

 07986                        04,3217   30000 1  3/4       2DEC   3.0 B -2
 07986                        04,3220   00000 1
 0799                         04,3221   22525 0  7/12      2DEC   .5833333333
 0799                         04,3222   12525 0
 0800                         04,3223   22000 1  9/16      2DEC   9 B -4
 0800                         04,3224   00000 1
 0801                         04,3225   01200 1  5/128     2DEC   5 B-7
 0801                         04,3226   00000 1
 0802    REF   13  LAST 1233  12,2006            DPZERO    EQUALS ZEROVEC
 0803                         04,3227   25252 0  DP2/3     2DEC   .6666666667
 0803                         04,3230   25253 1
 0804    REF    3  LAST 1234  04,3227            2/3       EQUALS DP2/3
 0805                         04,3231   00027 1  OCT27     OCT    27
 0806                         13,3716                      BANK   13
 0807    REF    3  LAST 1233  13,2000                      SETLOC ORBITAL2
 0808                         13,3716                      BANK
P0809    IT IS VITAL THAT THE FOLLOWING CONSTANTS NOT BE SHUFFLED
 0810                         13,3716   77764 1            DEC    -11
 0811                         13,3717   77775 1            DEC    -2
 0812                         13,3720   77766 0            DEC    -9
 0813                         13,3721   77771 0            DEC    -6
 0814                         13,3722   77775 1            DEC    -2
 0815                         13,3723   77775 1            DEC    -2
 0816                         13,3724   00000 1            DEC    0
 0817                         13,3725   77763 0            DEC    -12
 0818                         13,3726   77766 0            DEC    -9
 0819                          13,3727   77773 1              DEC      -4
 0820                          13,3730   77770 1  ASCALE      DEC      -7
 0821                          13,3731   77771 0              DEC      -6
 0822                          13,3732   24000 1  5/8         2DEC     5 B-3
 0822                          13,3733   00000 1
 0823                          13,3734   74631 0  -1/12       2DEC     -.1
 0823                          13,3735   63145 1
 0824                          13,3736   00243 1  RECRATIO    2DEC     .01
 0824                          13,3737   32703 1
 0825                          13,3740   03654 0  RSPHERE     2DEC     64373.76 E3 B-29
 0825                          13,3741   21000 1
 0826                          13,3742   03654 0  RCM         2DEC     16093.44 E3 B-27
 0826                          13,3743   21000 1
 0827                          13,3744   04627 0  ROE         2DEC     60467.20 E3 B-29
 0827                          13,3745   25200 1
 0828                             0000            RATT        EQUALS 0D
 0829                             0006            VATT        EQUALS 6D
 0830                             0014            TAT         EQUALS 12D
 0831                             0016            RATT1       EQUALS 14D
 0832                             0024            VATT1       EQUALS 20D
 0833                             0032            MU(P)       EQUALS 26D
 0834                             0040            TDEC1       EQUALS 32D
 0835                             0016            URPV        EQUALS 14D
 0836   REF   8  LAST 1229        0022            COSPHI/2    EQUALS URPV +4
 0837                             0024            UZ          EQUALS 20D
 0838                             0032            TVEC        EQUALS 26D
 0001                          22,3773                              BANK    22
 0002    REF   2  LAST  326    23,2000                              SETLOC  INFLIGHT
 0003                          23,3251                              BANK

 0004    REF  23  LAST  566    E5,1642                              EBANK=  XSM

R0005    CALCGTA COMPUTES THE GYRO TORQUE ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0007    THE INPUT IS THE DESIRED STABLE MEMBER COORDINATES REFERRED TO PRESENT STABLE MEMBER COORDINATES. THE THREE
R0009    HALF-UNIT VECTORS ARE STORED AT XDC, YDC, AND ZDC.

R0010    THE OUTPUTS ARE THE THREE GYRO TORQUING ANGLES TO BE APPLIED TO THE Y, Z, AND X GYROS AND ARE STORED DP AT IGC,
R0012    MGC, AND OGC RESPECTIVELY.

 0013    REF   1                                                    COUNT*  $$/INFLT
 0014                          23,3251    71220 1  CALCGTA  ITA     DLOAD            PUSHDOWN  00-03,16D-27D,34D-37D
 0015    REF  41  LAST 1238    23,3252    00051 0                   S2               XDC = (XD1 XD2 XD3)
 0016    REF   6  LAST  968    23,3253    02665 0                   XDC              YDC = (YD1 YD2 YD3)
 0017                          23,3254    65325 0                   PDDL    PDDL     ZDC = (ZD1 ZD2 ZD3)
 0018    REF  16  LAST 1140    23,3255    06524 1                   HI6ZEROS
 0019    REF   7  LAST 1241    23,3256    02671 0                   XDC +4
 0020                          23,3257    55476 1                   DCOMP   VDEF
 0021                          23,3260    77656 1                   UNIT
 0022    REF   1               23,3261    14027 1                   STODL   ZPRIME           ZP = UNIT(-XD3 0 XD1) = (ZP1 ZP2 ZP3)
 0023    REF   2  LAST 1241    23,3262    00027 1                           ZPRIME

 0024                          23,3263    77742 0                   SR1
 0025    REF  12  LAST 1131    23,3264    14023 0                   STODL   SINTH            SIN(IGC) = ZP1
 0026    REF   3  LAST 1241    23,3265    00033 1                           ZPRIME +4
 0027                          23,3266    77742 0                   SR1
 0028    REF  11  LAST 1131    23,3267    34021 0                   STCALL  COSTH            COS(IGC) = ZP3
 0029    REF   4  LAST  324    23,3270    47322 1                           ARCTRIG

 0030    REF   2  LAST  124    23,3271    16742 1                   STODL   IGC              Y GYRO TORQUING ANGLE   FRACTION OF REV.
 0031    REF   8  LAST 1241    23,3272    02667 1                           XDC +2
 0032                          23,3273    77742 0                   SR1
 0033    REF  13  LAST 1241    23,3274    14023 0                   STODL   SINTH            SIN(MGC) = XD2
 0034    REF   4  LAST 1241    23,3275    00027 1                           ZPRIME

 0035                          23,3276    65205 0                   DMP     PDDL
 0036    REF   9  LAST 1241    23,3277    02671 0                           XDC +4           PD0D = (ZP1)(XD3)
 0037    REF   5  LAST 1241    23,3300    00033 1                           ZPRIME +4

 0038                          23,3301    45205 1                   DMP     DSU
 0039    REF  10  LAST 1241    23,3302    02665 0                           XDC              MPAC = (ZP3)(XD1)
 0040                          23,3303    77626 0                   STADR
 0041    REF  12  LAST 1241    23,3304    43756 1                   STCALL  COSTH            COS(MGC) = MPAC - PD0D
 0042    REF   5  LAST 1241    23,3305    47322 1                           ARCTRIG
 0043   REF   2  LAST  125   23,3306   26744 1          STCVL  MGC           Z GYRO TORQUING ANGLE   FRACTION OF REV.
 0044   REF   6  LAST 1241   23,3307   00027 1                 ZPRIME
 0045                        23,3310   77641 1          DOT
 0046   REF   4  LAST  926   23,3311   02701 0                 ZDC
 0047   REF  13  LAST 1241   23,3312   24021 1          STOVL  COSTH         COS(OGC) = ZP . ZDC
 0048   REF   7  LAST 1242   23,3313   00027 1                 ZPRIME
 0049                        23,3314   77641 1          DOT
 0050   REF   4  LAST  926   23,3315   02673 1                 YDC
 0051   REF  14  LAST 1241   23,3316   34023 1          STCALL SINTH         SIN(OGC) = ZP . YDC
 0052   REF   6  LAST 1241   23,3317   47322 1                 ARCTRIG

 0053   REF  14  LAST  965   23,3320   36740 1          STCALL OGC           X GYRO TORQUING ANGLE   FRACTION OF REV.
 0054   REF  42  LAST 1241   23,3321   00051 0                 S2
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R0055    ARCTRIG COMPUTES AN ANGLE GIVEN THE SINE AND COSINE OF THIS ANGLE.

R0056    THE INPUTS ARE SIN/4 AND COS/4 STORED DP AT SINTH AND COSTH.

R0057    THE OUTPUT IS THE CALCULATED ANGLE BETWEEN +.5 AND -.5 REVOLUTIONS AND STORED AT THETA. THE OUTPUT IS ALSO
R0059    AVAILABLE AT MPAC.


 0060                           23,3322   51545 1  ARCTRIG  DLOAD  ABS             PUSHDOWN  16D-21D
 0061   REF  15  LAST 1242      23,3323   00023 0                  SINTH
 0062                           23,3324   50025 0           DSU    BMN
 0063   REF   1                 23,3325   07536 0                  QTSN45          ABS(SIN/4) - SIN(45)/4
 0064   REF   1                 23,3326   47335 1                  TRIG1           IF (-45,45) OR (135,-135)


 0065                           23,3327   72545 0           DLOAD  SL1             (45,135) OR (-135,-45)
 0066   REF  14  LAST 1242      23,3330   00021 1                  COSTH
 0067                           23,3331   75326 1           ACOS   SIGN
 0068   REF  16  LAST 1243      23,3332   00023 0                  SINTH
 0069   REF   7  LAST 1131      23,3333   00025 0           STORE  THETA           X = ARCCOS(COS) WITH SIGN(SIN)
 0070                           23,3334   77616 0           RVQ


 0071                           23,3335   72545 0  TRIG1    DLOAD  SL1             (-45,45) OR (135,-135)
 0072   REF  17  LAST 1243      23,3336   00023 0                  SINTH
 0073                           23,3337   77736 0           ASIN
 0074   REF   8  LAST 1243      23,3340   14025 0           STODL  THETA           X = ARCSIN(SIN) WITH SIGN(SIN)
 0075   REF  15  LAST 1243      23,3341   00021 1                  COSTH
 0076                           23,3342   77640 0           BMN
 0077   REF   1                 23,3343   47346 0                  TRIG2           IF (135,-135)

 0078                           23,3344   43545 1           DLOAD  RVQ
 0079   REF   9  LAST 1243      23,3345   00025 0                  THETA           X = ARCSIN(SIN)     (-45,45)


 0080                           23,3346   75345 1  TRIG2    DLOAD  SIGN            (135,-135)
 0081   REF   6  LAST 1140      23,3347   06522 1                  HIDPHALF
 0082   REF  18  LAST 1243      23,3350   00023 0                  SINTH
 0083                           23,3351   77625 0           DSU
 0084   REF  10  LAST 1243      23,3352   00025 0                  THETA
 0085   REF  11  LAST 1243      23,3353   00025 0           STORE  THETA           X = .5 WITH SIGN(SIN) - ARCSIN(SIN)
 0086                           23,3354   77616 0           RVQ                                        (+) - (+) OR (-) - (-)
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R0087        SMNB, NBSM, AND AXISROT, WHICH USED TO APPEAR HERE, HAVE BEEN
R0088   COMBINED IN A ROUTINE CALLED AX*SR*T, WHICH APPEARS AMONG THE POWERED
R0089   FLIGHT SUBROUTINES.
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R0090   CALCGA COMPUTES THE CDU DRIVING ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0092   THE INPUTS ARE  1) THE NAVIGATION BASE COORDINATES REFERRED TO ANY COORDINATE SYSTEM. THE THREE HALF-UNIT
R0094   VECTORS ARE STORED AT XNB,YNB, AND ZNB.  2) THE DESIRED STABLE MEMBER COORDINATES REFERRED TO THE SAME
R0096   COORDINATE SYSTEM ARE STORED AT XSM, YSM, AND ZSM.

R0097   THE OUTPUTS ARE THE THREE CDU DRIVING ANGLES AND ARE STORED SP AT THETAD, THETAD +1, AND THETAD +2.


 0099                        23,3355   77601 0  CALCGA    SETPD                   PUSHDOWN  00-05, 16D-21D, 34D-37D
 0100                        23,3356   00001 0                    0
 0101                        23,3357   47375 0            VLCAD   VXV
 0102   REF   8  LAST  962   23,3360   02665 0                    XNB             XNB = OGA (OUTER GIMBAL AXIS)
 0103   REF   2  LAST  124   23,3361   02651 1                    YSM             YSM = IGA (INNER GIMBAL AXIS)
 0104                        23,3362   41456 0            UNIT    PUSH            P00 = UNIT(OGA X IGA) = MGA

 0105                        23,3363   44041 1            DOT     ITA
 0106   REF   6  LAST  975   23,3364   02701 0                    ZNB
 0107   REF  43  LAST 1242   23,3365   00051 0                    S2
 0108   REF  16  LAST 1243   23,3366   24021 1            STOVL   COSTH           COS(OG) = MGA . ZNB
 0109                        23,3367   00001 0                    0
 0110                        23,3370   77641 1            DOT
 0111   REF   6  LAST  975   23,3371   02673 1                    YNB
 0112   REF  19  LAST 1243   23,3372   34023 1            STCALL  SINTH           SIN(OG) = MGA . YNB
 0113   REF   7  LAST 1242   23,3373   47322 1                    ARCTRIG
 0114   REF  15  LAST 1242   23,3374   26740 0            STOVL   OGC
 0115                        23,3375   00001 0                    0

 0116                        23,3376   50235 0            VXV     DOT             PROVISION FOR MG ANGLE OF 90 DEGREES
 0117   REF   9  LAST 1245   23,3377   02665 0                    XNB
 0118   REF   3  LAST 1245   23,3400   02651 1                    YSM
 0119                        23,3401   77752 1            SL1
 0120   REF  17  LAST 1245   23,3402   24021 1            STOVL   COSTH           COS(MG) = IGA . (MGA X OGA)
 0121   REF   4  LAST 1245   23,3403   02651 1                    YSM
 0122                        23,3404   77641 1            DOT
 0123   REF  10  LAST 1245   23,3405   02665 0                    XNB
 0124   REF  20  LAST 1245   23,3406   34023 1            STCALL  SINTH           SIN(MG) = IGA . OGA
 0125   REF   8  LAST 1245   23,3407   47322 1                    ARCTRIG
 0126   REF   3  LAST 1242   23,3410   02744 1            STORE   MGC

 0127                        23,3411   45246 0            ABS     DSU
 0128   REF   1              23,3412   07540 1                    .166...
 0129                        23,3413   77644 1            BPL
 0130   REF   1              23,3414   47433 0                    GIMLOCK1        IF ANGLE GREATER THAN 60 DEGREES

 0131                        23,3415   50375 0  CALCGA1   VLDAD   DOT
 0132   REF   2  LAST  124   23,3416   02657 1                    ZSM
 0133                        23,3417   00001 0                    0
 0134   REF  18  LAST 1245   23,3420   24021 1            STOVL   COSTH           COS(IG) = ZSM . MGA
 0135   REF  24  LAST 1241   23,3421   02643 1                    XSM
 0136                          23,3422   45441 1            DOT    STADR
 0137   REF  21  LAST 1245     23,3423   43754 0            STCALL SINTH          SIN(IG) = XSM . MGA
 0138   REF   9  LAST 1245     23,3424   47322 1                   ARCTRIG

 0139   REF   3  LAST 1241     23,3425   26742 1            STOVL  IGC
 0140   REF  16  LAST 1245     23,3426   02740 0                   OGC
 0141                          23,3427   77634 0            RTB
 0142   REF   4  LAST  487     23,3430   21621 1                   VISTO2S
 0143   REF  20  LAST  962     23,3431   34322 0            STCALL THETAD
 0144   REF  44  LAST 1245     23,3432   00051 0                   S2

 0145                          23,3433   77776 1   GIMLOCK1 EXIT
 0146   REF  43  LAST 1236     23,3434   05567 0            TC     ALARM
 0147                          23,3435   00401 1            OCT    00401
 0148   REF  70  LAST 1235     23,3436   05504 0            TC     UPFLAG         GIMBAL LOCK HAS OCCURED
 0149   REF   3  LAST  376     23,3437   00056 1            ADRES  GLOKFAIL

 0150   REF 232  LAST 1236     23,3440   06042 1            TC     INTPRET
 0151                          23,3441   77650 1            GOTO
 0152   REF   1                23,3442   47415 1                   CALCGA1
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R0153   AXISGEN COMPUTES THE COORDINATES OF ONE COORDINATE SYSTEM REFERRED TO ANOTHER COORDINATE SYSTEM.

R0155   THE INPUTS ARE  1) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM A STORED AT STARAD.  2) THE STAR2 VECTOR
R0157   REFERRED TO COORDINATE SYSTEM A STORED AT STARAD +6.  3) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM B STORED
R0159   AT LOCATION 6 OF THE VAC AREA.  4) THE STAR2 VECTOR REFERRED TO COORDINATE SYSTEM B STORED AT LOCATION 12D OF
R0161   THE VAC AREA.

R0162   THE OUTPUT DEFINES COORDINATE SYSTEM A REFERRED TO COORDINATE SYSTEM B. THE THREE HALF-UNIT VECTORS ARE STORED
R0164   AT LOCATIONS XDC, XDC +6, XDC +12D, AND STARAD, STARAD +6, STARAD +12D.


 0165                          23,3443   66370 0  AXISGEN  AXT,1   SSP                 PUSHDOWN  00-30D,34D-37D
 0166   REF  30  LAST  965     23,3444   02714 1                   STARAD +6
 0167   REF  29  LAST 1228     23,3445   00051 0                   S1
 0168   REF  31  LAST 1247     23,3446   02700 1                   STARAD -6

 0169                          23,3447   77601 0           SETPD
 0170                          23,3450   00001 0                   0
 0171                          23,3451   46773 0  AXISGEN1 VLOAD*  VXV*               06D   UA = S1
 0172   REF  32  LAST 1247     23,3452   02723 0                   STARAD +12D,1              STARAD +00D   UB = S1
 0173   REF  33  LAST 1247     23,3453   02731 0                   STARAD +18D,1
 0174                          23,3454   77656 1           UNIT                        12D   VA = UNIT(S1 X S2)
 0175   REF  34  LAST 1247     23,3455   06731 1           STORE   STARAD +18D,1              STARAD +06D   VB = UNIT(S1 X S2)
 0176                          23,3456   77773 1           VLOAD*
 0177   REF  35  LAST 1247     23,3457   02723 0                   STARAD +12D,1

 0178                          23,3460   76433 1           VXV*    VSL1
 0179   REF  36  LAST 1247     23,3461   02731 0                   STARAD +18D,1       18D   WA = UA X VA
 0180   REF  37  LAST 1247     23,3462   06737 1           STORE   STARAD +24D,1              STARAD +12D   WB = UB X VB

 0181                          23,3463   77700 0           TIX,1
 0182   REF   1                23,3464   47451 1                   AXISGEN1

 0183                          23,3465   66160 0           AXC,1   SXA,1
 0184                          23,3466   00006 1                   6
 0185                          23,3467   00036 1                   30D

 0186                          23,3470   66370 0           AXT,1   SSP
 0187                          23,3471   00022 1                   18D
 0188   REF  30  LAST 1247     23,3472   00051 0                   S1
 0189                          23,3473   00006 1                   6

 0190                          23,3474   66374 1           AXT,2   SSP
 0191                          23,3475   00006 1                   6
 0192   REF  45  LAST 1246     23,3476   00052 0                   S2
 0193                          23,3477   00002 0                   2

 0194                          23,3500   76720 0  AXISGEN2 XCHX,1  VLOAD*
 0195                          23,3501   00036 1                   30D                 X1=-6  X2=+6    X1=-6  X2=+4    X1=-6  X2=+2
 0196                          23,3502   00001 0                   0,1
 0197                          23,3503   62757 0            VXSC*   PDVL*               J=(UA)(UB1)   J=(UA)(UB2)   J=(UA)(UB3)
 0198     REF  38  LAST 1247   23,3504   75062 1                    STARAD +6,2
 0199                          23,3505   00007 0                    6,1
 0200                          23,3506   77757 1            VXSC*
 0201     REF  39  LAST 1248   23,3507   75054 1                    STARAD +12D,2
 0202                          23,3510   30031 0            STOVL*  24D                 K=(VA)(VB1)   J=(VA)(VB2)   J=(VA)(VB3)
 0203                          23,3511   00015 0                    12D,1

 0204                          23,3512   53357 0            VXSC*   VAD
 0205     REF  40  LAST 1248   23,3513   75046 1                    STARAD +18D,2       L=(WA)(WB1)   J=(WA)(WB2)   J=(WA)(WB3)
 0206                          23,3514   76455 1            VAD     VSL1
 0207                          23,3515   00031 0                    24D
 0208                          23,3516   53520 0            XCHX,1  UNIT
 0209                          23,3517   00036 1                    30D
 0210     REF  11  LAST 1241   23,3520   06707 1            STORE   XDC +18D,1          XDC = L+J+K   YDC = L+J+K   ZDC = L+J+K

 0211                          23,3521   77700 0            TIX,1
 0212     REF   1              23,3522   47523 0                    AXISGEN3

 0213                          23,3523   77704 1  AXISGEN3  TIX,2
 0214     REF   1              23,3524   47500 1                    AXISGEN2

 0215                          23,3525   77775 1            VLOAD
 0216     REF  12  LAST 1248   23,3526   02665 0                    XDC
 0217     REF  41  LAST 1248   23,3527   26707 0            STOVL   STARAD
 0218     REF   5  LAST 1242   23,3530   02673 1                    YDC
 0219     REF  42  LAST 1248   23,3531   26715 0            STOVL   STARAD +6
 0220     REF   5  LAST 1242   23,3532   02701 0                    ZDC
 0221     REF  43  LAST 1248   23,3533   02723 0            STORE   STARAD +12D

 0222                          23,3534   77616 0            RVQ
 0281                         23,3535   05520 0  QTSN45    2DEC     .1768
 0281                         23,3536   26075 1
 0282                         23,3537   05252 1  .166...   2DEC     .1666666667
 0282                         23,3540   25253 1
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 0001                         14,3775                        BANK    14        SAME FBANK AS THE FINDCDUD SUB-PROGRAM
 0002   REF   1               23,2000                        SETLOC  POWFLITE
 0003                         23,3541                        BANK

 0004   REF   1                  0142                        EBANK=  DEXDEX
 0005   REF   1                                              COUNT*  $$/POWFL

R0006        CDUTRIG, CDUTRIG1, CDUTRIG2, AND CD*TR*GS ALL COMPUTE THE SINES AND
R0007   COSINES OF THREE 2'S COMPLEMENT ANGLES AND PLACE THE RESULT, DOUBLE
R0008   PRECISION, IN THE SAME ORDER AS THE INPUTS, AT SINCDU AND COSCDU.   AN
R0009   ADDITIONAL OUTPUT IS THE 1'S COMPLEMENT ANGLES AT CDUSPOT.   THESE
R0010   ROUTINES GO OUT OF THEIR WAY TO LEAVE THE MPAC AREA AS THEY FIND IT,
R0011   EXCEPT FOR THE GENERALLY UNIMPORTANT MPAC +2.   THEY DIFFER ONLY IN
R0012   WHERE THEY GET THE ANGLES, AND IN METHOD OF CALLING.

R0013        CDUTRIG (AND CDUTRIG1, WHICH CAN BE CALLED IN BASIC) COMPUTE THE
R0014   SINES AND COSINES FROM THE CURRENT CONTENTS OF THE CDU REGISTERS.
R0015   THE CONTENTS OF CDUTEMP, ETC., ARE NOT TOUCHED SO THAT THEY MAY
R0016   CONTINUE TO FORM A CONSISTENT SET WITH THE LATEST PIPA READINGS.

R0017        CDUTRIG1 IS LIKE CDUTRIG EXCEPT THAT IT CAN BE CALLED IN BASIC.

R0018        CD*TR*GS FINDS CDU VALUES IN CDUSPOT RATHER THAN IN CDUTEMP.   THIS
R0019   ALLOWS USERS TO MAKE TRANSFORMATIONS USING ARBITRARY ANGLES, OR REAL
R0020   ANGLES IN AN ORDER OTHER THAN X Y Z.   A CALL TO THIS ROUTINE IS
R0021   NECESSARY IN PREPARATION FOR A CALL TO AX*SR*T IN EITHER OF ITS TWO
R0022   MODES (SMNB OR NBSM).   SINCE AX*SR*T EXPECTS TO FIND THE SINES AND
R0023   COSINES IN THE ORDER Y Z X THE ANGLES MUST HAVE BEEN PLACED IN CDUSPOT
R0024   IN THIS ORDER.   CD*TR*GS NEED NOT BE REPEATED WHEN AX*SR*T IS CALLED
R0025   MORE THAN ONCE, PROVIDED THE ANGLES HAVE NOT CHANGED.   NOTE THAT SINCE
R0026   IT CLOBBERS BUF2 (IN THE SINE AND COSINE ROUTINES) CD*TR*GS CANNOT BE
R0027   CALLED USING BANKCALL.   SORRY.

R0028        CD*TR*G IS LIKE CD*TR*GS EXCEPT THAT IT CAN BE CALLED IN
R0029   INTERPRETIVE.

 0030                         23,3541   77776 1  CDUTRIG  EXIT
 0031   REF   1               23,3542  0 3551 0           TC      CDUTRIGS
 0032   REF 233  LAST 1246    23,3543  0 6042 1           TC      INTPRET
 0033                         23,3544   77616 0           RVQ

 0034                         23,3545   77776 1  CD*TR*G  EXIT
 0035   REF   1               23,3546  0 3557 0           TC      CD*TR*GS
 0036   REF 234  LAST 1251    23,3547  0 6042 1           TC      INTPRET
 0037                         23,3550   77616 0           RVQ

 0038   REF  17  LAST  943    23,3551  3 0032 0  CDUTRIGS CA      CDUX
 0039   REF  26  LAST  962    23,3552  54 771 1           TS      CDUSPOT +4
 0040   REF   8  LAST  943    23,3553  3 0033 1           CA      CDUY
 0041   REF  27  LAST 1251    23,3554  54 765 1           TS      CDUSPOT
 0042    REF  11  LAST  943   23,3555  3 0034 0           CA      CDUZ
 0043    REF  28  LAST 1251   23,3556  54 767 0           TS      CDUSPCT +2

 0044                         23,3557  0 0006 1  CD*TR*GS EXTEND
 0045    REF  26  LAST  917   23,3560  22 142 0           DXCH    TEM2
 0046    REF  23  LAST 1071   23,3561  3 4751 0           CAF     FOUR
 0047    REF  18  LAST 1041   23,3562  7 6245 0  TR*GL**P MASK    SIX              MAKE IT EVEN AND SMALLER
 0048    REF  13  LAST  917   23,3563  54 143 0           TS      TEM3
 0049    REF  14  LAST 1252   23,3564  50 143 1           INDEX   TEM3
 0050    REF  29  LAST 1252   23,3565  3 0765 0           CA      CDUSPOT
 0051    REF 743  LAST 1230   23,3566  52 155 1           DXCH    MPAC             STORING 2'S COMP ANGLE, LOADING MPAC
 0052    REF  65  LAST 1067   23,3567  52 127 1           DXCH    VBUF +4          STORING MPAC FOR LATER RESTORATION
 0053    REF   5  LAST  819   23,3570  0 4713 0           TC      USPRCADR
 0054    REF  15  LAST  576   23,3571   21577 1           CADR    CDULOGIC
 0055                         23,3572  0 0006 1           EXTEND
 0056    REF 744  LAST 1252   23,3573  3 0155 0           DCA     MPAC
 0057    REF  15  LAST 1252   23,3574  50 143 1           INDEX   TEM3
 0058    REF  30  LAST 1252   23,3575  52 766 1           DXCH    CDUSPOT          STORING 1'S COMPLEMENT ANGLE
 0059    REF   6  LAST 1252   23,3576  0 4713 0           TC      USPRCADR
 0060    REF   2  LAST 1007   23,3577   01517 0           CADR    COSINE
 0061    REF 745  LAST 1252   23,3600  52 155 1           DXCH    MPAC
 0062    REF  16  LAST 1252   23,3601  50 143 1           INDEX   TEM3
 0063    REF   4  LAST  100   23,3602  52 744 1           DXCH    COSCDU           STORING COSINE
 0064                         23,3603  0 0006 1           EXTEND
 0065    REF  17  LAST 1252   23,3604  5 0143 1           INDEX   TEM3
 0066    REF  31  LAST 1252   23,3605  3 0766 0           DCA     CDUSPOT          LOADING 1'S COMPLEMENT ANGLE
 0067    REF   7  LAST 1252   23,3606  0 4713 0           TC      USPRCADR
 0068    REF   2  LAST 1007   23,3607   01531 1           CADR    SINE +1          SINE +1 EXPECTS ARGUMENT IN A AND L
 0069    REF  66  LAST 1252   23,3610  52 127 1           DXCH    VBUF +4          BRINGING UP PRIOR MPAC TO BE RESTORED
 0070    REF 746  LAST 1252   23,3611  52 155 1           DXCH    MPAC
 0071    REF  18  LAST 1252   23,3612  50 143 1           INDEX   TEM3
 0072    REF   4  LAST  100   23,3613  52 736 1           DXCH    SINCDU
 0073    REF  19  LAST 1252   23,3614  10 143 0           CCS     TEM3
 0074    REF   1              23,3615  1 3562 1           TCF     TR*GL**P
 0075    REF  27  LAST 1252   23,3616  0 0142 0           TC      TEM2
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P0076    ************************************************************************************************************

R0078        QUICTRIG, INTENDED FOR GUIDANCE CYCLE USE WHERE TIME IS CRITICAL, IS A MUCH FASTER VERSION OF CD*TR*GS.
R0080    QUICTRIG COMPUTES AND STORES THE SINES AND COSINES OF THE 2'S COMPLEMENT ANGLES AT CDUSPOT, CDUSPOT +2,
R0082    AND CDUSPOT +4.   UNLIKE CD*TR*GS, QUICTRIG DOES NOT LEAVE THE 1'S COMPLEMENT VERSIONS OF THE ANGLES IN
R0084    CDUSPOT.   QUICTRIG'S EXECUTION TIME IS 4.1 MS;   THIS IS 10 TIMES AS FAST AS CD*TR*GS.   QUICTRIG MAY BE
R0086    CALLED FROM INTERPRETIVE AS AN RTB OP-CODE, OR FROM BASIC VIA BANKCALL OR IBNKCALL.

 0090                             23,3617   0 0004 0   QUICTRIG INHINT                      INHINT SINCE DAP USES THE SAME TEMPS
 00901                            23,3620   0 0006 1            EXTEND
 00902   REF  38  LAST  896       23,3621   22 061 0            DXCH    ITEMP1
 0091    REF  24  LAST 1252       23,3622   3 4751 0            CAF     FOUR
 0092    REF  19  LAST 1252       23,3623   7 6245 0       +4   MASK    SIX
 0093    REF  14  LAST  896       23,3624   54 062 1            TS      ITEMP2
 0094    REF  15  LAST 1253       23,3625   50 062 0            INDEX   ITEMP2
 0095    REF  32  LAST 1252       23,3626   3 0765 0            CA      CDUSPOT
 0096    REF   5  LAST  607       23,3627   0 5033 1            TC      SPSIN
 0097                             23,3630   0 0006 1            EXTEND
 0098    REF  69  LAST 1126       23,3631   7 4736 0            MP      BIT14               SCALE DOWN TO MATCH INTERPRETER OUTPUTS
 0099    REF  16  LAST 1253       23,3632   50 062 0            INDEX   ITEMP2
 0100    REF   5  LAST 1252       23,3633   52 736 1            DXCH    SINCDU
 0101    REF  17  LAST 1253       23,3634   50 062 0            INDEX   ITEMP2
 0102    REF  33  LAST 1253       23,3635   3 0765 0            CA      CDUSPOT
 0103    REF   5  LAST  607       23,3636   0 5032 0            TC      SPCOS
 0104                             23,3637   0 0006 1            EXTEND
 0105    REF  70  LAST 1253       23,3640   7 4736 0            MP      BIT14
 0106    REF  18  LAST 1253       23,3641   50 062 0            INDEX   ITEMP2
 0107    REF   5  LAST 1252       23,3642   52 744 1            DXCH    COSCDU
 0108    REF  19  LAST 1253       23,3643   10 062 1            CCS     ITEMP2
 0109    REF   5  LAST  906       23,3644   1 3623 1            TCF     QUICTRIG +4
 01091   REF  39  LAST 1253       23,3645   3 0061 0            CA      ITEMP1
 0110                             23,3646   0 0003 1            RELINT
 01101   REF 378  LAST 1213       23,3647   0 0000 1            TC      A
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R0111    ******************************************************************************************************

R0113        THESE INTERFACE ROUTINES MAKE IT POSSIBLE TO CALL AX*SR*T, ETC., IN
R0114    INTERPRETIVE.   LATER, WHERE POSSIBLE, THEY WILL BE ELIMINATED.

R0127        THESE INTERFACE ROUTINES ARE PERMANENT.   ALL RESTORE USER'S EBANK
R0128    SETTING.   ALL ARE STRICT INTERPRETIVE SUBROUTINES, CALLED USING "CALL",
R0129    RETURNING VIA QPRET.   ALL EXPECT AND RETURN THE VECTOR TO BE TRANSFOR-
R0130    MED INTERPRETER-STYLE IN MPAC; COMPONENTS AT MPAC, MPAC +3, AND MPAC +5.

R0131        TRG*SMNB AND TRG*NBSM BOTH EXPECT TO SEE THE 2'S COMPLEMENT ANGLES
R0132    AT CDUSPOT (ORDER Y Z X, AT CDUSPOT, CDUSPOT +2, AND CDUSPOT +4; ODD
R0133    LOCATIONS NEED NOT BE ZEROED).   TRG*NBSM DOES THE NB TO SM TRANSFOR-
R0134    MATION;  TRG*SMNB, VICE VERSA.

R0135        CDU*NBSM DOES ITS TRANSFORMATION USING THE PRESENT CONTENTS OF
R0136    THE CDU COUNTERS.   OTHERWISE IT IS LIKE TRG*NBSM.

R01361       CDU*SMNB IS THE COMPLEMENT OF CDU*NBSM.

 01362                         23,3650   77776 1  CDU*SMNB EXIT
 01363  REF   2  LAST 1251    23,3651  0 3551 0           TC      CDUTRIGS
 01364  REF   1               23,3652  1 3655 0           TCF     C*MM*N1

 0137                          23,3653   77776 1  TRG*SMNB EXIT
 0138   REF   2  LAST 1251    23,3654  0 3557 0           TC      CD*TR*GS
 0139   REF   4  LAST 1064    23,3655  0 7535 0  C*MM*N1  TC      MPACVBUF          AX*SR*T EXPECTS VECTOR IN VBUF
 0140   REF  32  LAST 1093    23,3656  4 6250 1           CS      THREE             SIGNAL FOR SM TO NB TRANSFORMATION
 0141   REF   2  LAST  606    23,3657  0 3677 1  C*MM*N2  TC      AX*SR*T
 0142   REF 235  LAST 1251    23,3660  0 6042 1           TC      INTPRET
 0143                          23,3661   43575 1           VLOAD   RVQ
 0144   REF  67  LAST 1252    23,3662   00123 1                   VBUF

 0145                          23,3663   77776 1  CDU*NBSM EXIT
 0146   REF   3  LAST 1254    23,3664  0 3551 0           TC      CDUTRIGS
 0147   REF   1               23,3665  1 3670 1           TCF     C*MM*N3

 0148                          23,3666   77776 1  TRG*NBSM EXIT
 0149   REF   3  LAST 1254    23,3667  0 3557 0           TC      CD*TR*GS
 0150   REF   5  LAST 1254    23,3670  0 7535 0  C*MM*N3  TC      MPACVBUF          FOR AX*SR*T
 0151   REF  33  LAST 1254    23,3671  3 6250 0           CA      THREE             SIGNAL FOR NB TO SM TRANSFORMATION
 0152   REF   1               23,3672  1 3657 1           TCF     C*MM*N2

R0153        *NBSM* AND *SMNB* EXPECT TO SEE THE SINES AND COSINES (AT SINCDU
R0154    AND COSCDU) RATHER THAN THE ANGLES THEMSELVES.   OTHERWISE THEY ARE
R0155    LIKE TRG*NBSM AND TRG*SMNB.

R0156        NOTE THAT JUST AS CD*TR*GS NEED BE CALLED ONLY ONCE FOR EACH SERIES
R0157    OF TRANSFORMATIONS USING THE SAME ANGLES, SO TOO ONLY ONE OF TRG*NBSM
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R0158    AND TRG*SMNB NEED BE CALLED FOR EACH SERIES.   FOR SUBSEQUENT TRANSFOR-
R0159    MATIONS USE *NBSM* AND *SMNB*.

 0160                          23,3673   77776 1  *SMNB*    EXIT
 0161    REF    2  LAST 1254   23,3674   1 3655 0           TCF     C*MM*N1

 0162                          23,3675   77776 1  *NBSM*    EXIT
 0163    REF    2  LAST 1254   23,3676   1 3670 1           TCF     C*MM*N3

R0164          AX*SR*T COMBINES THE OLD SMNB AND NBSM.   FOR THE NB TO SM
R0165    TRANSFORMATION, ENTER WITH +3 IN A.   FOR SM TO NB, ENTER WITH -3.
R0166    THE VECTOR TO BE TRANSFORMED ARRIVES, AND IS RETURNED, IN VBUF.
R0167    AX*SR*T EXPECTS TO FIND THE SINES AND COSINES OF THE ANGLES OF ROTATION
R0168    AT SINCDU AND COSCDU, IN THE ORDER Y Z X.   A CALL TO CD*TR*GS, WITH
R0169    THE 2'S COMPLEMENT ANGLES (ORDER Y Z X) AT CDUSPOT, WILL TAKE CARE OF
R0170    THIS.   HERE IS A SAMPLE CALLING SEQUENCE:-

R0171                                         TC      CDUTRIGS
R0172                                         CS      THREE         ("CA  THREE" FOR NBSM)
R0173                                         TC      AX*SR*T

R0174    THE CALL TO CD*TR*GS NEED NOT BE REPEATED, WHEN AX*SR*T IS CALLED MORE
R0175    THAN ONCE, UNLESS THE ANGLES HAVE CHANGED.

R0176        AX*SR*T IS GUARANTEED SAFE ONLY FOR VECTORS OF MAGNITUDE LESS THAN
R0177    UNITY.   A LOOK AT THE CASE IN WHICH A VECTOR OF GREATER MAGNITUDE
R0178    HAPPENS TO LIE ALONG AN AXIS OF THE SYSTEM TO WHICH IT IS TO BE TRANS-
R0179    FORMED CONVINCES ONE THAT THIS IS A RESTRICTION WHICH MUST BE ACCEPTED.

 0180    REF    2  LAST 1251   23,3677   54 142 1  AX*SR*T   TS      DEXDEX          WHERE IT BECOMES THE INDEX OF INDEXES
 0181                          23,3700   0 0006 1            EXTEND
 0182    REF    1              23,3701   22 145 1            QXCH    RTNSAVER

 0183    REF    3  LAST 1255   23,3702   10 142 1  R*TL**P   CCS     DEXDEX                    +3 --> 0      -3 --> 2
 0184    REF    4  LAST 1255   23,3703   4 0142 1            CS      DEXDEX          THUS:     +2 --> 1      -2 --> 1
 0185    REF   34  LAST 1254   23,3704   6 6250 0            AD      THREE                     +1 --> 2      -1 --> 0
 0186                          23,3705   0 0006 1            EXTEND
 0187    REF  379  LAST 1253   23,3706   5 0000 1            INDEX   A
 0188    REF    1              23,3707   3 3766 0            DCA     INDEXI
 0189    REF    1              23,3710   52 144 1            DXCH    DEXI

 0190    REF  126  LAST 1177   23,3711   3 4753 1            CA      ONE
 0191    REF  160  LAST 1109   23,3712   54 130 1            TS      BUF
 0192                          23,3713   0 0006 1            EXTEND
 0193    REF    2  LAST   98   23,3714   5 0143 1            INDEX   DEXI
 0194    REF   68  LAST 1254   23,3715   4 0123 0            CCS     VBUF
 0195    REF    1              23,3716   1 3720 0            TCF     LOOP1             REALLY BE A SUBTRACT, AND VICE VERSA

 0196    REF  161  LAST 1255   23,3717   52 131 0  LOOP2     DXCH    BUF             LOADING VECTOR COMPONENT, STORING INDEX
 0197   REF 747  LAST 1252   23,3720   52 155 1  LOOP1     DXCH    MPAC
 0198   REF   1              23,3721    3 3764 1           CA      SINESLOC
 0199   REF   3  LAST 1255   23,3722    6 0143 1           AD      DEX1
 0200   REF  81  LAST 1070   23,3723   54 116 0            TS      ADDRWD

 0201   REF  21  LAST 1079   23,3724    0 7112 1           TC      DMPSUB         MULTIPLY BY SIN(CDUANGLE)
 0202   REF   5  LAST 1255   23,3725   10 142 1            CCS     DEXDEX
 0203   REF 748  LAST 1256   23,3726   52 155 1            DXCH    MPAC           NBSM CASE
 0204                        23,3727    1 3732 0           TCF     +3
 0205                        23,3730    0 0006 1           EXTEND                 SMNB CASE
 0206   REF 749  LAST 1256   23,3731    4 0155 1           DCS     MPAC
 0207   REF   1              23,3732   52 160 1            DXCH    TERMITMP

 0208   REF  20  LAST 1253   23,3733    3 6245 1           CA      SIX            SINCDU AND COSCDU (EACH 6 WORDS) MUST
 0209   REF  82  LAST 1256   23,3734   26 116 0            ADS     ADDRWD           BE CONSECUTIVE AND IN THAT ORDER

 0210                        23,3735    0 0006 1           EXTEND
 0211   REF 162  LAST 1255   23,3736    5 0130 0           INDEX   BUF
 0212   REF   4  LAST 1256   23,3737    5 0143 1           INDEX   DEX1
 0213   REF  69  LAST 1255   23,3740    3 0123 1           DCA     VBUF
 0214   REF 750  LAST 1256   23,3741   52 155 1            DXCH    MPAC
 0215   REF  22  LAST 1256   23,3742    0 7112 1           TC      DMPSUB         MULTIPLY BY COS(CDUANGLE)
 0216   REF 751  LAST 1256   23,3743   52 155 1            DXCH    MPAC
 0217   REF   2  LAST 1256   23,3744   20 160 1            DAS     TERMITMP
 0218   REF   3  LAST 1256   23,3745   52 160 1            DXCH    TERMITMP
 0219                        23,3746   20 001 1            DDOUBL
 0220   REF 163  LAST 1256   23,3747   50 130 0            INDEX   BUF
 0221   REF   5  LAST 1256   23,3750   50 143 1            INDEX   DEX1
 0222   REF  70  LAST 1256   23,3751   52 123 0            DXCH    VBUF
 0223   REF 164  LAST 1256   23,3752   52 131 0            DXCH    BUF            LOADING INDEX, STORING VECTOR COMPONENT

 0224   REF 380  LAST 1255   23,3753   10 000 0            CCS     A              'CAUSE THAT'S WHERE THE INDEX NOW IS
 0225   REF   1              23,3754    1 3717 1           TCF     LOOP2

 0226                        23,3755    0 0006 1           EXTEND
 0227   REF   6  LAST 1256   23,3756   26 142 1            DIM     DEXDEX         DECREMENT MAGNITUDE PRESERVING SIGN

 0228   REF   7  LAST 1256   23,3757   10 142 1  TSTPOINT  CCS     DEXDEX         ONLY THE BRANCHING FUNCTION IS USED
 0229   REF   1              23,3760    1 3702 0           TCF     R*TL**P
 0230   REF   2  LAST 1255   23,3761    0 0145 1           TC      RTNSAVER
 0231   REF   2  LAST 1256   23,3762    1 3702 0           TCF     R*TL**P
 0232   REF   3  LAST 1256   23,3763    0 0145 1           TC      RTNSAVER


 0233   REF   6  LAST 1253   23,3764     00735 0  SINESLOC  ADRES   SINCDU         FOR USE IN SETTING ADDRWD


 0234                        23,3765     00004 0  INDEXI    DEC     4              **********    DON'T     **********
 0235                        23,3766     00002 0            DEC     2              **********    TOUCH     **********
 0236                        23,3767     00000 1            DEC     0              **********    THESE     **********
 0237                     23,3770   00004 0          DEC     4                ********** CONSTANTS **********

R0238    ******************************************************************************************************

 0240                     10,2030                    BANK    10
 0241    REF   1          10,2000                    SETLOC  FLESHLOC
 0242                     10,2030                    BANK
 0243    REF   1                                     COUNT*  $$/POWFL

R0244       ROUTINE FLESHPOT COMPUTES THE BODY-STABLE MEMBER TRANSFORMATION MATRIX (COMMONLY CALLED XNB) AND STORES
R0246    IT IN THE LOCATIONS SPECIFIED BY THE ECADR ENTERING IN A.

 0247                     10,2030   77776 1 CALCSMSC EXIT
 0248    REF 301  LAST  971  10,2031  0 4616 1          TC      BANKCALL
 02481   REF   2  LAST  856  10,2032   20036 0          CADR    FLESHPOT -1
 02482   REF 236  LAST 1254  10,2033  0 5042 1          TC      INTPRET
 02483                    10,2034   77616 0          RVQ

 0249    REF  11  LAST 1245  10,2035   02664 1 XNBECADR ECADR   XNB

 0250    REF   1          10,2036  3 2035 0    -1    CAF     XNBECADR

 0251    REF  28  LAST 1252  10,2037  54 142 1 FLESHPOT TS      TEM2
 0252    REF  65  LAST 1083  10,2040  56 003 1          XCH     EBANK
 0253    REF  29  LAST 1257  10,2041  56 142 0          XCH     TEM2
 0254    REF  15  LAST 1083  10,2042  7 4357 0          MASK    LOW8
 0255    REF   8  LAST 1093  10,2043  6 5007 0          AD      OCT1400
 0256    REF  22  LAST 1064  10,2044  54 141 1          TS      TEM1

 0257                     10,2045  0 0006 1          EXTEND
 0258    REF   3  LAST  482  10,2046  3 0744 0          DCA     COSCDUY
 0259    REF 752  LAST 1256  10,2047  52 155 1          DXCH    MPAC
 0260    REF  18  LAST  792  10,2050  0 7106 1          TC      DMP
 0261    REF   7  LAST  912  10,2051   00745 1          ADRES   COSCDUZ
 0262    REF 753  LAST 1257  10,2052  52 155 1          DXCH    MPAC
 0263                     10,2053  20 001 1          DDOUBL
 0264    REF  23  LAST 1257  10,2054  50 141 0          INDEX   TEM1
 0265                     10,2055  52 001 1          DXCH    0                = COSY COSZ

 0266                     10,2056  0 0006 1          EXTEND
 0267    REF   6  LAST  912  10,2057  3 0740 1          DCA     SINCDUZ
 0268    REF  24  LAST 1257  10,2060  50 141 0          INDEX   TEM1
 0269                     10,2061  52 003 0          DXCH    2                = SINZ

 0270                     10,2062  0 0006 1          EXTEND
 0271    REF   3  LAST  482  10,2063  4 0736 1          DCS     SINCDUY
 0272    REF 754  LAST 1257  10,2064  52 155 1          DXCH    MPAC
 0273    REF  23  LAST 1256  10,2065  0 7112 1          TC      DMPSUB           ADDRWD SET TO COSCDUZ
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L        POWERED FLIGHT SUBROUTINES                                                      USER'S PAGE NO.  8       EO S3

 0274    REF 755  LAST 1257   10,2066  52 155 1          DXCH    MPAC
 0275                         10,2067  20 001 1          DDOUBL
 0276    REF  25  LAST 1257   10,2070  50 141 0          INDEX   TEM1
 0277                         10,2071  52 005 0          DXCH    4                    = - SINY COSZ

 0278                         10,2072  0 0006 1          EXTEND
 0279    REF   5  LAST  912   10,2073  4 0742 1          DCS     SINCDUX
 0280    REF 756  LAST 1258   10,2074  52 155 1          DXCH    MPAC
 0281    REF  24  LAST 1257   10,2075  0 7112 1          TC      DMPSUB               ADDRWD SET TO COSCDUZ STILL
 0282    REF 757  LAST 1258   10,2076  52 155 1          DXCH    MPAC
 0283                         10,2077  20 001 1          DDOUBL
 0284    REF 758  LAST 1258   10,2100  52 160 1          DXCH    MPAC      +3

 0285                         10,2101  0 0006 1          EXTEND
 0286    REF   6  LAST 1258   10,2102  4 0742 1          DCS     SINCDUX
 0287    REF 759  LAST 1258   10,2103  52 155 1          DXCH    MPAC
 0288    REF  19  LAST 1257   10,2104  0 7106 1          TC      DMP
 0289    REF   7  LAST 1257   10,2105   00737 1          ADRES   SINCDUZ
 0290                         10,2106  0 0006 1          EXTEND
 0291    REF 760  LAST 1258   10,2107  4 0155 1          DCS     MPAC
 0292    REF 761  LAST 1258   10,2110  52 162 0          DXCH    MPAC      +5
 0293    REF  20  LAST 1258   10,2111  0 7106 1          TC      DMP
 0294    REF   4  LAST 1257   10,2112   00735 0          ADRES   SINCDUY
 0295    REF 762  LAST 1258   10,2113  52 155 1          DXCH    MPAC
 0296                         10,2114  20 001 1          DDOUBL
 0297                         10,2115  20 001 1          DDOUBL
 0298    REF 763  LAST 1258   10,2116  52 162 0          DXCH    MPAC      +5

 0299    REF 764  LAST 1258   10,2117  52 155 1          DXCH    MPAC
 0300    REF  21  LAST 1258   10,2120  0 7106 1          TC      DMP
 0301    REF   4  LAST 1257   10,2121   00743 1          ADRES   COSCDUY
 0302    REF 765  LAST 1258   10,2122  52 155 1          DXCH    MPAC
 0303                         10,2123  20 001 1          DDOUBL
 0304                         10,2124  20 001 1          DDOUBL
 0305    REF 165  LAST 1256   10,2125  52 131 0          DXCH    BUF

 0306                         10,2126  0 0006 1          EXTEND
 0307    REF   5  LAST 1258   10,2127  3 0744 0          DCA     COSCDUY
 0308    REF 766  LAST 1258   10,2130  52 155 1          DXCH    MPAC
 0309    REF  22  LAST 1258   10,2131  0 7106 1          TC      DMP
 0310    REF   6  LAST  912   10,2132   00747 0          ADRES   COSCDUX
 0311    REF 767  LAST 1258   10,2133  52 155 1          DXCH    MPAC
 0312                         10,2134  20 001 1          DDOUBL
 0313    REF 768  LAST 1258   10,2135  20 162 0          DAS     MPAC      +5

 0314                         10,2136  0 0006 1          EXTEND
 0315    REF   5  LAST 1258   10,2137  3 0736 0          DCA     SINCDUY
 0316    REF 769  LAST 1258   10,2140  52 155 1          DXCH    MPAC
 0317    REF  25  LAST 1258   10,2141  0 7112 1          TC      DMPSUB               ADDRWD SET TO COSCDUX
 0318    REF 770  LAST 1258   10,2142  52 155 1          DXCH    MPAC
 0319                           10,2143  20 001 1          DDOUBL
 0320  REF 166  LAST 1258       10,2144  20 131 0          DAS      BUF

 0321  REF 167  LAST 1259       10,2145  52 131 0          DXCH     BUF
 0322  REF 771  LAST 1258       10,2146  52 155 1          DXCH     MPAC

 0323                           10,2147  0 0006 1          EXTEND
 0324  REF 772  LAST 1259       10,2150  3 0155 0          DCA      MPAC
 0325  REF  26  LAST 1258       10,2151  50 141 0          INDEX    TEM1
 0326                           10,2152  52 015 1          DXCH     14                 = SINY COSX + SINX SINZ COSY

 0327                           10,2153  0 0006 1          EXTEND
 0328  REF 773  LAST 1259       10,2154  3 0160 0          DCA      MPAC      +3
 0329  REF  27  LAST 1259       10,2155  50 141 0          INDEX    TEM1
 0330                           10,2156  52 017 0          DXCH     16                 = - SINX COSZ

 0331                           10,2157  0 0006 1          EXTEND
 0332  REF 774  LAST 1259       10,2160  3 0162 1          DCA      MPAC      +5
 0333  REF  28  LAST 1259       10,2161  50 141 0          INDEX    TEM1
 0334                           10,2162  52 021 0          DXCH     20                 = COSX COSY - SINX SINY SINZ

 0335  REF  29  LAST 1259       10,2163  3 0141 0          CA       TEM1
 0336  REF  83  LAST 1256       10,2164  54 116 0          TS       ADDRWD
 0337                           10,2165  0 0006 1          EXTEND
 0338  REF  22  LAST  858       10,2166  3 0006 1          DCA      Z
 0339  REF  25  LAST 1253       10,2167  6 4751 0          AD       FOUR
 0340  REF  43  LAST 1110       10,2170  52 165 1          DXCH     LOC
 0341  REF  37  LAST 1116       10,2171  3 4744 1          CAF      BIT8
 0342  REF  11  LAST  997       10,2172  54 023 1          TS       EDOP
 0343  REF   2  LAST 1005       10,2173  1 7463 0          TCF      VXV
 0344  REF 775  LAST 1259       10,2174  52 155 1          DXCH     MPAC
 0345                           10,2175  20 001 1          DDOUBL
 0346  REF  30  LAST 1259       10,2176  50 141 0          INDEX    TEM1
 0347                           10,2177  52 007 1          DXCH     6

 0348  REF 776  LAST 1259       10,2200  52 160 1          DXCH     MPAC      +3
 0349                           10,2201  20 001 1          DDOUBL
 0350  REF  31  LAST 1259       10,2202  50 141 0          INDEX    TEM1
 0351                           10,2203  52 011 0          DXCH     10

 0352  REF 777  LAST 1259       10,2204  52 162 0          DXCH     MPAC      +5
 0353                           10,2205  20 001 1          DDOUBL
 0354  REF  32  LAST 1259       10,2206  50 141 0          INDEX    TEM1
 0355                           10,2207  52 013 1          DXCH     12

 0356  REF  30  LAST 1257       10,2210  3 0142 0          CA       TEM2
 0357  REF  66  LAST 1257       10,2211  54 003 0          TS       EBANK
 0358  REF   5  LAST  977       10,2212  1 4631 0          TCF      SWRETURN
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R0001             THE TFF SUBROUTINES MAY BE USED IN EITHER EARTH OR MOON CENTERED COORDINATES. THE TFF ROUTINES NEVER
R0003    KNOW WHICH ORIGIN APPLIES. IT IS THE USER WHO KNOWS, AND WHO SUPPLIES  RONE, VDNE AND 1/SQRT(MU)  AT THE
R0005    APPROPRIATE SCALE LEVEL FOR THE PROPER PRIMARY BODY.

R0006             EARTH ORIGIN             POSITION      -29        METERS
R0007                                      VELOCITY      -7         METERS/CENTISECOND
R0009                                      1/SQRT(MU)    +17        SQRT(CS SQ/METERS CUBED)

R0011             MOON ORIGIN              POSITION      -27        METERS
R0012                                      VELOCITY      -5         METERS/CENTISECONDS
R0014                                      1/SQRT(MU)    +14        SQRT(CS SQ/METERS CUBED)

R0016    ALL DATA PROVIDED TO AND RECEIVED FROM ANY TFF SUBROUTINE WILL BE AT ONE OF THE LEVELS ABOVE. IN ALL CASES,
R0018    THE FREE FALL TIME IS RETURNED IN CENTISECONDS AT (-28). PROGRAM  TFF/CONIC  WILL GENERATE VONE/RTMU  AND
R0020    LEAVE IT IN  VONE' AT (+10) IF EARTH ORIGIN AND (+9) IF MOON ORIGIN.
R0021             THE USER MUST STORE THE STATE VECTOR IN  RONE, VONE  AND MU IN  THE FORM 1/SQRT(MU) IN  TFF/RTMU
R0023    AT THE PROPER SCALE BEFORE CALLING  TFF/CONIC. SINCE  RONE, VONE  ARE IN THE EXTENDED VERB STORAGE AREA,
R0025    THE USER MUST ALSO LOCK OUT THE EXTENDED VERBS, AND RELEASE THEM WHEN FINISHED.
R0027             PROGRAMS     CALC/TFF  AND  CALC/TPER  ASSUME THAT THE TERMINAL RADIUS IS LESS THAN THE PRESENT
R0029    RADIUS. THIS RESTRICTION CAN BE REMOVED BY A  15 W CODING CHANGE, BUT AT PRESENT IT IS NOT DEEMED NECESSARY.
R0031
R0032             THE FOLLOWING ERASABLE QUANTITIES ARE USED BY THE TFF ROUTINES, AND ARE LOCATED IN THE PUSH LIST.
R0034

A0035                                                      BELOW      E:   IS USED FOR EARTH ORIGIN SCALE
A0036                                                                 M:   IS USED FOR MOON  ORIGIN SCALE

A0037                               TFFSW     =      119D  BIT1       0 = CALCTFF          1 = CALCTPER
 0038                 0012          TFFDELQ   =      10D              Q2-Q1                E: (-16)   M: (-15)
 0039                 0014          RMAG1     =      12D              ABVAL(RN)  M         E: (-29)   M: (-27)
A0040                               RPER      =      14D              PERIGEE RADIUS M     E: (-29)   M: (-27)
 0041                 0016          TFFQ1     =      14D              R.V / SQRT(MUE)      E: (-16)   M: (-15)
A0042                               SDELF/2                           SIN(THETA) /2
 0043                 0016          CDELF/2   =      14D              COS(THETA) /2
A0044                               RAPO      =      16D              APOGEE RADIUS  M     E: (-29)   M: (-27)
 0045                 0020          NRTERM    =      16D              TERMINAL RADIUS M    E: (-29+NR)
A0046                                                                                      M: (-27+NR)
 0047                 0022          RTERM     =      18D              TERMINAL RADIUS M    E: (-29)   M: (-27)
 0048                 0024          TFFVSQ    =      20D              -(V SQUARED/MU)  1/M   E: (20)   M: (18)
 0049                 0026          TFF1/ALF  =      22D              SEMI MAJ AXIS  M   E: (-22-2 NA)
A0050                                                                                    M: (-20-2 NA)
 0051                 0030          TFFRTALF  =      24D              SQRT(ALFA)  E: (10+NA)   M: (9+NA)
 0052                 0032          TFFALFA   =      26D              ALFA  1/M   E: (26-NR)  M: (24-NR)
 0053                 0034          TFFNP     =      28D              SEMI LATUS RECTUM  M   E: (-38+2 NR)
A0054                                                                                        M: (-36+2 NR)
 0055                 0036          TFF/RTMU  =      30D              1/SQRT(MU)           E: (17)    M: (14)
 0056                 0040          NRMAG     =      32D              PRESENT RADIUS  M    E: (-29+NR)
A0057                                                                                      M: (-27+NR)
 0058                 0042          TFFX      =      34D
 0059                 0044          TFFTEM    =      36D              TEMPORARY
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A0060                                    REGISTERS S1, S2 ARE UNTOUCHED BY ANY TFF SUBROUTINE
A0061                                    INDEX REGISTERS X1, X2 ARE USED BY ALL TFF SUBROUTINES. THEY ARE ESTAB-
A0062                                    LISHED IN TFF/CONIC AND MUST BE PRESERVED BETWEEN CALLS TO SUBSEQUENT
A0063                                    SUBROUTINES.
A0064                                    -NR                       C(X1) = NORM COUNT OF RMAG
A0065                                    -NA                       C(X2)= NORM COUNT OF SQRT(ABS(ALFA))
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P0066

R0067   SUBROUTINE NAME:     TFFCONIC                                           DATE:    01.29.67
R0069   MOD NO:  0                                                              LOG SECTION:    TIME OF FREE FALL
R0071   MOD BY:  RR BAIRNSFATHER
R0072   MOD NO:  1           MOD BY:  RR BAIRNSFATHER      DATE:  11 APR 67
R0073   MOD NO:  2           MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67     ADD MOON MU.
R0075   MOD NO:  3           MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68     ACCEPT DIFFERENT EARTH/MOON SCALES
R0077   FUNCTIONAL DESCRIPTION:      THIS SUBROUTINE IS CALLED TO COMPUTE THOSE CONIC PARAMETERS REQUIRED BY THE TFF
R0079            SUBROUTINES AND TO ESTABLISH THEM IN THE PUSH LIST AREA. THE PARAMETERS ARE LISTED UNDER OUTPUT.
R0081            THE EQUATIONS ARE
R0082                   -   -  -
R0083                   H = RN*VN                                               ANGULAR MOMENTUM
R0085                         - -
R0086                   LCP = H.H / MU                                          SEMI LATUS RECTUM
R0088                                 -  -
R0089                   ALFA = 2/RN - VN.VN / MU                                RECIPROCAL SEMI MAJ AXIS, SIGNED

R0091            AND ALFA IS POS FOR ELLIPTIC  ORBITS
R0092                         0  FOR PARABOLIC ORBITS
R0093                        NEG FOR HYPERBOLIC ORBITS.
R0094            SUBROUTINE ALSO COMPUTES AND SAVES  RMAG.
R0095   CALLING SEQUENCE:
R0096            TFFCONIC  EXPECTS CALLER TO ENTER WITH CORRECT GRAVITATIONAL CONSTANT IN MPAC, IN THE FORM
R0098            1/SQRT(MU). PROGRAM WILL SAVE IN  TFF/RTMU  . THE SCALE IS DETERMINED BY WHETHER EARTH OR MOON
R0100            ORIGIN IS USED.  THE CALLER MUST LOCK OUT THE EXTENDED VERBS BEFORE PROVIDING STATE VECTOR IN RONE,
R0102            VONE  AT PROPER SCALE. THE EXTENDED VERBS MUST BE RESTORED WHEN THE CALLER IS FINISHED USING THE
R0104            TFF ROUTINES.
R0105            ENTRY POINT  TFFCONMU  EXPECTS THAT  TFF/RTMU  IS ALREADY LOADED.
R0107            TO SPECIFY MU:      DLOAD  CALL                IF MU ALREADY STORED:    CALL
R0109                                       YOURMU       1/RTMU   E: (17)  M: (14)              TFFCONMU
R0111                                       TFFCONIC
R0112            PUSHLOC = PDL+0, ARBITRARY IF LEQ 18D

R0113   SUBROUTINES CALLED:  NONE
R0114   NORMAL EXIT MODES:   RVQ
R0115   ALARMS:  NONE
R0116   OUTPUT:  THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0117            RMAG1  E:(-29) M:(-27) M  RN, PRESENT RADIUS LENGTH.
R0118            NRMAG  E: (-29+NR)     M  RMAG, NORMALIZED
R0119                   M: (-27+NR)
R0120            X1                     -NR, NORM COUNT
R0121            TFFNP  E: (-38+2NR)    M  LCP, SEMI LATUS RECTUM, WEIGHTED BY NR.       FOR VGAMCALC
R0123                   M: (-36+2NR)
R0124            TFF/RTMU  E:(17)  M:(14)       1/SQRT(MU)
R0125            TFFVSQ E:(20)  M:(18)  1/M   -(V SQ/MU): PRESENT VELOCITY,NORMLIZED.    FOR VGAMCALC
R0127            TFFALFA  E: (26-NR)    1/M   ALFA, WEIGHTED BY NR
R0128                     M: (24-NR)
R0129            TFFRTALF  E: (10+NA)   SQRT(ALFA), NORMALIZED
R0130                       M: (9+NA)
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R0131              X2                    -NA, NORM COUNT
R0132              TFF1/ALF   E: (-22-2NA) SIGNED SEMI MAJ AXIS, WEIGHTED BY NA
R0133                         M: (-20-2NA)
R0134              PUSHLOC AT PDL+0
R0135              THE FOLLOWING  IS STORED IN GENERAL ERASABLE
R0136              VONE'  E:(10)  M:(9)   V/RT(MU), NORMALIZED VELOCITY
R0137      ERASABLE INITIALIZATION REQUIRED:
R0138              RONE    E:(-29)  M:(-27)  M      STATE VECTOR                      LEFT BY CALLER
R0140              VONE    E:(-7)    M:(-5)   M/CS   STATE VECTOR                      LEFT BY CALLER
R0142              TFF/RTMU  E:(17)  M:(14)      1/RT(CS SQ/M CUBE)                    IF ENTER VIA  TFFCONMU.
R0144      DEBRIS:  QPRET,    PDL+0 ... PDL+3
R0145


 0146                           33,3760                           BANK    33
 0147      REF    1             27,2000                           SETLOC  TOF-FF
 0148                           27,3361                           BANK

 0149      REF   2 LAST   46 TO   46:      2      2*              COUNT*  $$/TFF

 0150      REF   4  LAST   719   27,3361    00037 0   TFFCONIC  STORE   TFF/RTMU         1/SQRT(MU)        E: (17)   M: (14)

 0151                           27,3362    53575 0   TFFCONMU  VLOAD   UNIT             COME HERE WITH TFFRTMU LOADED.
 0152      REF  15  LAST   722   27,3363    02207 0                     RONE             SAVED RN.  M       E: (-29)  M: (-27)
 0153                           27,3364    77725 1             PDDL                     UR/2 TO PDL+0, +5
 0154                           27,3365    00045 0                     36D              MAGNITUDE
 0155      REF   1              27,3366    00015 0             STORE   RMAG1            M     E: (-29)    M: (-27)

 0156                           27,3367    77701 1             NORM
 0157      REF  68.  LAST 1228   27,3370    00047 1                     X1               -NR
 0158      REF   1              27,3371    24041 1             STOVL   NRMAG            RMAG  M    E: (-29+NR)  M: (-27+NR)
 0159      REF   9   LAST  722   27,3372    02215 0                     VONE             SAVED VN.  M/CS    E: (-7)     M: (-5)
 0160                           27,3373    77761 1             VXSC
 0161      REF   5   LAST 1263   27,3374    00037 0                     TFF/RTMU         E: (17)    M: (14)
 0162      REF   1              27,3375    02170 0             STORE   VONE'            VN/SQRT(MU)   E: (10)    M: (9)

 0163                           27,3376    47361 0             VXSC    VXV
 0164      REF   2   LAST 1263   27,3377    00041 1                     NRMAG            E: (-29+NR)  M: (-27+NR)
A0165                                                                                   UR/2 FROM PDL
 0166                           27,3400    47572 1             VSL1    VSQ              BEFORE:  E:(-19+NR)  M:(-18+NR)
 0167      REF   1              27,3401    14035 1             STODL   TFFNP            LC P  M    E:(-38+2NR)  M:(-36+2NR)
A0168                                                                                   SAVE ALSO FOR VGAMCALC
 0169      REF   1              27,3402    06514 1                     TFF1/4
 0170                           27,3403    63271 0             DDV     PDVL             (2/RMAG)  1/M    E:(26-NR)    M:(24-NR)
 0171      REF   3   LAST 1263   27,3404    00041 1                     NRMAG            RMAG  M    E:(-29+NR)  M:(-27+NR)
 0172      REF   2   LAST 1263   27,3405    02170 0                     VONE'            SAVED VN.   E: (10)    M: (9)
 0173                           27,3406    57436 1             VSQ     DCOMP            KEEP MPAC+2 HONEST FOR SQRT.
 0174      REF   1              27,3407    00025 0             STORE   TFFVSQ           -(V SQ/MU)    E:(20)    M:(18)
A0175                                                                                   SAVE FOR VGAMCALC
 0176                           27,3410    43257 0             SR*     0AC
 0177                             27,3411    20573 1                            0 -6,1          GET -VSQ/MU    E:(26-NR)    M:(24-NR)
 0178                             27,3412    77626 0                 STADR
A0179                                                                                           2/RMAG    FROM POL+2
 0180   REF    1                  27,3413    77744 0                 STORE     TFFALFA          ALFA  1/M    E:(26-NR)    M:(24-NR)
 0181                             27,3414    41457 1                 SL*       PUSH             TEMP SAVE ALFA     E:(20)    M:(18)
 0182                             27,3415    20173 0                           0 -6,1
 0183                             27,3416    75446 0                 ABS       SQRT             E:(10)    M:(9)
 0184                             27,3417    77701 1                 NORM
 0185   REF   29  LAST 1229       27,3420    00050 1                           X2               X2 = -NA
 0186   REF    1                  27,3421    00031 0                 STORE     TFFRTALF         SQRT( ABS(ALFA) )   E:(10+NA)    M:(9+NA)
 0187                             27,3422    75316 1                 DSQ       SIGN             NOT SO ACCURATE, BUT CK
A0188                                                                                           ALFA FROM POL+2    E:(20)    M:(18)
 0189                             27,3423    55254 1                 BZE       BOOV             SET 1/ALFA =0, TO SHOW SMALL ALFA
 0190                             27,3424    57426 0                           +2
 0191   REF    2  LAST 1263       27,3425    06514 1                           TFF1/4
 0192   REF    1                  27,3426    00027 1  +2             STORE     TFF1/ALF         1/ALFA    E:(-22-2 NA)    M:(-20-2 NA)
 0193                             27,3427    77616 0  DUMPCNIC RVQ

A0194                                                                                                                39 W
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R0195   SUBROUTINE NAME:      TFFRP/RA                                                 DATE:  01.17.67
R0197   MOD NO:  0                                                                     LOG SECTION:    TIME OF FREE FALL
R0199   MOD BY:  RR BAIRNSFATHER
R0200   MOD NO:  1            MOD BY:  RR BAIRNSFATHER        DATE:  11 APR 67
R0201   MOD NO:  2            MOD BY:  RR BAIRNSFATHER        DATE:  21 MAR 68     ACCEPT DIFFERENT EARTH/MOON SCALES
R0203                                                                              ALSO IMPROVE ACCURACY OF RAPO.
R0205   FUNCTIONAL DESCRIPTION:          USED BY CALCTPER AND TFF DISPLAYS TO CALCULATE PERIGEE RADIUS AND ALSO
R0207            APOGEE RADIUS FOR A GENERAL CONIC.
R0208            PROGRAM GIVES PERIGEE RADIUS AS                       APOGEE RADIUS IS GIVEN BY
R0210                  RP = P /(1+E)                                          RA = (1+E) / ALFA
R0212            WHERE    2
R0213                  E  = 1 - P ALFA
R0214            IF RA IS NEGATIVE OR SHOWS DIVIDE OVERFLOW, THEN RA = POSMAX BECAUSE
R0216                  1. APOGEE RADIUS IS NOT MEANINGFUL FOR HYPERBOLA
R0217                  2. APOGEE RADIUS IS NOT DEFINED FOR PARABOLA
R0218                  3. APOGEE RADIUS EXCEEDS THE SCALING FOR ELLIPSE.
R0219            THIS SUBROUTINE REQUIRES THE SIGNED  RECIPROCAL SEMI MAJ AXIS,  ALFA,  AND SEMI LATUS RECTUM AS DATA.
R0221   CALLING SEQUENCE:  CALL
R0222                           TFFRP/RA
R0223            PUSHLOC = PDL+0, ARBITRARY IF LEQ 100
R0224            C(MPAC) UNSPECIFIED

R0225   SUBROUTINES CALLED:  NONE
R0226   NORMAL EXIT MODE:     RVQ
R0227            IF ELLIPSE, WITHIN NORMAL SCALING, RAPO IS CORRECT.
R0228            OTHERWISE, RAPO = POSMAX.
R0229   ALARMS:  NONE
R0230   OUTPUT:  STORED IN PUSH LIST AREA. SCALE OF OUTPUT AGREES WITH DATA SUPPLIED TO  TFF/CONIC.
R0232            RPER    E:(-29)  M:(-27)  M      PERIGEE RADIUS                       DESTROYED BY CALCTFF/CALCTPER, TFFTRIG.
R0234            RAPO    E:(-29)  M:(-27)  M      APOGEE  RADIUS                       WILL BE DESTROYED BY CALCTFF/CALCTPER
R0236            PUSHLOC AT PDL+0
R0237   ERASABLE INITIALIZATION REQUIRED:
R0238            TFFALFA E:(26-NR)      M   1/SEMI MAJ AXIS                        LEFT BY TFFCONIC
R0240                 M:(24-NR)
R0241            TFFNP  E: (-38+2NR)    M  LC P, SEMI LATUS RECTUM                 LEFT BY TFFCONIC
R0243                   M: (-36+2NR)
R0244            X1                     -NR, NORM COUNT OF RMAG                    LEFT BY TFFCONIC
R0246            X2                     -NA, NORM COUNT OF ALFA                    LEFT BY TFFCONIC
R0248   DEBRIS:  QPRET,     PDL+0 ... PDL+1
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L        TIME OF FREE FALL                                                                         USER'S PAGE NO.   7       EO S3

P0249
 0250                                 0020             RAPO      =         160               APOGEE RADIUS   M   E:(-29)  M:(-27)
 0251                                 0016             RPER      =         14D               PERIGEE RADIUS   M   E:(-29)  M:(-27)
A0252
 0253                           27,3430   41345 0   TFFRP/RA DLOAD     DMP
 0254    REF    2   LAST 1264   27,3431   00033 1                      TFFALFA             ALFA  1/M  E:(26-NR)    M:(24-NR)
 0255    REF    2   LAST 1263   27,3432   00035 1                      TFFNP               LC P   M    E:(-38+2NR)    M:(-36+2NR)
 0256                           27,3433   57457 0            SR*       DCOMP               ALFA P (-12+NR)
 0257                           27,3434   20571 0                      0 -8D,1             ALFA P  (-4)
 0258                           27,3435   51415 0            DAD       ABS                 (DCOMP GIVES VALID TP RESULT FOR SQRT)
A0259                                                                                      (ABS PROTECTS SQRT IF E IS VERY NEAR 0)
 0260    REF    1               27,3436   17766 0                      DP2(-4)
 0261                           27,3437   43366 0            SQRT      DAD                 F SQ = (1- P ALFA)   (-4)
 0262    REF    3   LAST 1264   27,3440   06514 1                      TFF1/4
 0263                           27,3441   55206 0            PUSH      BDDV                (1+E)  (-2)  TO PDL+0
 0264    REF    3   LAST 1266   27,3442   00035 1                      TFFNP               LCP   M E:(-38+2NR)    M:(-36+2NR)
 0265                           27,3443   53657 0            SR*       SR*                 (DOES SR THEN SL TO AVOID OVFL)
 0266                           27,3444   20601 1                      0,1                 X1=-NR
 0267                           27,3445   20572 0                      0 -7,1              (EFFECTIVE SL)
 0268    REF    3   LAST  723   27,3446   14017 1            STODL     RPER                PERIGEE RADIUS  M    E:(-29)    M:(-27)
A0269                                                                                      (1+E)  (-2)    FROM PDL+0
 0270                           27,3447   41005 1            DMP       BOVB
 0271    REF    2   LAST 1264   27,3450   00027 1                      TFF1/ALF            E:(-22-2NA)  M:(-20-2NA)
 0272    REF    5   LAST 1226   27,3451   57754 0                      TCDANZIG            CLEAR OVFIND, IF ON.
 0273                           27,3452   53654 0            BZE       SL*
 0274    REF    1               27,3453   57462 0                      MAXRA               SET POSMAX, IF ALFA=0
 0275                           27,3454   57603 0                      0 -5,2              -5+NA
 0276                           27,3455   40057 1            SL*       BOV
 0277                           27,3456   57576 1                      0,2
 0278    REF    2   LAST 1266   27,3457   57462 0                      MAXRA               SET POSMAX IF OVFL.
 0279                           27,3460   77644 1            BPL                           CONTINUE WITH VALID RAPO.
 0280                           27,3461   57464 0                      +3
 0281                           27,3462   77745 1   MAXRA    DLOAD                         RAPO CALC IS NOT VALID. SET RAPO =
 0282    REF    3   LAST  851   27,3463   17772 0                      NEARONE             POSMAX AS A TAG.
 0283    REF    1               27,3464   00021 1   +3       STORE     RAPO                APOGEE RADIUS  M    E:(-29)    M:(-27)
 0284                           27,3465   77616 0   DUMPRPRA RVQ

AD285                                                                                                        30 W
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R0286   SUBROUTINE NAME:     CALCTPER  /  CALCTFF                                 DATE:     01.29.67
R0288   MOD NO:  0                                                                LOG SECTION:    TIME OF FREE FALL
R0290   MOD BY:  RR BAIRNSFATHER
R0291   MOD NO:  1              MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 67
R0292   MOD NO:  2              MOD BY:  RR BAIRNSFATHER      DATE:  14 APR 67
R0293   MOD NO:  3              MOD BY:  RR BAIRNSFATHER      DATE:  8JUL 67      NEAR EARTH MUE AND NEG TFF (GONEPAST)
R0295   MOD NO:  4              MOD BY:  RR BAIRNSFATHER      DATE:  21 NOV 67    ADD VARIABLE MU.
R0297   MOD NO:  5              MOD BY:  RR BAIRNSFATHER      DATE:  21 MAR 68    ACCEPT DIFFERENT EARTH/MOON SCALES
R0299   FUNCTIONAL DESCRIPTION:      PROGRAM CALCULATES THE FREE-FALL TIME OF FLIGHT FROM PRESENT POSITION  RN  AND
R0301           VELOCITY  VN  TO A RADIUS LENGTH SPECIFIED BY  RTERM  , SUPPLIED BY THE USER. THE POSITION VECTOR
R0303           RN  MAY BE ON EITHER SIDE OF THE CONIC, BUT  RTERM  IS CONSIDERED ON THE INBOUND SIDE.
R0305           THE EQUATIONS ARE

R0306                   Q2 = -SQRT(RTERM (2-RTERM ALFA) - LOP)    (INBOUND SIDE))        LEQ +- LOE/SQRT(ALFA)
R0308                         -  -
R0309                   Q1 = RN.VN / SQRT(MU)                                            LEQ +- LOE/SQRT(ALFA)

R0311                   Z = NUM / DEN                                                    LEQ +- 1/SQRT(ALFA)

R0313           WHERE, IF INBOUND
R0314                   NUM = RTERM - RN                                                 LEQ +- 2 LOE/ALFA
R0316                   DEN = Q2+Q1                                                      LEQ +- 2 LOE/SQRT(ALFA)

R0318           AND, IF OUTBOUND
R0319                   NUM = Q2-Q1                                                      LEQ +- 2 LOE/SQRT(ALFA)
R0321                   DEN = 2 - ALFA (RTERM + RN) .                                    LEQ +- 2 LOE

R0323           IF      ALFA ZZ  <  1.0               (FOR ALL CONICS EXCEPT ELLIPSES HAVING ABS(DEL ECC ANOM) G 90 DEG)

R0325           THEN    X = ALFA Z Z
R0326           AND     TFF = (RTERM +RN -2 ZZ T(X) ) Z/SQRT(MU)

R0327                   EXCEPT IF ALFA PNZ, AND IF TFF NEG,
R0328                   THEN    TFF = 2 PI /(ALFA SQRT(ALFA)) + TFF

R0329           OR IF   ALFA ZZ  GEQ  1.0             (FOR ELLIPSES HAVING ABS(DEL ECC ANOM) GEQ 90 DEG)

R0331           THEN    X = 1/ALFA Z Z
R0332           AND     TFF = (PI/SQRT(ALFA) -Q2 +Q1 +2(X T(X) -1) /ALFA Z) /ALFA SQRT(MU)

R0334           WHERE  T(X) IS A POLYNOMIAL APPPROXIMATION TO THE SERIES
R0335                               2     3                                   2
R0336                   1/3 -X/5 +X /7 -X /9 ...                            (X    <  1.0)

R0337   CALLING SEQUENCE:  TIME TO RTERM                                 TIME TO PERIGEE
R0339                      CALL                                          CALL
R0340                           CALCTFF                                       CALCTPER
R0342                      C(MPAC) = TERMNL RAD  M                       C(MPAC) = PERIGEE RAD  M
R0344           FOR EITHER,   E: (-29)    M: (-27)
R0345           FOR EITHER, PUSHLOC = PDL+0 , ARBITRARY IF LEQ BD.
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R0346   SUBROUTINES CALLED:  T(X),  VIA RTB
R0347   NORMAL EXIT MODE:  RVQ
R0348             HOWEVER, PROGRAM EXITS WITH ONE OF THE FOLLOWING VALUES FOR TFF (-28) CS  IN MPAC. USER MUST STORE.
R0350                      A.  TFF= FLIGHT TIME. NORMAL CASE FOR POSITIVE FLIGHT TIME LESS THAN ONE ORBITAL PERIOD.
R0352                      B.  (THIS OPTION IS NO LONGER USED.)
R0353                      C.  TFF = POSMAX.  THIS INDICATES THAT THE CONIC FROM THE PRESENT POSITION WILL NOT RETURN TO
R0355                          THE SPECIFIED ALTITUDE.  ALSO INDICATES OUTBOUND PARABOLA OR HYPERBOLA.
R0357   OUTPUT:   C(MPAC)  (-28)  CS       TIME OF FLIGHT, OR TIME TO PERIGEE
R0358             TFFX     (0)             X,                                         LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0360             NRTERM  E: (-29+NR)      M  RTERM, WEIGHTED BY NR                    LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0362                     M: (-27+NR)
R0363             TFFTEM  E: (-59+2NR)   LCP Z Z SGN(SDELF)                           LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0365                     M: (-55+2NR)   LCP /ALFA SGN(SDELF)                         LEFT FOR ENTRY DISPLAY TFF ROUTINES
R0367             NOTE:  TFFTEM = PDL 36D AND WILL BE DESTROYED BY .:UNIT:.
R0368             RMAG1  E:(-29)  M:(-27)  PDL 12 NOT TOUCHED.
R0369             TFFQ1  E:(-16)  M:(-15)  PDL 14D
R0370             TFFDELQ E:(-16) M:(-15)  PDL 10D
R0371             PUSHLOC AT PDL+0
R0372   ERASABLE INITIALIZATION REQUIRED:
R0373             RONE    E:(-29)  M:(-27)  M    STATE VECTOR                         LEFT BY USER
R0375             VONE'   E:(+10)  M:(+9)   VN/SQRT(MU)                             LEFT BY TFF/CONIC
R0377             RMAG1   E:(-29)  M:(-27)  PRESENT RADIUS,  M                      LEFT BY TFFCONIC
R0379             C(MPAC)E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH, M        LEFT BY USER

R0381             THE FOLLOWING ARE STORED IN THE PUSH LIST AREA.
R0382             TFF/RTMU  E:(17)  M:(14)  1/SQRT(MU)                              LEFT BY TFFCONIC.
R0384             NRMAG  E: (-29+NR)  M  RMAG, NORMALIZED                           LEFT BY TFFCONIC
R0386                    M: (-27+NR)
R0387             X1                         -NR, NORM COUNT                        LEFT BY TFFCONIC
R0389             TFFNP  E: (-38+2NR)  M   LCP, SEMI LATUS RECTUM, WEIGHT  NR      LEFT BY TFFCONIC
R0391                    M: (-36+2NR)
R0392             TFFALFA  E: (26-NR)    1/M  ALFA, WEIGHT  NR                      LEFT BY TFFCONIC
R0394                        M: (24-NR)
R0395             TFFRTALF  E:(10+NA)    SQRT(ALFA), NORMALIZED                     LEFT BY TFFCONIC
R0397                       M:(9+NA)
R0398             X2                         -NA, NORM COUNT                        LEFT BY TFFCONIC
R0400             TFF1/ALF  E: (-22-2NA)  SIGNED SEMIMAJ AXIS, WEIGHTED BY NA      LEFT BY TFFCONIC
R0402                       M: (-20-2NA)
R0403   DEBRIS:   QPRET,   PDL+0 ... PDL+3
R0404             RTERM  E:(-29)  M:(-27)  RTERM, TERMINAL RADIUS LENGTH
R0405             RAPO   E:(-29)  M:(-27)  PDL 16D  (=NRTERM)
R0406             RPER   E:(-29)  M:(-27)  PDL 14D   (=TFFQ1)
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P0407
 0408                        27,3466    77614 1  CALCTPER  SETGO                          ENTER WITH RPER  IN MPAC
 0409   REF    1             27,3467    03436 0                      TFFSW
 0410                        27,3470    57473 0                      +3
 0411                        27,3471    77614 1  CALCTFF   CLEAR                          ENTER WITH RTERM IN MPAC
 0412   REF    2  LAST 1269  27,3472    03676 0                      TFFSW
 0413   REF    1             27,3473    00023 0  +3        STORE     RTERM                E: (-29)  M: (-27)
 0414                        27,3474    77657 0            SL*
 0415                        27,3475    20201 0                      0,1                  X1=-NR
 0416   REF    1             27,3476    00021 1            STORE     NRTERM               RTERM  E: (-29+NR)  M: (-27+NR)
 0417                        27,3477    44205 0            DMP       BDSU
 0418   REF    3  LAST 1266  27,3500    00033 1                      TFFALFA              ALFA  E: (26-NR)  M: (24-NR)
 0419   REF    4  LAST 1266  27,3501    06514 1                      TFF1/4
 0420                        27,3502    41206 0            PUSH      DMP                  (2-ALFA RTERM)  (-3)  TO PDL+0
 0421   REF    2  LAST 1269  27,3503    00021 1                      NRTERM               E: (-29+NR)  M: (-27+NR)
 0422                        27,3504    53725 1            PDDL      SR*                  RTERM(2-ALFA RTERM) TO PDL+2
A0423                                                                                     E: (-32+NR)   M: (-30+NR)
 0424   REF    4  LAST 1266  27,3505    00035 1                      TFFNP                LO P  E:(-38+2NR)  M:(-36+2NR)
 0425                        27,3506    20573 1                      0 -6,1               X1 = -NR
 0426                        27,3507    43276 0            DCOMP     DAD                  DUE TO SHIFTS, KEEP PRECISION FOR SQRT
A0427                                                                                     RTERM(2-ALFA RTERM) FROM PDL+2
A0428                                                                                     E: (-32+NR)  M: (-30+NR)
 0429                        27,3510    77657 0            SR*                            LEAVE  E: (-32)  M: (-30)
 0430                        27,3511    20601 1                      0,1                  X1 = -NR
 0431                        27,3512    71214 0            BOFF      DLOAD                CHECK TFF / TPER SWITCH
 0432   REF    3  LAST 1269  27,3513    03756 0                      TFFSW
 0433                        27,3514    57516 1                      +2                   IF TFF, CONTINUE
 0434   REF    1             27,3515    06524 1                      TFFZEROS             IF TPER, SET Q2 = 0
 0435                        27,3516    75440 0  +2        BMN       SQRT                 E: (-16)  M: (-15)

 0436   REF    1             27,3517    57651 1                      MAXTFF1              NO FREE FALL CONIC TO RTERM FROM HERE
A0437                                                                                     RESET PDL, SET TFF=POSMAX, AND EXIT.

 0438                        27,3520    41076 0            DCOMP     BOVB                 RT IS ON INBOUND SIDE.  ASSURE OVFIND=0
 0439   REF    6  LAST 1266  27,3521    57754 0                      TCDANZIG             ANY PORT IN A STORM.
 0440   REF    1             27,3522    24045 0            STOVL     TFFTEM               Q2   E: (-16)  M: (-15)
 0441   REF    3  LAST 1263  27,3523    02170 0                      VONE'                VN/SQRT(MU) E: (10)  M: (9)
 0442                        27,3524    52441 1            DOT       SL3
 0443   REF   16  LAST 1263  27,3525    02207 0                      RONE                 SAVED RN.  E: (-29)  M: (-27)
 0444   REF    1             27,3526    00017 1            STORE     TFFQ1                Q1, SAVE FOR GONEPAST TEST.
A0445                                                                                     E: (-16)  M: (-15)
 0446                        27,3527    44240 1            BMN       BDSU
 0447   REF    1             27,3530    57551 1                      INBOUND              USE ALTERNATE Z
 0448   REF    2  LAST 1269  27,3531    00045 0                      TFFTEM               Q2  E: (-16)  M: (-15)

A0449                                            OUTBOUND  Z CALC CONTINUES HERE

 0450   REF    1             27,3532    14043 0            STODL     TFFX                 NUM=Q2-Q1  E: (-16)  M: (-15)
 0451   REF    4  LAST 1269  27,3533    00033 1                      TFFALFA              ALFA  E: (26-NR)  M: (24-NR)
 0452                        27,3534    44205 0            DMP       BDSU
 0453   REF   4  LAST 1263   27,3535   00041 1                    NRMAG      RMAG  E: (-29+NR)  M: (-27+NR)
A0454                                                                        (2-RTERM ALFA)  (-3) FROM PDL+0
 0455                        27,3536   51406 1  SAVEDEN  PUSH     ABS        DEN TO PDL+0  E: (-3) OR (-16)
A0456                                                                                      M: (-3) OR (-15)
 0457                        27,3537   40015 1           DAC      BDV        INDETERMINANCY TEST
·0458   REF   1              27,3540   17760 0                    LIM(-22)   =1.0-B(-22)
 0459   REF   1              27,3541   57562 1                    TFFXTEST   GO IF DEN >/= B(-22)
 0460                        27,3542   65345 0           DLOAD    PDDL       SET DEN=0  OTHERWISE
 0461   REF   2  LAST 1269   27,3543   06524 1                    TFFZEROS
A0462                                                                        XCH ZERO WITH PDL+0
 0463                        27,3544   57545 1           DLOAD    DCOMP
 0464   REF   5  LAST 1269   27,3545   00033 1                    TFFALFA    ALFA  E: (26-NR)  M: (24-NR)
 0465                        27,3546   71240 1           BMN      DLOAD      FOR TPER: Z INDET AT DELE/2=0 AND 90.
 0466   REF   1              27,3547   57656 0                    TFFEL1     ASSUME 90, AND LEAVE 0 IN PDL: 1/Z=0/N

A0467                                                                        Z INDET. AT PERIGEE FOR PARAB OR HYPERB.
 0468                        27,3550   77616 0  DUMPTFF1 RVQ                 RETURN  TFF =0

A0469                                           INBOUND  Z  CALC CONTINUES HERE
 0470                        27,3551   77745 1  INBOUND  DLOAD               RESET PDL+0
 0471                        27,3552   45345 1           DLOAD    DSU        ALTERNATE Z CALC
 0472   REF   2  LAST 1269   27,3553   00023 0                    RTERM      E: (-29)  M: (-27)
 0473   REF   2  LAST 1263   27,3554   00015 0                    RMAG1      E: (-29)  M: (-27)
 0474   REF   2  LAST 1269   27,3555   14043 0           STODL    TFFX       NUM=RTERM-RN  E: (-29)  M: (-27)
 0475   REF   3  LAST 1269   27,3556   00045 0                    TFFTEM     Q2  E: (-16)  M: (-15)
 0476                        27,3557   52015 1           DAD      GOTO
 0477   REF   2  LAST 1269   27,3560   00017 1                    TFFQ1      Q1  E: (-16)  M: (-15)
 0478   REF   1              27,3561   57536 0                    SAVEDEN    DEN = Q2+Q1   E: (-16)  M: (-15)

 0479                        27,3562   65215 1  TFFXTEST DAD      PDDL        (ABS(DEN) TO PD(+2))  E: (-3) OR (-16)
A0480                                                                                             M: (-3) OR (-15)
 0481   REF   1              27,3563   17762 1                    DP(-22)    RESTORE ABS(DEN) TO MPAC
 0482   REF   3  LAST 1270   27,3564   00043 0                    TFFX       NUM E:(-16) OR (-29)  M:(-15) OR (-27)
 0483                        27,3565   53605 1           DMP      SR*
 0484   REF   2  LAST 1264   27,3566   00031 0                    TFFRTALF   SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0485                        27,3567   57201 0                    0 -3,2     X2=-NA
 0486                        27,3570   77671 1           DDV                 C(MPAC) =NUM SQRT(ALFA)  E:(-3) OR (-16)
A0487                                                                                                 M:(-3) OR (-15)
A0488                                                                        ABS(DEN) FROM PDL+2  E:(-3) OR (-16)
A0489                                                                                             M:(-3) OR (-15)
 0490                        27,3571   40145 0           DLOAD    BDV        (THE DLOAD IS SHARED WITH TFFELL)
 0491   REF   4  LAST 1270   27,3572   00043 0                    TFFX       NUM  E: (-16) OR (-29)  M:(-15) OR (-27)
 0492   REF   1              27,3573   57654 1                    TFFELL     USE EQN FOR DELE GEQ 90, LEQ -90

A0493                                           OTHERWISE, CONTINUE FOR GENERAL CONIC FOR TFF EQN

 0494                        27,3574   45471 1           DDV      STADR
A0495                                                                        DEN FROM PDL+0   E: (-3) OR (-16)
A0496                                                                                         M: (-3) OR (-15)
 0497   REF   4  LAST 1270   27,3575   77732 1           STORE    TFFTEM     Z  SAVE FOR SIGN OF SDELF.
```

```
A0498                                                                     E: (-13)  M: (-12)
 0499                       27,3576   63406 0           PUSH   DSQ        Z TO PDL+0
 0500                       27,3577   41206 0           PUSH   DMP        Z SQ TO PDL+2  E: (-26)  M: (-24)
 0501   REF   5  LAST 1269  27,3600   00035 1                  TFFNP      LC P  E: (-38+2NR)  M: (-36+2NR)
 0502                       27,3601   75261 0           SL     SIGN
 0503                       27,3602   20206 1                  5
 0504   REF   5  LAST 1270  27,3603   00045 0                  TFFTEM     AFFIX SIGN FOR SDELF (ENTRY DISPLAY)
 0505   REF   6  LAST 1271  27,3604   14045 0           STODL  TFFTEM     P ZSQ  E: (-59+2NR)  M: (-55+2NR)
A0506                                                                     (ARG IS USED IN TFF/TRIG)
A0507                                                                     ZSQ FROM PDL+2   E: (-26)  M: (-24)
 0508                       27,3605   41206 0           PUSH   DMP        RESTORE PUSH LOC
 0509   REF   6  LAST 1270  27,3606   00033 1                  TFFALFA    ALFA  E: (26-NR)  M: (24-NR)
 0510                       27,3607   77657 0           SL*
 0511                       27,3610   20201 0                  0,1        X1=-NR
 0512   REF   5  LAST 1270  27,3611   00043 0           STORE  TFFX       X
 0513                       27,3612   41234 1           RTB    DMP
 0514   REF   1             27,3613   57736 1                  T(X)        POLY
A0515                                                                     ZSQ FROM PDL+2  E: (-26)  M: (-24)
 0516                       27,3614   44302 0           SR2    BDSU       2 ZSQ T(X)  E: (-29)  M: (-27)
 0517   REF   3  LAST 1270  27,3615   00023 0                  RTERM      RTERM  E: (-29)  M: (-27)
 0518                       27,3616   41215 1           DAD    DMP
 0519   REF   3  LAST 1270  27,3617   00015 0                  RMAG1      E: (-29)  M: (-27)
A0520                                                                     Z FROM PDL+0  E: (-13)  M: (-12)
 0521                       27,3620   51042 0           SR3    BPL        TFF SQRT(MU)   E: (-45)  M: (-42)
 0522   REF   1             27,3621   57642 0                  ENDTFF     (NO PUSH UP)
 0523                       27,3622   75206 1           PUSH   SIGN       TFF SQRT(MU)  TO PDL+0
 0524   REF   3  LAST 1270  27,3623   00017 1                  TFFQ1      Q1 FOR GONEPAST TEST
 0525                       27,3624   71244 0           BPL    DLOAD      GONE PAST ?
 0526   REF   1             27,3625   57646 1                  NEGTFF     YES. TFF < 0 .
 0527   REF   3  LAST 1266  27,3626   00027 1                  TFF1/ALF   1/ALFA  E: (-22-2NA)  M: (-20-2NA)
 0528                       27,3627   51076 1           DCOMP  BPL        ALFA > 0 ?
 0529   REF   2  LAST 1271  27,3630   57646 1                  NEGTFF     NO. TFF IS NEGATIVE.

A0530                                          CORRECT FOR ORBITAL PERIOD.

 0531                       27,3631   77676 0           DCOMP             YES. CORRECT FOR ORB PERIOD.
 0532                       27,3632   56205 0           DMP    DDV
 0533   REF   1             27,3633   17756 0                  PI/16      2 PI (-5)
 0534   REF   3  LAST 1270  27,3634   00031 0                  TFFRTALF   SQRT(ALFA)  E: (10+NA)  M: (9+NA)
 0535                       27,3635   53657 0           SL*    SL*
 0536                       27,3636   57602 1                  0 -4,2     X2=-NA
 0537                       27,3637   57602 1                  0 -4,2
 0538                       27,3640   43257 0           SL*    DAD
 0539                       27,3641   57576 1                  0,2
A0540                                                                     TFF SQRT(MU) FROM PDL+0  E:(-45) M:(-42)
 0541                       27,3642   40005 0  ENDTFF   DMP    BOV        TFF SQRT(MU) IN MPAC     E:(-45) M:(-42)
 0542   REF   6  LAST 1263  27,3643   00037 0                  TFF/RTMU   E: (17)  M: (14)
 0543   REF   1             27,3644   57652 1                  MAXTFF     SET POSMAX IF OVFL.

 0544                       27,3645   77616 0  DUMPTFF2 RVQ               RETURN  TFF   (-28) CS IN MPAC.
 0545                           27,3646   77745 1  NEGTFF    DLOAD                        
A0546                                                                        TFF SQRT(MU)  FROM PDL+0, NEGATIVE.
 0547                           27,3647   77650 1            GOTO
 0548  REF   2  LAST 1271       27,3650   57642 0                      ENDTFF

 0549                           27,3651   77745 1  MAXTFF1   DLOAD                        RESET PDL
 0550                           27,3652   43545 1  MAXTFF    DLOAD     RVQ
 0551  REF   4  LAST 1266       27,3653   17772 0                      NEARONE

RD552  TIME OF FLIGHT ELLIPSE WHEN DEL (ECCENTRIC ANOM) GEQ 90 AND LEQ -90.

A0553                                                                        NUM FROM TFFX.  E: (-16) OR (-29)
A0554                                                                                        M: (-15) OR (-27)
 0555                           27,3654   77712 0  TFFELL    SL2                          NUM  E:(-14) OR (-27)  M:(-13) OR (-25)
 0556                           27,3655   41465 0            BDDV      PUSH               TEMP SAVE D/N IN PDL+0
A0557                                                                        DEN FROM PDL+0 E:(-3)/( 16) M:(-3)/(-15)
A0558                                                                        N/D TO PDL+0  E: (11)  M: (10)
 0559                           27,3656   45345 1  TFFEL1    DLOAD     DSU                (ENTER WITH D/N=0 IN PDL+0)
 0560  REF   7  LAST 1271       27,3657   00045 0                      TFFTEM             Q2  E: (-16)  M: (-15)
 0561  REF   4  LAST 1271       27,3660   00017 1                      TFFQ1              Q1  E: (-16)  M: (-15)
 0562  REF   1                  27,3661   14013 0            STODL     TFFDELQ            Q2-Q1  E: (-16)  M: (-15)
A0563                                                                        D/N FROM PDL+0
 0564                           27,3662   77626 0            STADR
 0565  REF   8  LAST 1272       27,3663   77732 1            STORE     TFFTEM             D/N  E: (11)  M: (10)
 0566                           27,3664   53605 1            DMP       SL*
 0567  REF   4  LAST 1271       27,3665   00027 1                      TFF1/ALF           1/ALFA E: (-22-2NA)  M: (-20-2NA)
 0568                           27,3666   57576 1                      0,2                1/ALFA Z  E: (-11-NA)  M: (-10-NA)
 0569                           27,3667   41206 0            PUSH      DMP                TO PDL+0
 0570  REF   9  LAST 1272       27,3670   00045 0                      TFFTEM             1/Z  E: (11)  M: (10)
 0571                           27,3671   41057 0            SL*       BOVB
 0572                           27,3672   57576 1                      0,2                X2= -NA
 0573  REF  14  LAST 1212       27,3673   21713 1                      SIGNMPAC           IN CASE X= 1.0, CONTINUE
 0574  REF   6  LAST 1271       27,3674   00043 0            STORE     TFFX               X=1/ALFA ZSQ
 0575                           27,3675   41234 1            RTB       DMP
 0576  REF   2  LAST 1271       27,3676   57736 1                      T(X)               POLY
 0577  REF   7  LAST 1272       27,3677   00043 0                      TFFX
 0578                           27,3700   45242 1            SR3       DSU
 0579  REF   1                  27,3701   17764 1                      DP2(-3)
 0580                           27,3702   41405 0            DMP       PUSH               2(X T(X)-1) /Z ALFA  E: (-15-NA)
A0581                                                                                             M: (-14-NA)
A0582                                                                        1/ALFA Z FROM PDL+0  E: (-11-NA)
A0583                                                                                             M: (-10-NA)
 0584                           27,3703   41345 0            DLOAD     DMP                GET SIGN FOR SDELF
 0585  REF  10  LAST 1272       27,3704   00045 0                      TFFTEM             1/Z  E: (11)  M: (10)
 0586  REF   4  LAST 1271       27,3705   00015 0                      RMAG1              E: (-29)  M: (-27)
 0587                           27,3706   43312 0            SL2       DAD
 0588  REF   5  LAST 1272       27,3707   00017 1                      TFFQ1              Q1  E: (-16)  M: (-15)
 0589  REF  11  LAST 1272       27,3710   14045 0            STODL     TFFTEM             (Q1+R 1/Z)  =SGN OF SDELF E:(-16) M:(-15
 0590  REF   6  LAST 1271       27,3711   00035 1                      TFFNP              LC P E: (-38+2NR)  M: (-36+2NR)
 0591                           27,3712   53605 1            DMP       SL*                CALC FOR ARG FOR TFF/TRIG.
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L        TIME OF FREE FALL                                                                      USER'S PAGE NO.  14       EQ S3

 0592   REF    5  LAST 1272   27,3713   00027 1                   TFF1/ALF      1/ALFA    E:(-22-2NA)  M:(-20-2NA)
 0593                         27,3714   57575 1                   1,2           X2=-NA
 0594                         27,3715   53765 0           SIGN    SL*
 0595   REF   12  LAST 1272   27,3716   00045 0                   TFFTEM        AFFIX SIGN FOR SDELF
 0596                         27,3717   57576 1                   0,2
 0597   REF   13  LAST 1273   27,3720   14045 0           STODL   TFFTEM        P/ALFA  E:(-59+2NR)  M:(-55+2NR)
A0598                                                                           (ARG FOR USE IN TFF/TPIG)
 0599   REF    6  LAST 1273   27,3721   00027 1                   TFF1/ALF      1/ALFA E:(-22-2NA)  M:(-20-2NA)
 0600                         27,3722   41366 1           SQRT    DMP
 0601   REF    2  LAST 1271   27,3723   17756 0                   PI/16         PI (-4)
 0602                         27,3724   77615 0           DAD
A0603                                                                           2(XT(X)-1)/Z ALFA FROM PDL E:(-15-NA)
A0604                                                                                                      M:(-14-NA)
 0605                         27,3725   45257 0           SL*     DSU
 0606                         27,3726   57577 0                   0 -1,2
 0607   REF    2  LAST 1272   27,3727   00013 0                   TFFDELQ       Q2-Q1  E: (-16)  M: (-15)
 0608                         27,3730   53605 1           DMP     SL*
 0609   REF    7  LAST 1273   27,3731   00027 1                   TFF1/ALF      1/ALFA  E:(-22-2NA)  M:(-20-2NA)
 0610                         27,3732   57601 1                   0 -3,2
 0611                         27,3733   52057 1           SL*     GOTO
 0612                         27,3734   57602 1                   0 -4,2
 0613   REF    3  LAST 1272   27,3735   57642 0                   ENDTFF        TFF SQRT(MU) IN MPAC E:(-45) M:(-42)
```

```
R0614    PROGRAM NAME:      T(X)                                                   DATE:     01.17.67
R0616    MOD NO:  0                                                                LOG SECTION:    TIME OF FREE FALL
R0618    MOD BY:  RR BAIRNSFATHER
R0619    FUNCTIONAL DESCRIPTION:       THE POLYNOMIAL T(X) IS USED BY TIME OF FLIGHT SUBROUTINES  CALCTFF AND
R0621              CALCTPER TO APPROXIMATE THE SERIES
R0622                                 2      3
R0623                     1/3 -X/5 +X /7 -X /9 ...

R0624              WHERE  X = ALFA Z Z          IF ALFA Z Z  LEQ 1
R0625                     X = 1/(ALFA Z Z )   IF ALFA Z Z   G  1

R0626              ALSO   X IS NEG FOR HYPERBOLIC ORBITS
R0627                     X = 0 FOR PARABOLIC ORBITS
R0628                     X IS POSITIVE FOR ELLIPTIC ORBITS
R0629              FOR FLIGHT 278, THE POLYNOMIAL  T(X) IS FITTED OVER THE RANGE  (0,+1)  AND HAS A MAXIMUM
R0631              DEVIATION FROM THE SERIES OF  2 E-5       (T(X) IS A CHEBYCHEV  TYPE FIT AND WAS OBTAINED USING
R0633              MAC PROGRAM AUTCURFIT294RRB  AND IS VALID TO THE SAME TOLERANCE OVER THE RANGE  (-.08,+1). )
R0635    CALLING SEQUENCE:  RTB
R0636                                T(X)
R0637              C(MPAC) = X

R0638    SUBROUTINES CALLED:  NONE
R0639    NORMAL EXIT MODE:     TC    DANZIG
R0640    ALARMS:  NONE
R0641    OUTPUT:  C(MPAC) = T(X)
R0642    ERASABLE INITIALIZATION REQUIRED:
R0643              C(MPAC)  =  X
R0644    DEBRIS:  NONE

 0645    REF   7  LAST 1183    27,3736  0 7225 0  T(X)      TC      POLY
 0646                          27,3737   00004 0            DEC     4                      N-1
 0647                          27,3740   12525 0            2DEC    3.333333333 E-1
 0647                          27,3741   12525 0
 0648                          27,3742   71463 0            2DEC*   -1.999819135 E-1 *
 0648                          27,3743   57703 1
 0649                          27,3744   04423 0            2DEC*   1.418148467  E-1 *
 0649                          27,3745   17645 0
 0650                          27,3746   74604 0            2DEC*   -1.01310997  E-1 *
 0650                          27,3747   43667 1
 0651                          27,3750   01626 1            2DEC*   5.609004986  E-2 *
 0651                          27,3751   37256 1
 0652                          27,3752   77404 1            2DEC*   -1.536156925 E-2 *
 0652                          27,3753   52071 0
 0653    REF  60  LAST 1205    27,3754  0 6064 0  ENDT(X)   TC      DANZIG

 0654    REF   1               27,3754            TCDANZIG =        ENDT(X)
```

```
P0655    TFF CONSTANTS
 0656                               32,3751                          BANK    32

 0657    REF   2  LAST   46         27,2000                          SETLOC  TOF-FF1
 0658                               27,3755                          BANK

A0659                                                                                  NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0660                                                       MUE        =        3.990 815 471 E10  M CUBE/CS SO
A0661                                                       RTMUE      =        1.997702549 E5 B-18*     MODIFIED EARTH MU

A0663                                                                                  NOTE _  NOTE _ ADJUSTED MUE FOR NEAR EARTH TRAJ.

A0664                                                       MUM        =        4.902 778  E8      M CUBE /CS SO

A0665                                                       RTMUM      2DEC*    2.21422176 E4 B-18*
 0666                               27,3755    06220 1      PI/16      2DEC     3.141592653 B-4
 0666                               27,3756    37553 0
 0667                               27,3757    37777 1      LIM(-22)   2OCT     37777 37700       1.0 -B(-22)
 0667                               27,3760    37700 1
 0668                               27,3761    00000 1      CP(-22)    2OCT     00000 00100       B(-22)
 0668                               27,3762    00100 0
 0669                               27,3763    04000 0      DP2(-3)    2DEC     1  B-3
 0669                               27,3764    00000 1
 0670                               27,3765    02000 0      DP2(-4)    2DEC     1 B-4             1/16
 0670                               27,3766    00000 1
R0671    RPAD1    2DEC    6373338 B-29     M   (-29)    =20 909 901.57 FT

 0672    REF   4  LAST  719         23,2337                 RPAD1      =        RPAD
 0673                               27,3767    00305 1      R300K      2DEC     6464778 B-29       (-29)  M
 0673                               27,3770    11205 0
 0674                               27,3771    37777 1      NEARONE    2DEC     .999999999
 0674                               27,3772    37777 1
 0675    REF  17  LAST 1241         23,2523                 TFFZEROS EQUALS HI6ZEROS
 0676    REF   1                    23,2513                 TFF1/4     EQUALS HIDP1/4
```

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R0001    PROGRAM DESCRIPTION
R0003    PROGRAM NAME -  SELF-CHECK
R0005    MOD NO -  1
R0007    MOD BY - GAUNTT
                                                           DATE  20 DECEMBER 1967
                                                           LOG SECTION AGC BLOCK TWO SELF-CHECK
                                                           ASSEMBLY SUBROUTINE UTILITYM REV 25

R0008    FUNCTIONAL DESCRIPTION

R0009         PROGRAM HAS TWO MAIN PARTS. THE FIRST IS SELF-CHECK WHICH RUNS AS A ZERO PRIORITY JOB WITH NO CORE SET, AS
R0011    PART OF THE BACK-UP IDLE LOOP. THE SECOND IS SHOW-BANKSUM WHICH RUNS AS A REGULAR EXECUTIVE JOB WITH ITS OWN
R0013    STARTING VERB.
R0014         THE PURPOSE OF SELF-CHECK IS TO CHECK OUT VARIOUS PARTS OF THE COMPUTER AS OUTLINED BELOW IN THE OPTIONS.
R0016         THE PURPOSE OF SHOW-BANKSUM IS TO DISPLAY THE SUM OF EACH BANK , ONE AT A TIME.
R0020         IN ALL THERE ARE  7 POSSIBLE OPTIONS IN THIS BLOCK II VERSION OF SELF-CHECK. MORE DETAIL DESCRIPTION MAY BE
R0022    FOUND IN E-2065 BLOCK II AGC SELF-CHECK AND SHOW BANKSUM BY EDWIN D. SMALLY DECEMBER 1966, AND ADDENDA 2 AND 3.
R0024         THE DIFFERENT OPTIONS ARE CONTROLLED BY PUTTING DIFFERENT NUMBERS IN THE SMODE REGISTER (NOUN 27). BELOW IS
R0026    A DESCRIPTION OF WHAT PARTS OF THE COMPUTER ARE CHECKED BY THE OPTIONS, AND THE CORRESPONDING NUMBER, IN
R0028    OCTAL, TO LOAD INTO SMODE.
R0032    +-4    ERASABLE MEMORY
R0033    +-5    FIXED MEMORY
R0034    +-1,2,3,6,7,10    EVERYTHING IN OPTIONS 4 AND 5.
R0036    -0     SAME AS +-10 UNTIL AN ERROR IS DETECTED.
R0037    +0     NO CHECK, PUTS COMPUTER INTO THE BACKUP IDLE LOOP.


R0038    WARNINGS

R0039         USE OF E MEMORY RESERVED FOR SELF-CHECK (EVEN IN IDLE LOOP) AS TEMP STORAGE BY OTHER PROGRAMS IS DANGEROUS.
R0041         SMODE SET GREATER THAN OCT 10 PUTS COMPUTER INTO BACKUP IDLE LOOP.


R0042    CALLING SEQUENCE

R0043         TO CALL SELF-CHECK KEY IN
R0044              V 21 N 27 E  OPTION NUMBER E
R0047         TO CALL SHOW-BANKSUM KEY IN
R0048              V 91 E          DISPLAYS FIRST BANK
R0049              V 33 E          PROCEED, DISPLAYS NEXT BANK


R0050    EXIT MODES, NORMAL AND ALARM

R0051         SELF-CHECK NORMALLY CONTINUES INDEFINITELY UNLESS THERE IS AN ERROR DETECTED. IF SO + OPTION NUMBERS PUT
R0053    COMPUTER INTO BACKUP IDLE LOOP, - OPTION NUMBERS RESTART THE OPTION.
R0054         THE -0 OPTION PROCEEDS FROM THE LINE FOLLOWING THE LINE WHERE THE ERROR WAS DETECTED.
R0057         SHOW-BANKSUM PROCEEDS UNTIL A TERMINATE IS KEYED IN (V 34 E). THE COMPUTER IS PUT INTO THE BACKUP IDLE LOOP
R0059


R0060    OUTPUT
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R0061         SELF-CHECK UPON DETECTING AN ERROR LOADS THE SELF-CHECK ALARM CONSTANT (01102) INTO THE FAILREG SET AND
R0063    TURNS ON THE ALARM LIGHT. THE OPERATOR MAY THEN DISPLAY THE THREE FAILREGS BY KEYING IN V 05 N 09 E. FOR FURTHER
R0065    INFORMATION HE MAY KEY IN V 05 N 08 E, THE DSKY DISPLAY IN R1 WILL BE ADDRESS+1 OF WHERE THE ERROR WAS DETECTED,
R0067    IN R2 THE BBCON OF SELF-CHECK, AND IN R3 THE TOTAL NUMBER OF ERRORS DETECTED BY SELF-CHECK SINCE THE LAST MAN
R0069    INITIATED FRESH START (SLAP1).
R0073         SHOW-BANKSUM STARTING WITH BANK 0 DISPLAYS IN R1 THE BANK SUM (A +-NUMBER EQUAL TO THE BANK NUMBER), IN R2
R0075    THE BANK NUMBER, AND IN R3 THE BUGGER WORD.


R0076    ERASABLE INITIALIZATION REQUIRED

R0077         ACCOMPLISHED BY FRESH START
R0078              SMODE SET TO +0


R0079    DEBRIS

R0080         ALL EXITS FROM THE CHECK OF ERASABLE (ERASCHK) RESTORE ORIGINAL CONTENTS TO REGISTERS UNDER CHECK.
R0082    EXCEPTION IS A RESTART. RESTART THAT OCCURS DURING ERASCHK RESTORES ERASABLE, UNLESS THERE IS EVIDENCE TO DOUBT
R0084    E MEMORY, IN WHICH CASE PROGRAM THEN DOES A FRESH START (DOFSTART).


 0085                              25,3757                        BANK    25
 0086    REF    1                  43,2000                        SETLOC  SELFCHEC
 0087                              43,3257                        BANK

 0088    REF    1                                                 COUNT*  $$/SELF
 0089    REF   50  LAST 1093          4753              SBIT1     EQUALS  BIT1
 0090    REF   48  LAST 1093          4752              SBIT2     EQUALS  BIT2
 0091    REF   34  LAST 1093          4751              SBIT3     EQUALS  BIT3
 0092    REF   42  LAST 1093          4750              SBIT4     EQUALS  BIT4
 0093    REF   38  LAST 1008          4747              SBIT5     EQUALS  BIT5
 0094    REF   48  LAST 1050          4746              SBIT6     EQUALS  BIT6
 0095    REF   41  LAST 1090          4745              SBIT7     EQUALS  BIT7
 0096    REF   38  LAST 1259          4744              SBIT8     EQUALS  BIT8
 0097    REF   25  LAST  977          4743              SBIT9     EQUALS  BIT9
 0098    REF   37  LAST 1093          4742              SBIT10    EQUALS  BIT10
 0099    REF   27  LAST 1093          4741              SBIT11    EQUALS  BIT11
 0100    REF   31  LAST 1093          4740              SBIT12    EQUALS  BIT12
 0101    REF   42  LAST 1093          4737              SBIT13    EQUALS  BIT13
 0102    REF   71  LAST 1253          4736              SBIT14    EQUALS  BIT14
 0103    REF   42  LAST 1093          4735              SBIT15    EQUALS  BIT15

 0104    REF  226  LAST 1147          4755              S+ZERO    EQUALS  ZERO
 0105    REF   51  LAST 1277          4753              S+1       EQUALS  BIT1
 0106    REF   49  LAST 1277          4752              S+2       EQUALS  BIT2
 0107    REF   35  LAST 1255          6250              S+3       EQUALS  THREE
 0108    REF   26  LAST 1259          4751              S+4       EQUALS  FOUR
 0109    REF   20  LAST 1028          4756              S+5       EQUALS  FIVE
 0110    REF   21  LAST 1256          6245              S+6       EQUALS  SIX
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L        AGC BLCCK TWO SELF-CHECK                                                        USFR'S PAGE NC.   3      EC S3

 0111   REF  17  LAST 1093       4757              S+7       EQUALS SEVEN
 0112   REF  16  LAST 1257       4357              SB8ITS    EQUALS LOW8            00377
 0113   REF   2  LAST  306       4771              CNTRCON   =      OCT50           USEO IN CNTRCHK
 0114                         43,3257   COC61 0   ERASCON1  OCTAL  00061           USEC IN ERASCHK
 0115                         43,3260   01373 1   ERASCON2  OCTAL  01373           LSEO IN ERASCHK
 0116   REF   9  LAST 1257       5007              ERASCON6  =      OCT1400         USEC IN ERASCHK
 0117                         43,3261   C1461 0   ERASCON3  OCTAL  01461           USEC IN ERASCHK
 0118                         43,3262   01773 0   ERASCON4  OCTAL  01773           USEO IN ERASCHK
 0119   REF  20  LAST 1018       5012              S10BITS   EQUALS LOW10           01777, USEO IN ERASCHK
 0120   REF   3  LAST  900       5020              SBNK03    EOUALS PRIO6           06000, USEO IN ROPECHK
 0121   REF   7  LAST 1093       4350              -MAXACRS  =      HI5             FOR ROPECHK
 0122                         43,3263  `COC60 1   SIXTY     OCTAL  00060
 0123                         43,3264   60017 1   SUPRCON   OCTAL  60017           USEO IN ROPECHK
 0124                         43,3265   17777 0   S13BITS   OCTAL  17777
 0125                         43,3266   25252 0   CONC+S1   OCTAL  25252           USEC IN CYCLSHFT
 0126                         43,3267   52400 1   CONC+S2   OCTAL  52400           LSEO IN CYCLSHFT
 0127                         43,3270   76777 1   ERASCCN5  OCTAL  76777
 0128   REF   2  LAST  235       5650              S-7       =      OCT77770
 0129   REF   2  LAST 1002       6115              S-4       EQUALS NEG4
 0130   REF   3  LAST  883       7750              S-3       EQUALS NEG3
 0131   REF   7  LAST 1197       7751              S-2       EOUALS NEG2
 0132   REF  12  LAST 1093       7752              S-1       EOUALS NEGONE
 0133   REF  24  LAST  991       4754              S-ZERO    EQUALS NEGO

 0134   REF  46  LAST 1126    E3,1400                        EBANK= LST1
 0135   REF   3  LAST  293    43,3271   01371 0   AORS1     AORES  SKEEP1
 0136   REF   4  LAST 1110    43,3272   03363 1   SELFAORS  AORES  SELFCHK         SELFCHK RETURN AOORESS. SHOULO BE PUT
A0137                                                                               IN SELFRET WHEN GOING FROM SELFCHK TO
A0138                                                                               SHOWSUM ANO PUT IN SKEEP1 WHEN GOING
A0139                                                                               FROM SHOWSUM TO SELF-CHECK.

 0140   REF   6  LAST  217    43,3273  3 1360 0   PRERRORS  CA     ERESTCRE        IS IT NECESSARY TO RESTORE ERASABLE
 0141                         43,3274  C 0006 1             EXTENO
 0142   REF   1               43,3275  1 3304 1             BZF    ERRORS          NO
 0143                         43,3276  C 0006 1             EXTENO
 0144   REF   3  LAST  217    43,3277  3 1376 1             OCA    SKEEP5
 0145   REF   3  LAST  217    43,3300  51'377 0             INDEX  SKEEP7
 0146                         43,3301  52 C01 1             OXCH   0000            RESTORE THE TWO ERASABLE REGISTERS
 0147   REF   2  LAST  292    43,3302  3 4755 1             CA     S+ZERO
 0148   REF   7  LAST 1278    43,3303  55'360 1             TS     ERESTCRE
 0149                         43,3304  C 0C04 0   ERRORS    INHINT
 0150   REF 329  LAST 1206    43,3305  3 0002 0             CA     Q
 0151   REF   3  LAST  475    43,3306  55'357 0             TS     SFAIL           SAVE Q FOR FAILURE LOCATION
 0152   REF   3  LAST  307    43,3307  55'363 1             TS     ALMCAOR         FOR OISPLAY WITH BBANK ANO ERCOUNT
 0153   REF   3  LAST  213    43,3310  25'365 0             INCR   ERCOUNT         KEEP TRACK OF NUMBER OF MALFUNCTIONS.
 0154   REF   1               43,3311  0 5571 1   TCALARM2  TC     ALARM2
 0155                         43,3312   01102 0             OCT    01102           SELF-CHECK MALFUNCTION INOICATOR
 0156   REF   5  LAST  307    43,3313  11'362 0             CCS    SMCOE
 0157   REF   3  LAST 1278    43,3314  3 4755 1   SIOLOOP   CA     S+ZERC
 0158   REF   6  LAST 1278    43,3315  55'362 0             TS     SMODE
 0159    REF    5  LAST 1278   43,3316  0 3363 1             TC       SELFCHK         GO TO IDLE LOOP
 0160    REF    4  LAST 1278   43,3317  0 1357 1             TC       SFAIL           CONTINUE WITH SELF-CHECK

 0161    REF  381  LAST 1256   43,3320  10 000 0  -1CHK      CCS      A
 0162    REF    1              43,3321  1 3273 0             TCF      PRERRORS
 0163    REF    2  LAST 1279   43,3322  1 3273 0             TCF      PRERRORS
 0164    REF  382  LAST 1279   43,3323  10 000 0             CCS      A
 0165    REF    3  LAST 1279   43,3324  1 3273 0             TCF      PRERRORS
 0166    REF  330  LAST 1278   43,3325  0 0002 0             TC       Q

 0167                          43,3326  0 0006 1  SMODECHK   EXTEND
 0168    REF    4  LAST 1278   43,3327  23'371 0             QXCH     SKEEP1
 0169    REF    1              43,3330  0 3357 0             TC       CHECKNJ         CHECK FOR NEW JOB
 0170    REF    7  LAST 1278   43,3331  11'362 0             CCS      SMODE
 0171    REF    1              43,3332  0 3337 0             TC       SOPTIONS
 0172    REF    1              43,3333  0 3330 1             TC       SMODECHK +2     TO BACKUP IDLE LOOP
 0173    REF    2  LAST 1279   43,3334  0 3337 0             TC       SOPTIONS
 0174    REF    2  LAST  109   43,3335  25'366 0             INCR     SCOUNT
 0175    REF    5  LAST 1279   43,3336  0 1371 0             TC       SKEEP1          CONTINUE WITH SELF-CHECK

 0176    REF    1              43,3337  6 5650 1  SOPTIONS   AD       S-7
 0177                          43,3340  0 0006 1             EXTEND
 0178                          43,3341  6 3343 0             BZMF     +2              FOR OPTIONS BELOW NINE.
 0179    REF    1              43,3342  0 3314 1  BNKOPTN    TC       SIDLOOP         ILLEGAL OPTION.  GO TO IDLE LOOP.
 0180    REF    3  LAST 1279   43,3343  25'366 0             INCR     SCOUNT          FOR OPTIONS BELOW NINE.
 0181    REF    1              43,3344  6 4757 0             AD       S+7

 0182    REF  383  LAST 1279   43,3345  50 000 1             INDEX    A
 0183    REF    1              43,3346  0 3347 1             TC       SOPTION1
 0184    REF    6  LAST 1279   43,3347  0 1371 0  SOPTION1   TC       SKEEP1          WAS TC+TCF
 0185    REF    7  LAST 1279   43,3350  0 1371 0  SOPTION2   TC       SKEEP1          WAS IN:OUT1
 0186    REF    8  LAST 1279   43,3351  0 1371 0  SOPTION3   TC       SKEEP1          WAS COUNTCHK
 0187    REF    1              43,3352  0 3364 0  SOPTION4   TC       ERASCHK
 0188    REF    1              43,3353  0 3545 0  SOPTION5   TC       ROPECHK
 0189    REF    9  LAST 1279   43,3354  0 1371 0  SOPTION6   TC       SKEEP1
 0190    REF   10  LAST 1279   43,3355  0 1371 0  SOPTION7   TC       SKEEP1
 0191    REF   11  LAST 1279   43,3356  0 1371 0  SOPTON10   TC       SKEEP1          CONTINUE WITH SELF-CHECK

 0192                          43,3357  0 0006 1  CHECKNJ    EXTEND
 0193    REF    7  LAST 1110   43,3360  23'361 1             QXCH     SELFRET         SAVE RETURN ADDRESS WHILE TESTING NEWJOB
 0194    REF   57  LAST 1151   43,3361  0 4635 0             TC       POSTJUMP        TO SEE IF ANY JOBS HAVE BECOME ACTIVE.
 0195    REF    2  LAST 1104   43,3362   03215 1             CADR     ADVAN

 0196    REF    2  LAST 1279   43,3363  0 3326 0  SELFCHK    TC       SMODECHK        ** CHARLEY, COME IN HERE

R0197    SKEEP7 HOLDS LOWEST OF TWO ADDRESSES BEING CHECKED.
R0198    SKEEP6 HOLDS B(X+1).
R0199    SKEEP5 HOLDS B(X).
R0200    SKEEP4 HOLDS C(EBANK) DURING ERASLOOP AND CHECKNJ.
R0201    SKEEP3 HOLDS LAST ADDRESS BEING CHECKED (HIGHEST ADDRESS).
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R0202   SKEEP2 CONTROLS CHECKING OF NON-SWITCHABLE ERASABLE MEMORY WITH BANK NUMBERS IN EB.
R0204   ERASCHK TAKES APPROXMATELY 7 SECONDS
 0205   REF   2  LAST  292   43,3364  3 4753 1  ERASCHK  CA      S+1
 0206   REF   3  LAST  292   43,3365  55'372 1           TS      SKEEP2
 0207   REF   4  LAST 1278   43,3366  3 4755 1  0EBANK   CA      S+ZERO
 0208   REF  67  LAST 1259   43,3367  54 003 0           TS      EBANK
 0209   REF   1              43,3370  3 3261 1           CA      ERASCON3           01461
 0210   REF   4  LAST 1278   43,3371  55'377 1           TS      SKEEP7             STARTING ADDRESS
 0211   REF   1              43,3372  3 5012 1           CA      S10BITS            01777
 0212   REF   3  LAST  292   43,3373  55'373 0           TS      SKEEP3             LAST ADDRESS CHECKED
 0213   REF   1              43,3374  0 3414 0           TC      ERASLOOP

 0214   REF   1              43,3375  3 5007 0  E134567B CA      ERASCON6           01400
 0215   REF   5  LAST 1280   43,3376  55'377 1           TS      SKEEP7             STARTING ADDRESS
 0216   REF   2  LAST 1280   43,3377  3 5012 1           CA      S10BITS            01777
 0217   REF   4  LAST 1280   43,3400  55'373 0           TS      SKEEP3             LAST ADDRESS CHECKED
 0218   REF   2  LAST 1280   43,3401  0 3414 0           TC      ERASLOOP

 0219   REF   2  LAST 1280   43,3402  3 5007 0  2EBANK   CA      ERASCON6           01400
 0220   REF   6  LAST 1280   43,3403  55'377 1           TS      SKEEP7             STARTING ADDRESS
 0221   REF   1              43,3404  3 3262 1           CA      ERASCON4           01773
 0222   REF   5  LAST 1280   43,3405  55'373 0           TS      SKEEP3             LAST ADDRESS CHECKED
 0223   REF   3  LAST 1280   43,3406  0 3414 0           TC      ERASLOOP

 0224   REF   4  LAST 1280   43,3407  55'372 1  NOEBANK  TS      SKEEP2             +0
 0225   REF   1              43,3410  3 3257 1           CA      ERASCON1           00061
 0226   REF   7  LAST 1280   43,3411  55'377 1           TS      SKEEP7             STARTING ADDRESS
 0227   REF   1              43,3412  3 3260 0           CA      ERASCON2           01373
 0228   REF   6  LAST 1280   43,3413  55'373 0           TS      SKEEP3             LAST ADDRESS CHECKED

 0229                        43,3414  0 0004 0  ERASLOOP INHINT
 0230   REF  68  LAST 1280   43,3415  3 0003 1           CA      EBANK              STORES C(EBANK)
 0231   REF   3  LAST  217   43,3416  55'374 1           TS      SKEEP4
 0232                        43,3417  0 0006 1           EXTEND
 0233   REF   8  LAST 1280   43,3420  5 1377 0           NDX     SKEEP7
 0234                        43,3421  3 0001 0           DCA     0000
 0235   REF   4  LAST 1278   43,3422  53'376 0           DXCH    SKEEP5             STORES C(X) AND C(X+1) IN SKEEP6 AND 5.
 0236   REF   9  LAST 1280   43,3423  3 1377 0           CA      SKEEP7
 0237   REF   8  LAST 1278   43,3424  55'360 1           TS      ERESTORE           IF RESTART, RESTORE C(X) AND C(X+1)
 0238   REF 223  LAST 1122   43,3425  54 001 1           TS      L
 0239   REF 224  LAST 1280   43,3426  24 001 0           INCR    L
 0240   REF 364  LAST 1279   43,3427  50 000 1           NDX     A
 0241                        43,3430  52 001 1           DXCH    0000               PUTS OWN ADDRESS IN X AND X +1
 0242   REF  10  LAST 1280   43,3431  51'377 0           NDX     SKEEP7
 0243                        43,3432  4 0001 1           CS      0001               CS  X+1
 0244   REF  11  LAST 1280   43,3433  51'377 0           NDX     SKEEP7
 0245                        43,3434  6 0000 1           AD      0000               AD X
 0246   REF   1              43,3435  0 3320 0           TC      -1CHK
 0247   REF   9  LAST 1280   43,3436  3 1360 0           CA      ERESTORE           HAS ERASABLE BEEN RESTORED
 0248                        43,3437  0 0006 1           EXTEND
 0249   REF   1                43,3440  1 3464 0           BZF     ELOOPFIN        YES, EXIT ERASLOOP.
 0250                          43,3441  0 0006 1           EXTEND
 0251   REF  12  LAST 1280     43,3442  5 1377 0           NDX     SKEEP7
 0252                          43,3443  4 0001 1           DCS     0000            COMPLEMENT OF ADDRESS OF X AND X+1
 0253   REF  13  LAST 1281     43,3444  51'377 0           NDX     SKEEP7
 0254                          43,3445  52 001 1           DXCH    0000            PUT COMPLEMENT OF ADDRESS OF X AND X+1
 0255   REF  14  LAST 1281     43,3446  51'377 0           NDX     SKEEP7
 0256                          43,3447  4 0000 0           CS      0000            CS  X
 0257   REF  15  LAST 1281     43,3450  51'377 0           NDX     SKEEP7
 0258                          43,3451  6 0001 0           AD      0001            AD X+1
 0259   REF   2  LAST 1280     43,3452  0 3220 0           TC      -1CHK
 0260   REF  10  LAST 1280     43,3453  3 1360 0           CA      ERESTORE        HAS ERASABLE BEEN RESTORED
 0261                          43,3454  0 0006 1           EXTEND
 0262   REF   2  LAST 1281     43,3455  1 3464 0           BZF     ELOOPFIN        YES, EXIT ERASLOOP.
 0263                          43,3456  0 0006 1           EXTEND
 0264   REF   5  LAST 1280     43,3457  3 1376 1           DCA     SKEEP5
 0265   REF  16  LAST 1281     43,3460  51'377 0           NDX     SKEEP7
 0266                          43,3461  52 001 1           DXCH    0000            PUT B(X) AND B(X+1) BACK INTO X AND X+1
 0267   REF   5  LAST 1280     43,3462  3 4755 1           CA      S+ZERO
 0268   REF  11  LAST 1281     43,3463  55'360 1           TS      ERESTORE        IF RESTART, DO NOT RESTORE C(X), C(X+1)
 0269                          43,3464  0 0003 1  ELOOPFIN RELINT
 0270   REF   2  LAST 1279     43,3465  0 3357 0           TC      CHECKNJ         CHECK FOR NEW JOB
 0271   REF   4  LAST 1280     43,3466  3 1374 0           CA      SKEEP4          REPLACES B(EBANK)
 0272   REF  69  LAST 1280     43,3467  54 003 0           TS      EBANK
 0273   REF  17  LAST 1281     43,3470  25'377 0           INCR    SKEEP7
 0274   REF  18  LAST 1281     43,3471  4 1377 1           CS      SKEEP7
 0275   REF   7  LAST 1280     43,3472  6 1373 1           AD      SKEEP3
 0276                          43,3473  0 0006 1           EXTEND
 0277                          43,3474  1 3476 0           BZF     +2
 0278   REF   4  LAST 1280     43,3475  0 3414 0           TC      ERASLOOP        GO TO NEXT ADDRESS IN SAME BANK
 0279   REF   5  LAST 1280     43,3476  11'372 1           CCS     SKEEP2
 0280   REF   1                43,3477  0 3407 1           TC      NOEBANK
 0281   REF   6  LAST 1281     43,3500  25'372 0           INCR    SKEEP2          PUT +1 IN SKEEP2.
 0282   REF  70  LAST 1281     43,3501  3 0003 1           CA      EBANK
 0283   REF   1                43,3502  6 4743 0           AD      SBIT9
 0284   REF  71  LAST 1281     43,3503  54 003 0           TS      EBANK
 0285   REF   1                43,3504  6 3270 1           AD      ERASCON5        76777, CHECK FOR BANK E2
 0286                          43,3505  0 0006 1           EXTEND
 0287   REF   1                43,3506  1 3402 0           BZF     2EBANK
 0288   REF  72  LAST 1281     43,3507  10 003 0           CCS     EBANK
 0289   REF   1                43,3510  0 3375 0           TC      E134567B        GO TO EBANKS 1,3,4,5,6, AND 7
 0290   REF   3  LAST 1280     43,3511  3 5007 0           CA      ERASCON6        END OF ERASCHK
 0291   REF  73  LAST 1281     43,3512  54 003 0           TS      EBANK
R0292   CNTRCHK PERFORMS A CS OF ALL REGISTERS FROM OCT. 60 THROUGH OCT. 10.
R0293   INCLUDED ARE ALL COUNTERS, T6-1, CYCLE AND SHIFT, AND ALL RUPT REGISTERS
 0294   REF   1                43,3513  3 4771 1  CNTRCHK  CA      CNTRCON         00050
 0295   REF   7  LAST 1281     43,3514  55'372 1  CNTRLOOP TS      SKEEP2
 0296   REF   1                43,3515  6 4750 1           AD      SBIT4           +10 OCTAL
 0297   REF 385  LAST 1280     43,3516  50 000 1           INDEX   A
 0298                          43,3517  4 0000 0           CS      0000
 0299   REF   8  LAST 1281   43,3520  11'372 1            CCS     SKEEP2
 0300   REF   1              43,3521  0 3514 1            TC      CNTRLOOP

R0301   CYCLSHFT CHECKS THE CYCLE AND SHIFT REGISTERS
 0302   REF   1              43,3522  3 3266 0  CYCLSHFT  CA      CONC+S1          25252
 0303   REF  38  LAST 1065   43,3523  54 020 1            TS      CYR              C(CYR) = 12525
 0304   REF  21  LAST 1075   43,3524  54 022 0            TS      CYL              C(CYL) = 52524
 0305   REF  20  LAST 1075   43,3525  54 021 0            TS      SR               C(SR) = 12525
 0306   REF  12  LAST 1259   43,3526  54 023 1            TS      EDOP             C(EDOP) = 00125
 0307   REF  39  LAST 1282   43,3527  6 0020 0            AD      CYR              37777        C(CYR) = 45252
 0308   REF  22  LAST 1282   43,3530  6 0022 1            AD      CYL              00-12524     C(CYL) = 25251
 0309   REF  21  LAST 1282   43,3531  6 0021 1            AD      SR               00-25251     C(SR) = 05252
 0310   REF  13  LAST 1282   43,3532  6 0023 0            AD      EDOP             00-25376     C(EDOP) = +0
 0311   REF   1              43,3533  6 3267 1            AD      CONC+S2          C(CONC+S2) = 52400
 0312   REF   3  LAST 1281   43,3534  0 3320 0            TC      -1CHK
 0313   REF  40  LAST 1282   43,3535  6 0020 0            AD      CYR              45252
 0314   REF  23  LAST 1282   43,3536  6 0022 1            AD      CYL              72523
 0315   REF  22  LAST 1282   43,3537  6 0021 1            AD      SR               77775
 0316   REF  14  LAST 1282   43,3540  6 0023 0            AD      EDOP             77775
 0317   REF   3  LAST 1280   43,3541  6 4753 1            AD      S+1              77776
 0318   REF   4  LAST 1282   43,3542  0 3320 0            TC      -1CHK

 0319   REF   4  LAST 1279   43,3543  25'367 1            INCR    SCOUNT +1
 0320   REF   3  LAST 1279   43,3544  0 3326 0            TC      SMODECHK
R0321   SKEEP1 HOLDS SUM
R0322   SKEEP2 HOLDS PRESENT CONTENTS OF ADDRESS IN ROPECHK AND SHOWSUM ROUTINES
R0323   SKEEP2 HOLDS BANK NUMBER IN LOW ORDER BITS DURING SHOWSUM DISPLAY
R0324   SKEEP3 HOLDS PRESENT ADDRESS (00000 TO 01777 IN COMMON FIXED BANKS)
R0325                                (04000 TO 07777 IN FXFX BANKS)
R0326   SKEEP3 HOLDS BUGGER WORD DURING SHOWSUM DISPLAY
R0327   SKEEP4 HOLDS BANK NUMBER AND SUPER BANK NUMBER
R0328   SKEEP5 COUNTS 2 SUCCESSIVE TC SELF WORDS
R0329   SKEEP6 CONTROLS ROPECHK OR SHOWSUM OPTION
R0330   SKEEP7 CONTROLS WHEN ROUNTINE IS IN COMMON FIXED OR FIXED FIXED BANKS

 0331   REF   1              43,3545  3 4754 0  ROPECHK   CA      S-ZERO           *
 03311  REF   4  LAST  293   43,3546  55'376 0            TS      SKEEP6           * -0 FOR ROPECHK.
 03312  REF   6  LAST 1281   43,3547  3 4755 1  STSHOSUM  CA      S+ZERO           * SHOULD BE ROPECHK

 0332   REF   5  LAST 1281   43,3550  55'374 1            TS      SKEEP4           BANK NUMBER
 0333   REF   4  LAST 1282   43,3551  3 4753 1            CA      S+1
 0334   REF  19  LAST 1281   43,3552  55'377 1  COMMFX    TS      SKEEP7
 0335   REF   7  LAST 1282   43,3553  3 4755 1            CA      S+ZERO
 0336   REF  12  LAST 1279   43,3554  55'371 1            TS      SKEEP1
 0337   REF   8  LAST 1281   43,3555  55'373 0            TS      SKEEP3
 0338   REF   5  LAST 1282   43,3556  3 4753 1            CA      S+1
 0339   REF   6  LAST 1281   43,3557  55'375 0            TS      SKEEP5           COUNTS DOWN 2 TC SELF WORDS
 0340   REF   6  LAST 1282   43,3560  3 1374 0  COMADRS   CA      SKEEP4
 0341   REF 225  LAST 1290   43,3561  54 001 1            TS      L                TO SET SUPER BANK
 0342   REF   8  LAST 1278   43,3562  7 4350 1            MASK    HI5
 0343   REF   9  LAST 1282   43,3563   6 1373 1              AD       SKEEP3
 0344   REF   2  LAST  444   43,3564   0 4651 1              TC       SUPDACAL           SUPER DATA CALL
 0345   REF   1              43,3565   0 3610 0              TC       ADDSUM
 0346   REF   1              43,3566   6 4741 1              AD       SBIT11             02000
 0347   REF   1              43,3567   0 3621 1              TC       ADRSCHK

 0348   REF 386  LAST 1281   43,3570   4 0000 0   FXFX       CS       A
 0349   REF  20  LAST 1282   43,3571   55'377 1              TS       SKEEP7
 0350                        43,3572   0 0006 1              EXTEND
 0351                        43,3573   1 3576 1              BZF      +3
 0352   REF   1              43,3574   3 4740 0              CA       SBIT12             04000, STARTING ADDRESS OF BANK 02
 0353                        43,3575   0 3577 1              TC       +2
 0354   REF   1              43,3576   3 5020 0              CA       SBNK03             06000, STARTING ADDRESS OF BANK 03
 0355   REF  10  LAST 1283   43,3577   55'373 0              TS       SKEEP3
 0356   REF   8  LAST 1282   43,3600   3 4755 1              CA       S+ZERO
 0357   REF  13  LAST 1282   43,3601   55'371 1              TS       SKEEP1
 0358   REF   6  LAST 1282   43,3602   3 4753 1              CA       S+1
 0359   REF   7  LAST 1282   43,3603   55'375 0              TS       SKEEP5             COUNTS DOWN 2 TC SELF WORDS
 0360   REF  11  LAST 1283   43,3604   51'373 1   FXADRS     INDEX    SKEEP3
 0361                        43,3605   3 0000 1              CA       0000
 0362   REF   2  LAST 1283   43,3606   0 3610 0              TC       ADDSUM
 0363   REF   2  LAST 1283   43,3607   0 3621 1              TC       ADRSCHK

 0364   REF   9  LAST 1282   43,3610   55'372 1   ADDSUM     TS       SKEEP2
 0365   REF  14  LAST 1283   43,3611   6 1371 0              AD       SKEEP1
 0366   REF  15  LAST 1283   43,3612   55'371 1              TS       SKEEP1
 0367   REF   9  LAST 1283   43,3613   3 4755 1              CAF      S+ZERO
 0368   REF  16  LAST 1283   43,3614   6 1371 0              AD       SKEEP1
 0369   REF  17  LAST 1283   43,3615   55'371 1              TS       SKEEP1
 0370   REF  10  LAST 1283   43,3616   4 1372 1              CS       SKEEP2
 0371   REF  12  LAST 1283   43,3617   6 1373 1              AD       SKEEP3
 0372   REF 331  LAST 1279   43,3620   0 0002 0              TC       Q

 0373   REF 387  LAST 1283   43,3621   22 000 1   ADRSCHK    LXCH     A
 0374   REF  13  LAST 1283   43,3622   3 1373 1              CA       SKEEP3
 0375   REF  21  LAST 1278   43,3623   7 5012 0              MASK     LOW10              RELATIVE ADDRESS
 0376   REF   1              43,3624   6 4350 0              AD       -MAXADRS           SUBTRACT MAX RELATIVE ADDRESS = 1777.
 0377                        43,3625   0 0006 1              EXTEND
 0378   REF   1              43,3626   1 3715 0              BZF      SOPTION            CHECKSUM FINISHED IF LAST ADDRESS.
 0379   REF   8  LAST 1283   43,3627   11'375 0              CCS      SKEEP5             IS CHECKSUM FINISHED
 0380                        43,3630   0 3633 1              TC       +3                 NO
 0381                        43,3631   0 3633 1              TC       +2                 NO
 0382   REF   2  LAST 1283   43,3632   0 3715 1              TC       SOPTION            GO TO ROPECHK SHOWSUM OPTION
 0383   REF 226  LAST 1282   43,3633   10 001 1              CCS      L                  -0 MEANS A TC SELF WORD.
 0384   REF   1              43,3634   0 3643 0              TC       CONTINU
 0385   REF   2  LAST 1283   43,3635   0 3643 0              TC       CONTINU
 0386   REF   3  LAST 1283   43,3636   0 3643 0              TC       CONTINU
 0387   REF   9  LAST 1283   43,3637   11'375 0              CCS      SKEEP5
 0388   REF   4  LAST 1283   43,3640   0 3644 1              TC       CONTINU +1
 0389   REF   1              43,3641   3 7752 0              CA       S-1
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L        AGC BLOCK TWO SELF-CHECK                                                                   USER'S PAGE NO.   9       E3 S4

 0390    REF    5  LAST 1283   43,3642  0 3644 1              TC      CONTINU +1        AD IN THE BUGGER WORD
 0391    REF    7  LAST 1283   43,3643  3 4753 1   CONTINU    CA      S+1               MAKE SURE TWO CONSECUTIVE TC SELF WORDS
 0392    REF   10  LAST 1283   43,3644  55'375 0              TS      SKEEP5
 03921   REF    5  LAST 1282   43,3645  11'376 0              CCS     SKEEP6            *
 03922   REF   22  LAST 1110   43,3646  10 067 1              CCS     NEWJOB            * +1, SHOWSUM
 03923   REF    5  LAST  719   43,3647  0 5122 0              TC      CHANG1            *
 03924                         43,3650  0 3652 0              TC      +2                *
 0393    REF    3  LAST 1281   43,3651  0 3357 0              TC      CHECKNJ           -0 IN SKEEP6 FOR ROPECHK

 0394    REF   14  LAST 1283   43,3652  25'373 1   ADRS+1     INCR    SKEEP3
 0395    REF   21  LAST 1283   43,3653  11'377 1              CCS     SKEEP7
 0396    REF    1              43,3654  0 3560 1              TC      COMADRS
 0397    REF    2  LAST 1284   43,3655  0 3560 1              TC      COMADRS
 0398    REF    1              43,3656  0 3604 0              TC      FXADRS
 0399    REF    2  LAST 1284   43,3657  0 3604 0              TC      FXADRS

 0400    REF    7  LAST 1282   43,3660  4 1374 1   NXTBNK     CS      SKEEP4
 0401    REF    1              43,3661  6 3750 0              AD      LSTBNKCH          LAST BANK TO BE CHECKED
 0402                          43,3662  0 0006 1              EXTEND
 0403    REF    1              43,3663  1 3152 0              BZF     ENDSUMS           END OF SUMMING OF BANKS.
 0404    REF    8  LAST 1284   43,3664  3 1374 0              CA      SKEEP4
 0405    REF    2  LAST 1283   43,3665  6 4741 1              AD      SBIT11
 0406    REF    9  LAST 1284   43,3666  55'374 1              TS      SKEEP4            37 TO 40 INCRMTS SKEEP4 BY END AND CARRY
 0407    REF    1              43,3667  0 3673 0              TC      CHKSUPR
 0408    REF    1              43,3670  3 4735 1   17TO20     CA      SBIT15
 0409    REF   10  LAST 1284   43,3671  27'374 1              ADS     SKEEP4            SET FOR BANK 20
 0410    REF    1              43,3672  0 3707 1              TC      GONXTBNK
 0411    REF    9  LAST 1282   43,3673  7 4350 1   CHKSUPR    MASK    HI5
 0412                          43,3674  0 0006 1              EXTEND
 0413    REF    1              43,3675  1 3705 1              BZF     NXTSUPR           INCREMENT SUPER BANK
 0414    REF    1              43,3676  6 3265 0   27TO30     AD      S13BITS
 0415                          43,3677  0 0006 1              EXTEND
 0416                          43,3700  1 3702 0              BZF     +2                BANK SET FOR 30
 0417    REF    2  LAST 1284   43,3701  0 3707 1              TC      GONXTBNK
 0418    REF    1              43,3702  3 3263 0              CA      SIXTY             FIRST SUPER BANK
 0419    REF   11  LAST 1284   43,3703  27'374 1              ADS     SKEEP4
 0420    REF    3  LAST 1284   43,3704  0 3707 1              TC      GONXTBNK
 0421    REF    1              43,3705  6 3264 1   NXTSUPR    AD      SUPRCON           SET BNK 30 + INCR SUPR BNK AND CANCEL
 0422    REF   12  LAST 1284   43,3706  27'374 1              ADS     SKEEP4            ERC BIT OF THE 37 TO 40 ADVANCE.
 0423    REF   22  LAST 1284   43,3707  11'377 1   GONXTBNK   CCS     SKEEP7
 0424    REF    1              43,3710  0 3552 0              TC      COMMFX
 0425    REF    8  LAST 1284   43,3711  3 4753 1              CA      S+1
 0426    REF    1              43,3712  0 3570 0              TC      FXFX
 0427    REF    1              43,3713  3 4745 0              CA      SBIT7             HAS TO BE LARGER THAN NO OF FXSW BANKS.
 0428    REF    2  LAST 1284   43,3714  0 3552 0              TC      COMMFX

 0429    REF   13  LAST 1284   43,3715  3 1374 0   SOPTION    CA      SKEEP4
 0430    REF   10  LAST 1284   43,3716  7 4350 1              MASK    HI5               = BANK BITS
 0431    REF    5  LAST  441   43,3717  0 4331 1              TC      LEFT5
 0432    REF  227  LAST 1283   43,3720  54 001 1              TS      L                 BANK NUMBER BEFORE SUPER BANK
 0433    REF  14  LAST 1284    43,3721   3 1374 0             CA      SKEEP4
 0434    REF   1               43,3722   7 4357 0             MASK    S8BITS            = SUPER BANK BITS
 0435                          43,3723   0 0006 1             EXTEND
 0436    REF   1               43,3724   1 3732 0             BZF     SOPT              BEFORE SUPER BANK
 0437    REF  23  LAST 1282    43,3725  54 0021 0             TS      SR                SUPER BANK NECESSARY
 0438    REF 228  LAST 1284    43,3726   3 0001 0             CA      L
 0439    REF  18  LAST 1278    43,3727   7 4757 1             MASK    SEVEN
 0440    REF  24  LAST 1285    43,3730   6 0021 1             AD      SR
 0441    REF. 229  LAST 1285   43,3731  54 0001 1             TS      L                 BANK NUMBER WITH SUPER BANK
 0442    REF   6  LAST 1284    43,3732   3 1376 1  SOPT       CA      SKEEP6            *
 0443                          43,3733   0 0006 1             EXTEND                    *
 0444                          43,3734   1 3736 1             BZF     +2                * ON -0 CONTINUE WITH ROPE CHECK.
 0445    REF   1               43,3735   0 3134 1             TC      SDISPLAY          * ON +1 GO TO DISPLAY OF SUM.
 0446    REF  18  LAST 1283    43,3736  11'371 1              CCS     SKEEP1            FORCE SUM TO ABSOLUTE VALUE.
 04461                         43,3737   0 3741 0             TC      +2
 04462                         43,3740   0 3742 0             TC      +2
 04463   REF   9  LAST 1284    43,3741   6 4753 1             AD      S+1
 04464   REF  19  LAST 1285    43,3742  55'371 1              TS      SKEEP1
 0447    REF 230  LAST 1285    43,3743   4 0001 1  BNKCHK     CS      L                 = - BANK NUMBER
 0448    REF  20  LAST 1285    43,3744   6 1371 0             AD      SKEEP1
 0449    REF   2  LAST 1283    43,3745   6 7752 0             AD      S-1
 0450    REF   5  LAST 1282    43,3746   0 3320 0             TC      -1CHK             CHECK SUM
 0451    REF   2  LAST  292    43,3747   0 3660 1             TC      NXTBNK

 0454    REF  23  LAST 1284      0067                         EBANK=  NEWJOB
 0455                          43,3750    66100 0  LSTBNKCH   BBCON*                    * CONSTANT, LAST BANK.
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P0001                SUBROUTINE TO UPDATE THE PROGRAM NUMBER DISPLAY ON THE DSKY.

 0002   REF   1                                              COUNT* $$/PHASE
 0003                              5311                      BLOCK  02
 0004   REF   1                    4000                      SETLOC FFTAG1
 0005                              5311                      BANK

 0006   REF 332  LAST 1283         5311  50 002 0  NEWMODEX  INDEX   Q                UPDATE MODREG. ENTRY FOR MODE IN FIXED.
 0007                              5312  3 0000 1            CAF     0
 0008   REF 333  LAST 1286         5313  24 002 0            INCR    Q

 0009   REF  19  LAST 1224         5314  55 1010 0 NEWMODEA  TS      MODREG           ENTRY FOR MODE IN A.
 0014                              5315  3 5320 0  MMDSPLAY  CAF     +3               DISPLAY MAJOR MODE.
 0015   REF  41  LAST 1206         5316  22 006 1  PREBJUMP  LXCH    BBANK            PUTS BBANK IN L
 0016   REF  16  LAST 1217         5317  1 4640 0            TCF     BANKJUMP         PUTS Q INTO A
 0017   REF   1                    5320   20213 0            CADR    SETUPDSP

R0018                RETURN TO CALLER +3 IF MODE = THAT AT CALLER +1. OTHERWISE RETURN TO CALLER +2.

 0020   REF 334  LAST 1286         5321  50 002 0  CHECKMM   INDEX   Q
 0021                              5322  4 0000 0            CS      0
 0022   REF  20  LAST 1286         5323  6 1010 1            AD      MODREG
 0023                              5324  0 0006 1            EXTEND
 0024   REF   3  LAST 1099         5325  1 6744 1            BZF     Q+2
 0025   REF   5  LAST  889         5326  1 6742 1            TCF     Q+1              NO MATCH

 0026   REF   4  LAST 1286         6745              TCC     =       Q+2 +1

 0027                           14,3775                      BANK    14
 0028   REF   1                 10,2000                      SETLOC PHASETAB
 0029                           10,2213                      BANK

 0030   REF   1                                              COUNT* $$/PHASE
 0031                           10,2213  0 0004 0  SETUPDSP  INHINT
 0032   REF  46  LAST  987      10,2214  52 0071 0           DXCH    RUPTREG1         SAVE CALLER-S RETURN 2CADR
 0033   REF  11  LAST 1093      10,2215  3 4355 0            CAF     PRIO30             EITHER A TASK OR JOB CAN COME TO
 0034   REF  26  LAST 1115      10,2216  0 5072 1            TC      NOVAC              NEWMODEX
 0035   REF  21  LAST 1286         1010                      EBANK=  MODREG
 0036   REF   1                 10,2217   03577 1            2CADR   DSPMMJOB
 0036   REF   1                 10,2220   60102 1
 0037   REF  47  LAST 1286      10,2221  52 0071 0           DXCH    RUPTREG1
 0038                           10,2222  0 0003 1            RELINT
 0039   REF  23  LAST 1259      10,2223  52 0006 0           DXCH    Z                RETURN

 0040   REF   2  LAST  461      40,3577            DSPMMJOB  EQUALS  DSPMMJB


 0041                              5327                      BLOCK  02
 0042   REF   2  LAST 1286         4000                      SETLOC FFTAG1
 0043                              5327                      BANK
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P0044   PHASCHNG IS THE MAIN WAY OF MAKING PHASE CHANGES FOR RESTARTS.  THERE ARE THREE FORMS OF PHASCHNG, KNOWN AS TYPE
R0046   A, TYPE B, AND TYPE C. THEY ARE ALL CALLED AS FOLLOWS, WHERE OCT xxxxx   CONTAINS THE PHASE INFORMATION,

A0048                                                TC      PHASCHNG
A0049                                                OCT     xxxxx

R0050   TYPE A IS CONCERNED WITH FIXED PHASE CHANGES, THAT IS, PHASE INFORMATIONTHAT IS STORED PERMANENTLY.  THESE
R0052   OPTIONS ARE, WHERE G STANDS FOR A GROUP AND .X FOR THE PHASE,

R0053                   G.0                INACTIVE, WILLNOT PERMIT A GROUP G RESTART
R0055                   G.1                WILL CAUSE THE LAST DISPLAY TO BE REACTIVATED, USED MAINLY IN MANNED FLIGHTS
R0057                   G.EVEN             A DOUBLE TABLE RESTART, CAN CAUSE ANY COMBINATION OF TWO JOBS, TASKS, AND/OR
R0059                                      LONGCALL TO BE RESTARTED.
R0060                   G.ODD NOT .1       A SINGLE TABLE RESTART, CAN CAUSE EITHER A JOB, TASK, OR LONGCALL RESTART

R0062   THIS INFORMATION IS PUT INTO THE OCTAL WORD AFTER TC PHASCHNG AS FOLLOWS

R0063                   TL0 00P PPP PPP GGG

R0065   WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7, THE P:S FOR THE PHASE,
R0067   OCTAL 0 - 127.  0:S MUST BE 0.              IF ONE WISHES TO HAVE THE TBASE OF GROUP G TO BE SET AT THIS TIME,
R0069   T IS SET TO 1, OTHERWISE IT IS SET TO 0.  SIMIARLY IF ONE WISHES TO SET LONGBASE, THEN L IS SET TO 1, OTHERWISE
R0071   IT IS SET TO 0.  SOME EXAMPLES,

A0072                                                TC      PHASCHNG        THIS WILL CAUSE GROUP 3 TOBE SET TO 0,
A0073                                                OCT     00003           MAKING GROUP 3 INACTIVE

A0074                                                TC      PHASCHNG        IF A RESTART OCCURS THIS WOULD CAUSE
A0075                                                OCT     00012           GROUP 2 TO RESTART THE LAST DISPLAY

A0076                                                TC      PHASCHNG        THIS SETS THE TBASE OF GROUP 4 AND IN
A0077                                                OCT     40064           CASE OF A RESTART WOULD START UP THE TWO
A0078                                                                        THINGS LOCATED IN THE DOUBLE 4.6 RESTART
A0079                                                                        LOCATION
A0080                                                TC      PHASCHNG        THIS SETS LONGBASE AND UPON A RESTART
A0081                                                OCT     20135           CAUSES 5.13 TO BE RESTARTED  (SINCE
A0082                                                                        LONGBASE WAS SET THIS SINGLE ENTRY
A0083                                                                        SHOULD BE A LONGCALL)
A0084                                                TC      PHASCHNG        SINCE BOTH TBASE4 AND LONGBASE ARE SET,
A0085                                                OCT     60124           4.12 SHOULD CONTAIN BOTH A TASK AND A
A0086                                                                        LONGCALL TO BE RESTARTED

R0087   TYPE C PHASCHNG CONTAINS THE VARIABLE TYPE OF PHASCHNG INFORMATION. INSTEAD OF THE INFORMATION BEING IN A
R0089   PERMANENT FORM, ONE STORES THE DESIRED RESTART INFORMATION IN A VARIABKE LOCATION. THE BITS ARE AS FOLLOWS,

R0091                   TL0 1A0 xxx CJW GGG

R0092   WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7.  IF THE RESTART IS TO
R0094   BE BY WAITLIST, W IS SET TO 1, IF IT IS A JOB, J IS SET TO 1, IF IT IS A LONGCALL, C IS SET TO 1. ONLY ONE OF
R0096   THESE THREE BIT S MAY BE SET.  X:S ARE IGNORED  1 MUST BE 1, AND 0 MUST  BE 0.  AGAIN T STANDS FOR THE TBASE,
R0098    AND L FOR LONGBASE.  THE BITS A AND D ARE CONCERNED WITH THE VARIABLE INFORMATION. IF D IS SET TO 1, A PRIORITY
R0100    OR DELTA TIME WILL BE READ FROM THE NEXT LOCATION AFTER THE OCTAL INFORMATION, IF THIS IS TO BE INDIRECT, THAT
R0102    IS, THE NAME OF A LOCATION CONTAINING THE INFORMATION (DELTA TIME ONLY), THEN THIS IS GIVEN AS THE -GENADR OF
R0104    THAT LOCATION WHICH CONTAINS THE DELTA TIME.  IF THE OLD PRIORITY OR DELTA TIME IS TO BE USED, THAT WHICH IS
R0106    ALREADY IN THE VARIABLE STORAGE, THEN D IS SET TO 0. NEXT THE A BIT IS USED.  IF IT IS SET TO 0, THE ADDRESS
R0108    THAT WOULD BE RESTARTED DURING A RESTART IS THE NEXT LOCATION AFTER THE  PHASE INFORMATION, THAT IS, EITHER
R0110    (TC PHASCHNG) +2 OR +3, DEPENDING ON WHETHER D HAD BEEN SET OR NOT.  IF A IS SET TO 1, THEN THE ADDRESS THAT
R0112    WOULD BE RESTARTED IS THE 2CADR THAT IS READ FROM THE NEXT TWO LOCATIONS.  EXAMPLES,

A0114                                      AD        TC       PHASCHNG         THIS WOULD CAUSE LOCATION AD +3 TO BE
A0115                                      AD+1      OCT      05023            RESTARTED BY GROUP THREE WITHA PRIORITY
A0116                                      AD+2      OCT      23000            OF 23.  NOTE UPON RETURNING IT WOULD
A0117                                      AD+3                                ALSO GO TO AD+3

A0118                                      AD        TC       PHASCHNG         GROUP  1 WOULD CAUSE CAUSE CALLCALL TO
A0119                                      AD+1      OCT      27441            BE STARTED AS A LONGCALL FROM THE TIME
A0120                                      AD+2     -GENADR   DELTIME          STORED IN LONGBASE (LONGBASE WAS SET) BY
A0121                                      AD+3      2CADR    CALLCALL         A DELTATIME STORED IN DELTIME.  THE
A0122                                      AD+4                                BBCON OF THE 2CADR SHOULD CONTAIN THE E
A0123                                      AD+5                                BANK OF DELTIME. PHASCHNG RETURNS TO
A0124                                                                          LOCATION AD+5

R0125    NOTE THAT IF A VARIABLE PRIORITY IS GIVEN FOR A JOB, THE JOB WILL BE RESTARTED AS A NOVAC IF THE PRIORITY IS
R0127    NEGATIVE, AS A FINDVAC IF THE PRIORITY IS POSITIVE.


R0128    TYPE B PHASCHNG IS A COMBINATION OF VARIABLE AND FIXED PHASE CHANGES. IT WILL START UP A JOB AS INDICATED
R0130    BELOW AND ALSO START UP ONE FIXED RESTART, THAT IS EITHER AN G.1 OR  A G.ODD OR THE FIRST ENTRY OF G.EVEN
R0132    DOUBLE ENTRY.  THE BIT INFORMATION IS AS FOLLOWS,

R0133                       TL1 DAP PPP PPP GGG

R0134    WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. THE P:S FOR THE FIXED
R0136    PHASE INFORMATION, OCTAL 0 - 127. 1 MUST BE 1.  AND AGAIN T STANDS FOR THE TBASE AND L FOR LONGBASE. D THIS
R0138    TIME STANDS ONLY FOR PRIORITY SINCE THIS WILL BE CONSIDERED A JOB, AND IT MUST BE GIVEN DIRECTLY IF GIVEN.
R0140    AGAIN A STANDS FOR THE ADDRESS OF THE LOCATION TO BE RESTARTED, 1 IF THE 2CADR IS GIVEN , OR 0 IF IT IS TO BE
R0142    THE NEXT LOCATION.(THE RETURN LOCATION OF PHASCHNG) EXAMPLES,

A0143                                      AD        TC       PHASCHNG         TBASE IS SET AND ARESTART CAUSE GROUP 3
A0144                                      AD+1      OCT      56043            TO START THE JOB AJOBAJOB WITH PRIORITY
A0145                                      AD+2      OCT      31000            31 AND THE FIRST ENTRY OF 3.4SPOT(WE CAN
A0146                                      AD+3      2CADR    AJOBAJOB         ASSUME IT IS A TASK SINCE WE SET TBASE3)
A0147                                      AD+4                                UPON RETURN FROM PHASCHNG CONTROL WOULD
A0148                                      AD+5                                GO TO AD+5

A0149                                      AD        TC       PHASCHNG         UPON A RESTART THE LAST DISPLAY WOULD BE
A0150                                      AD+1      OCT      10015            RESTARTED AND A JOB WITH THE PREVIOUSLY
A0151                                      AD+2                                STORED PRIORITY WOULD BE BEGUN AT AD+2
A0152                                                                          BY MEANS OF GROUP 5
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R0153    THE NOVAC-FINDVAC CHOICE FOR JOBS HOLDS HERE ALSO - NEGATIVE PRIORITY CAUSES A NOVAC CALL, POSITIVE A FINDVAC.

R0155    SUMMARY OF BITS
R0156    TYPE A             TLO COP PPP PPP GGG
R0157    TYPE B             TL1 DAP PPP PPP GGG
R0158    TYPE C             TLO 1AO XXX CJW GGG
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L        PHASE TABLE MAINTENANCE                                                         USER'S PAGE NO.   5      EO S4

P0159    2PHSCHNG IS USED WHEN ONE WISHES TO START UP A GROUP OR CHANGE A GROUP WHILE UNDER THE CONTROL OF A DIFFERENT
R0161    GROUP. FOR EXAMPLE, CHANGE THE PHASE OF GROUP 3 WHILE THE PORTION OF THE PROGRAM IS UNDER GROUP 5. ALL 2PHSCHNG
R0163    CALLS ARE MADE IN THE FOLLOWING MANNER,

A0164                                                              TC      2PHSCHNG
A0165                                                              OCT     XXXXX
A0166                                                              OCT     YYYYY

R0167    WHERE OCT XXXXX MUST BE OF TYPE A AND OCT YYYYY MAY BE OF EITHER TYPE A OR TYPE B OR TYPEC.  THERE IS ONE
R0169    DIFFERENCE --- NOTE- IF LONGBASE IS TO BE SET THIS INFORMATION IS GIVEN IN THE OCT YYYYY INFORMATION, IT WILL
R0171    BE DISREGARDED IF GIVEN WITH THE OCT XXXXX INFORMATION. A COUPLE OF EXAMPLES MAY HELP,

A0173                                                     AD       TC      2PHSCHNG        SET TBASE3 AND IF A RESTART OCCURS START
A0174                                                     AD+1     OCT     40083           THE TWO ENTRIES IN 3.8 TABLE LOCATION
A0175                                                     AD+2     OCT     05025           THIS IS OF TYPE C, SET THE JOB TO BE
A0176                                                     AD+3     OCT     18000           TO BE LOCATION AD+4, WITH A PRIORITY 18,
A0177                                                     AD+4                             FOR GROUP 5 PHASE INFORMATION

 0178    REF   1                                                   COUNT* $$/PHASE
 0179                                   5327  0 0004 0  2PHSCHNG INHINT                     THE ENTRY FOR A DOUBLE PHASE CHANGE
 0180    REF 335  LAST 1286             5330  50 002 0             NDX     Q
 0181                                   5331  3 0000 1             CA      0
 0182    REF 336  LAST 1290             5332  24 002 0             INCR    Q
 0183    REF   1                        5333  54 072 0             TS      TEMPP2

 0184    REF   1                        5334  7 4757 1             MASK    OCT7
 0185                                   5335  6 0000 1             DOUBLE
 0186    REF   1                        5336  54 071 0             TS      TEMPG2

 0187    REF   2  LAST 1290             5337  3 0072 1             CA      TEMPP2
 0188    REF   1                        5340  7 5030 0             MASK    OCT17770        NEED ONLY 1770, BUT WHY GET A NEW CONST.
 0189                                   5341  0 0006 1             EXTEND
 0190    REF  32  LAST 1277             5342  7 4740 1             MP      BIT12
 0191    REF   3  LAST 1290             5343  56 072 1             XCH     TEMPP2

 0192    REF  43  LAST 1277             5344  7 4735 0             MASK    BIT15
 0193    REF   1                        5345  54 066 0             TS      TEMPSW2         INDICATES WHETHER TO SET TBASE OR NOT

 01932   REF 337  LAST 1290             5346  50 002 0             INDEX   Q
 01934                                  5347  3 0000 1             CA      0
 01936   REF 338  LAST 1290             5350  24 002 0             INCR    Q
 01938   REF   1                        5351  54 065 0             TS      TEMPSW

 0194    REF   1                        5352  1 5363 0             TCF     PHASJUMP

 0195                                   5353  0 0004 0  PHASCHNG INHINT                    NORMAL PHASCHNG ENTRY POINT.
 0196    REF 339  LAST 1290             5354  50 002 0             INDEX   Q
 0197                                   5355  3 0000 1             CA      0
 0198    REF 340  LAST 1290             5356  24 002 0             INCR    Q
 0199                                   5357  0 0004 0  PHSCHNGA INHINT                    FIRST OCTAL PARAMETER IN A.
 0200    REF   2  LAST 1290       5360  54 065 0              TS       TEMPSW
 0201    REF 127  LAST 1255       5361   3 4753 1             CA       ONE
 02015   REF   2  LAST 1290       5362  54 066 0              TS       TEMPSW2
 0202                             5363   0 0006 1   PHASJUMP  EXTEND
 0203    REF   1                  5364   3 5367 0             DCA      ADRPCHN2        OFF TO SWITCHED BANK
 0204                             5365  52 006 0              DTCB

 0205    REF  47  LAST 1276    E3,1400                        EBANK=   LST1
 0206    REF   1                  5366    02224 1   ADRPCHN2  2CADR    PHSCHNG2
 0206    REF   1                  5367    20103 1


 0207    REF   1                  5370  22 073 0    ONEORTWO  LXCH     TEMPBBCN
 0208    REF  42  LAST 1286       5371  22 006 1              LXCH     BBANK
 0209    REF   2  LAST 1291       5372  22 073 0              LXCH     TEMPBBCN

 0210    REF   1                  5373   7 5024 0             MASK     OCT14000        SEE WHAT KIND OF PHASE CHANGE IT IS
 0211    REF 388  LAST 1283       5374  10 000 0              CCS      A
 0212    REF   1                  5375   1 7753 0             TCF      CHECKB           IT IS OF TYPE :B:

 0213    REF   1                  5376   3 0062 0             CA       TEMPP
 0214    REF  42  LAST 1277       5377   7 4745 1             MASK     BIT7
 0215    REF 389  LAST 1291       5400  10 000 0              CCS      A                SHALL WE USE THE OLD PRIORITY
 0216    REF   1                  5401   1 5423 0             TCF      GETPRIO          NO GET A NEW PRIORITY (OR DELTA T)

 0217    REF   1                  5402  50 061 0    OLDPRIO   NDX      TEMPG            USE THE OLD PRIORITY (OR DELTA T)
 0218    REF   1                  5403   3 1051 1             CA       PHSPRDT1 -2
 0219    REF   1                  5404  54 070 1              TS       TEMPPR

 0220    REF   2  LAST 1291       5405   3 0062 0   CON1      CA       TEMPP           SEE IF A 2CADR IS GIVEN
 0221    REF  39  LAST 1277       5406   7 4744 0             MASK     BIT8
 0222    REF 390  LAST 1291       5407  10 000 0              CCS      A
 0223    REF   1                  5410   1 5427 1             TCF      GETNEWNM

 0224    REF 341  LAST 1290       5411   3 0002 0             CA       Q
 0225    REF   1                  5412  54 063 0              TS       TEMPNM
 0226    REF   1                  5413   3 0006 1             CA       BB
 0227                             5414   0 0006 1             EXTEND                   PICK UP USERS SUPERBANK
 0228    REF  24  LAST 1123       5415  04 007 1              ROR      SUPERBNK
 0229    REF   1                  5416  54 064 1              TS       TEMPBB

 0230    REF   1                  5417   3 5422 0   TOCON2    CA       CON2ADR         BACK TO SWITCHED BANK
 0231    REF   3  LAST 1291       5420  22 073 0              LXCH     TEMPBBCN
 0232                             5421  52 006 0              DTCB

 0233    REF   1                  5422    02312 0   CON2ADR   GENADR   CON2

 0234    REF 342  LAST 1291       5423  50 002 0    GETPRIO   NDX      Q               DON'T CARE IF DIRECT OR INDIRECT
 0235                             5424   3 0000 1             CA       0               LEAVE THAT DECISION TO RESTARTS
 0236    REF 343  LAST 1291       5425  24 002 0              INCR     Q               OBTAIN RETURN ADDRESS
 0237    REF    1       '          5426  1 5404 0            TCF      CON1 -1

 0238                              5427  0 0006 1  GETNEWNM EXTEND
 0239    REF 344  LAST 1291        5430  5 0002 0           INDEX    Q
 0240                              5431  3 0001 0           DCA      0
 0241    REF   2  LAST 1291        5432  52 064 1           DXCH     TEMPNM
 0242    REF  78  LAST 1125        5433  3 4752 0           CA       TWO
 0243    REF 345  LAST 1292        5434  26 002 1           ADS      Q                        OBTAIN RETURN ADDRESS

 0244    REF   1                   5435  1 5417 1           TCF      TOCON2

 0245    REF   2  LAST  507        5024              OCT14000 EQUALS PRIO14
 0246    REF  40  LAST 1253        0061              TEMPG    EQUALS ITEMP1
 0247    REF  20  LAST 1253        0062              TEMPP    EQUALS ITEMP2
 0248    REF  25  LAST  897        0063              TEMPNM   EQUALS ITEMP3
 0249    REF  11  LAST  896        0064              TEMPBB   EQUALS ITEMP4
 0250    REF  50  LAST  900        0065              TEMPSW   EQUALS ITEMP5
 0251    REF   7  LAST  899        0066              TEMPSW2  EQUALS ITEMP6
 0252    REF  48  LAST 1286        0070              TEMPPR   EQUALS RUPTREG1
 0253    REF   9  LAST  812        0071              TEMPG2   EQUALS RUPTREG2
 0254    REF  12  LAST  994        0072              TEMPP2   EQUALS RUPTREG3

 0255    REF   5  LAST  994        0073              TEMPBBCN EQUALS RUPTREG4
 0256    REF  43  LAST 1291        0006              BB       EQUALS BBANK


 0257                           14,3775                     BANK     14
 0258    REF   2  LAST 1286     10,2000                     SETLOC   PHASETAB
 0259                           10,2224                     BANK

 0260    REF   1                E3,1436                     EBANK=   PHSNAME1
 0261    REF   2 LAST 1286 TO 1290:     9      9*           COUNT*   $$/PHASE
 0262    REF   4  LAST 1291     10,2224  22 073 0  PHSCHNG2 LXCH     TEMPBBCN
 0263    REF   3  LAST 1291     10,2225  3 0065 1           CA       TEMPSW
 0264    REF   2  LAST 1290     10,2226  7 4757 1           MASK     OCT7
 0265                           10,2227  6 0000 1           DOUBLE
 0266    REF   2  LAST 1291     10,2230  54 061 1           TS       TEMPG

 0267    REF   4  LAST 1292     10,2231  3 0065 1           CA       TEMPSW
 0268    REF   2  LAST 1290     10,2232  7 5030 0           MASK     OCT17770
 0269                           10,2233  0 0006 1           EXTEND
 0270    REF  33  LAST 1290     10,2234  7 4740 1           MP       BIT12
 0271    REF   3  LAST 1291     10,2235  54 062 1           TS       TEMPP

 0272    REF   5  LAST 1292     10,2236  3 0065 1           CA       TEMPSW
 0273    REF   1                10,2237  7 4101 1           MASK     OCT60000
 0274    REF   6  LAST 1292     10,2240  56 065 1           XCH      TEMPSW
 0275    REF   2  LAST 1291     10,2241  7 5024 0           MASK     OCT14000
 0276    REF 391  LAST 1291     10,2242  10 000 0           CCS      A
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L         PHASE TABLE MAINTENANCE                                                       USER'S PAGE NO.   8      E3 S4

 0277   REF   1              10,2243  1 5370 1             TCF     ONECRTWO

 0278   REF   4  LAST 1292   10,2244  3 0062 0             CA      TEMPP           START STORING THE PHASE INFORMATION
 0279   REF   3  LAST 1292   10,2245  50 061 0             NDX     TEMPG
 0280   REF   2  LAST  219   10,2246  54 750 1             TS      PHASE1 -2

 0281   REF   3  LAST 1291   10,2247  10 066 0  BELOW1     CCS     TEMPSW2         IS IT A PHASCHNG OR A 2PHSCHNG
 0282   REF   1              10,2250  1 2264 1             TCF     BELOW2          IT:S A PHASCHNG

 0283                        10,2251  1 2252 1             TCF     +1              IT:S A 2PHSCHNG
 0284   REF   4  LAST 1290   10,2252  4 0072 0             CS      TEMPP2
 0285   REF   5  LAST 1293   10,2253  22 072 1             LXCH    TEMPP2
 0286   REF   2  LAST 1290   10,2254  50 071 1             NDX     TEMPG2
 0287   REF   5  LAST  860   10,2255  52 750 1             DXCH    -PHASE1 -2

 0288   REF   4  LAST 1293   10,2256  10 066 0             CCS     TEMPSW2
 0289                        10,2257  12 260 0             NOOP                    CAN:T GET HERE
 0290   REF   2  LAST 1293   10,2260  1 2264 1             TCF     BELOW2

 0291   REF  17  LAST  991   10,2261  4 0025 1             CS      TIME1
 0292   REF   3  LAST 1293   10,2262  50 071 1             NDX     TEMPG2
 0293   REF   2  LAST  730   10,2263  55'050 1             TS      TBASE1 -2

 0294   REF   7  LAST 1292   10,2264  10 065 0  BELOW2     CCS     TEMPSW          SEE IF WE SHOULD SET TBASE OR LONGBASE
 0295   REF   1              10,2265  1 2300 1             TCF     BELOW3          SET LONGBASE ONLY
 0296   REF   1              10,2266  1 2303 1             TCF     BELOW4          SET NEITHER

 0297   REF  18  LAST 1293   10,2267  4 0025 1             CS      TIME1           SET TBASE TO BEGIN WITH
 0298   REF   4  LAST 1293   10,2270  50 061 0             NDX     TEMPG
 0299   REF   3  LAST 1293   10,2271  55'050 1             TS      TBASE1 -2

 0300   REF   8  LAST 1293   10,2272  3 0065 1             CA      TEMPSW           SHALL WE NOW SET LONGBASE
 0301   REF   1              10,2273  6 2276 0             AD      BIT14COM
 0302   REF 392  LAST 1292   10,2274  10 000 0             CCS     A
 0303                        10,2275  12 276 1             NOOP                    ***** CANT GET HERE *****
 0304                        10,2276   17777 0  BIT14COM   OCT     17777           ***** CANT GET HERE *****
 0305   REF   2  LAST 1293   10,2277  1 2303 1             TCF     BELOW4          NO WE NEED ONLY SET TBASE

 0306                        10,2300  0 0006 1  BELOW3     EXTEND                  SET LONGBASE
 0307   REF  31  LAST 1217   10,2301  3 0025 0             DCA     TIME2
 0308   REF   1              10,2302  53'051 1             DXCH    LONGBASE

 0309   REF   5  LAST 1293   10,2303  4 0062 1  BELOW4     CS      TEMPP           AND STORE THE FINAL PART OF THE PHASE
 0310   REF   5  LAST 1293   10,2304  50 061 0             NDX     TEMPG
 0311   REF   6  LAST 1293   10,2305  54 747 1             TS      -PHASE1 -2

 0312   REF 346  LAST 1292   10,2306  3 0002 0             CA      Q
 0313   REF   5  LAST 1292   10,2307  22 073 0             LXCH    TEMPBBCN
 0314                        10,2310  0 0003 1             RELINT
 0315                        10,2311  52 006 0             DTCB
 0316    REF    6  LAST 1293   10,2312  22 073 0  CON2     LXCH    TEMPBBCN

 0317    REF    6  LAST 1293   10,2313   3 0062 0          CA      TEMPP
 0318    REF    6  LAST 1293   10,2314  50 061 0           NDX     TEMPG
 0319    REF    3  LAST 1293   10,2315  54 750 1           TS      PHASE1 -2

 0320    REF    2  LAST 1291   10,2316   3 0070 0          CA      TEMPPR
 0321    REF    7  LAST 1294   10,2317  50 061 0           NDX     TEMPG
 0322    REF    2  LAST 1291   10,2320  55'051 0           TS      PHSPRIO1 -2

 0323                          10,2321   0 0006 1          EXTEND
 0324    REF    3  LAST 1292   10,2322   3 0064 0          DCA     TEMPNM
 0325    REF    8  LAST 1294   10,2323  50 061 0           NDX     TEMPG
 0326    REF    2  LAST 1292   10,2324  53'435 0           DXCH    PHSNAME1 -2

 0327    REF    1              10,2325   1 2247 0          TCF     BELOW1

 0328                             7753                     BLOCK   03
 0329    REF    4  LAST  745      6000                     SETLOC  FFTAG6
 0330                             7753                     BANK

 0331    REF    1                                          COUNT*  $$/PHASE
 0332    REF   34  LAST 1292      7753   7 4740 1 CHECKB   MASK    BIT12            SINCE THIS IS OF TYPE B, THIS BIT SHOULD
 0333    REF  393  LAST 1293      7754  10 000 0           CCS     A                 BE HERE IF WE ARE TO GET A NEW PRIORITY
 0334    REF    2  LAST 1291      7755   1 5423 0          TCF     GETPRIO          IT IS, SO GET NEW PRIORITY

 0335    REF    1                 7756   1 5402 0          TCF     OLDPRIO          IT ISN:T, USE THE OLD PRIORITY
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L         RESTARTS ROUTINE                                                                    USER'S PAGE NO.   1      EQ S4

0001                          01,3527.                               BANK    01
0002   REF    2  LAST  240    01,2000                                SETLOC  RESTART
0003                          01,3527                                BANK

0004   REF    3  LAST 1294    E3,1436                                EBANK=  PHSNAME1         GOPROG MUST SWITCH TO THIS EBANK

0005   REF    1                                                      COUNT*  $$/RSROU
0006   REF 778   LAST 1259    01,3527   3 0161 1   RESTARTS CA       MPAC +5          GET GROUP NUMBER -1
0007                          01,3530   6 0000 1            DOUBLE                    SAVE FOR INDEXING
0008   REF    1               01,3531  54 155 1             TS      TEMP2G

0009   REF    1               01,3532   3 3771 0            CA      PHS2CADR         SET UP EXIT IN CASE IT IS AN EVEN
0010   REF    1               01,3533  54 157 0             TS      TEMPSWCH         TABLE PHASE

0011   REF    1               01,3534   3 3566 1            CA      RTRNCADR         TO SAVE TIME ASSUME IT WILL GET NEXT
0012   REF    1               01,3535  54 707 0             TS      GOLOC +2         GROUP AFTER THIS

0013   REF    1               01,3536   3 0154 1            CA      TEMPPHS
0014   REF   10  LAST 1278    01,3537   7 5007 1            MASK    OCT1400
0015   REF  394  LAST 1294    01,3540  10 000 0             CCS     A                IS IT A VARIABLE OR TABLE RESTART
0016   REF    1               01,3541   1 3552 1            TCF     ITSAVAR          IT:S A VARIABLE RESTART

0017   REF    2  LAST 1295    01,3542  10 154 0    GETPART2 CCS     TEMPPHS          IS IT AN X.1 RESTART
0018   REF  395  LAST 1295    01,3543  10 000 0             CCS     A
0019   REF    1               01,3544   1 3652 1            TCF     ITSATBL          NO, ITS A TABLE RESTART

0020   REF    3  LAST 1292    01,3545   3 5024 1            CA      PRIO14           IT IS AN X.1 RESTART, THEREFORE START
0021   REF   42  LAST 1202    01,3546   0 5105 0            TC      FINDVAC          THE DISPLAY RESTART JOB
0022   REF   48  LAST 1291    E3,1400                       EBANK=  LST1
0023   REF    1               01,3547    03040 0            2CADR   INITDSP
0023   REF    1               01,3550    20103 1

0024   REF    2  LAST 1295    01,3551   0 3566 1            TC      RTRNCADR         FINISHED WITH THIS GROUP, GET NEXT ONE

0025   REF   11  LAST 1295    01,3552   7 5007 1   ITSAVAR  MASK    OCT1400          IS IT TYPE B ?
0026   REF  396  LAST 1295    01,3553  10 000 0             CCS     A
0027   REF    1               01,3554   1 3623 1            TCF     ITSLIKEB         YES,IT IS TYPE B

0028                          01,3555   0 0006 1            EXTEND                   STORE THE JOB (OR TASK) 2CADR FOR EXIT
0029   REF    2  LAST 1295    01,3556   5 0155 0            NDX     TEMP2G
0030   REF    4  LAST 1295    01,3557   3 1437 0            DCA     PHSNAME1
0031   REF    2  LAST 1295    01,3560  52 706 1             DXCH    GOLOC

0032   REF    3  LAST 1295    01,3561   3 0154 1            CA      TEMPPHS          SEE IF THIS IS A JOB, TASK, OR A LONGCAL
0033   REF    3  LAST 1292    01,3562   7 4757 1            MASK    OCT7
0034   REF    3  LAST 1149    01,3563   6 7751 0            AD      MINUS2
0035   REF  397  LAST 1295    01,3564  10 000 0             CCS     A
0036   REF    1               01,3565   1 3735 1            TCF     ITSLNGCL         ITS A LONGCALL

0037   REF    6  LAST 1259    01,3566   0 4631 1   RTRNCADR TC      SWRETURN         CANT GET HERE
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L       RESTARTS ROUTINE                                                                   USER'S PAGE NO.   2       E3 S4

 0038   REF   1                    01,3567  1 3571 0            TCF     ITSAWAIT

 0039   REF   1                    01,3570  1 3636 0            TCF     ITSAJOB           ITS A JOB

 0040   REF   1                    01,3571  3 3775 1  ITSAWAIT CA      WTLTCADR          SET UP WAITLIST CALL
 0041   REF   3  LAST 1295         01,3572  54 704 0            TS      GOLOC -1

 0042   REF   3  LAST 1295         01,3573  50 155 0            NDX     TEMP2G            DIRECTLY STORED
 0043   REF   3  LAST 1294         01,3574  3 1053 0            CA      PHSPRDT1
 0044   REF 398  LAST 1295         01,3575  10 000 0  TIMETEST CCS     A                 IS IT AN IMMEDIATE RESTART
 0045   REF 399  LAST 1296         01,3576  24 000 1            INCR    A                 NO,
 0046   REF   1                    01,3577  1 3602 1            TCF     FINDTIME          FIND OUT WHEN IT SHOULD BEGIN

 0047   REF   1                    01,3600  1 5436 1            TCF     ITSINDIR          STORED INDIRECTLY

 0048   REF   1                    01,3601  1 3621 0            TCF     IMEDIATE          IT WANTS AN IMMEDIATE RESTART

R0049   ***** THIS MUST BE IN FIXED FIXED *****

 0050                                 5436                      BLOCK   02
 0051   REF   1                       4000                      SETLOC  FFTAG2
 0052                                 5436                      BANK

 0053   REF   1                                                 COUNT*  $$/RSROU
 0054   REF   4  LAST 1296            5436  22 706 0  ITSINDIR LXCH    GOLOC +1          GET THE CORRECT E BANK IN CASE THIS IS
 0055   REF   2  LAST 1291            5437  22 006 1            LXCH    BB                SWITCHED ERRASIBLE

 0056   REF 400  LAST 1296            5440  50 000 1            NDX     A                 GET THE TIME INDIRECTLY
 0057                                 5441  3 0001 0            CA      1

 0058   REF   3  LAST 1296            5442  22 006 1            LXCH    BB                RESTORE THE BB AND GOLOC
 0059   REF   5  LAST 1296            5443  22 706 0            LXCH    GOLOC +1

 0060   REF   2  LAST 1296            5444  1 3602 1            TCF     FINDTIME          FIND OUT WHEN IT SHOULD BEGIN

R0061   ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

 0062                              01,3602                      BANK    01
 0063   REF   3  LAST 1295         01,2000                      SETLOC  RESTART
 0064                              01,3602                      BANK

 0065   REF   2 LAST 1295 TO 1296:      43     43*              COUNT*  $$/RSROU
 0066                              01,3602  4 0000 0  FINDTIME COM                       MAKE NEGITIVE SINCE IT WILL BE SUBTRACTD
 0067   REF 231  LAST 1285         01,3603  54 001 1            TS      L                 AND SAVE
 0068   REF   4  LAST 1296         01,3604  50 155 0            NDX     TEMP2G
 0069   REF   4  LAST 1293         01,3605  4 1052 0            CS      TBASE1
 0070                              01,3606  0 0006 1            EXTEND
 0071   REF  19  LAST 1293         01,3607  60 025 0            SU      TIME1
 0072   REF 401  LAST 1296         01,3610  10 000 0            CCS     A
 0073                              01,3611  4 0000 0            COM
 0074    REF   2  LAST  161   01,3612  6 7734 0           AD      OCT37776
 0075    REF 128  LAST 1291   01,3613  6 4753 1           AD      ONE
 0076    REF 232  LAST 1296   01,3614  6 0001 0           AD      L
 0077    REF 402  LAST 1296   01,3615 10 000 0            CCS     A
 0078    REF 227  LAST 1277   01,3616  3 4755 1           CA      ZERO
 0079                         01,3617  1 3621 0           TCF     +2
 0080                         01,3620  1 3621 0           TCF     +1
 0081    REF 129  LAST 1297   01,3621  6 4753 1  IMEDIATE AD      ONE
 0082    REF   6  LAST 1296   01,3622  0 0704 1           TC      GOLOC -1
 0083    REF   3  LAST 1295   01,3623  3 3566 1  ITSLIKEB CA      RTRNCADR          TYPE B,           SO STORE RETURN IN
 0084    REF   2  LAST 1295   01,3624 54 157 0            TS      TEMPSWCH          TEMPSWCH IN CASE OF AN EVEN PHASE

 0085    REF   1              01,3625  3 3772 0           CA      PRT2CADR          SET UP EXIT TO GET TABLE PART OF THIS
 0086    REF   7  LAST 1297   01,3626 54 707 0            TS      GOLOC +2          VARIABLE TYPE OF PHASE

 0087    REF   4  LAST 1295   01,3627  3 0154 1           CA      TEMPPHS           MAKE THE PHASE LOOK RIGHT FOR THE TABLE
 0088    REF   1              01,3630  7 6077 0           MASK    OCT177            PART OF THIS VARIABLE PHASE
 0089    REF   5  LAST 1297   01,3631 54 154 0            TS      TEMPPHS

 0090                         01,3632  0 0006 1           EXTEND
 0091    REF   5  LAST 1296   01,3633  5 0155 0           NDX     TEMP2G            OBTAIN THE JOB:S 2CADR
 0092    REF   5  LAST 1295   01,3634  3 1437 0           DCA     PHSNAME1
 0093    REF   8  LAST 1297   01,3635 52 706 1            DXCH    GOLOC

 0094    REF   6  LAST 1297   01,3636 50 155 0   ITSAJOB  NDX     TEMP2G            NOW ADD THE PRIORITY AND LET:S GO
 0095    REF   4  LAST 1296   01,3637  3 1053 0           CA      PHSPRDT1
 0096    REF   9  LAST 1297   01,3640 54 704 0   CHKNOVAC TS      GOLOC -1          SAVE PRIO UNTIL WE SEE IF ITS
 0097                         01,3641  0 0006 1           EXTEND                    A FINDVAC OR A NOVAC
 0098    REF   1              01,3642  6 3646 0           BZMF    ITSNOVAC

 0099    REF   1              01,3643  3 3774 0           CAF     FVACCADR          POSITIVE, SET UP FINDVAC CALL.
 0100    REF  10  LAST 1297   01,3644 56 704 1            XCH     GOLOC -1          PICK UP PRIO,
 0101    REF  11  LAST 1297   01,3645  0 0704 1           TC      GOLOC -1          AND GO

 0102    REF   1              01,3646  3 3776 1  ITSNOVAC CAF     NOVACADR          NEGATIVE,
 0103    REF  12  LAST 1297   01,3647 56 704 1            XCH     GOLOC -1          SET UP NOVAC CALL,
 0104                         01,3650  4 0000 0           COM                       CORRECT PRIO,
 0105    REF  13  LAST 1297   01,3651  0 0704 1           TC      GOLOC -1          AND GO

 0106    REF  41  LAST 1282   01,3652 54 020 1   ITSATBL  TS      CYR               FIND OUT IF THE PHASE IS ODD OR EVEN
 0107    REF  42  LAST 1297   01,3653 10 020 1            CCS     CYR
 0108                         01,3654  1 3655 0           TCF     +1                IT:S EVEN
 0109    REF   1              01,3655  1 3753 1           TCF     ITSEVEN

 0110    REF   4  LAST 1297   01,3656  3 3566 1           CA      RTRNCADR          IN CASE THIS IS THE SECOND PART OF A
 0111    REF  14  LAST 1297   01,3657 54 707 0            TS      GOLOC +2          TYPE B RESTART, WE NEED PROPER EXIT

 0112    REF   6  LAST 1297   01,3660  3 0154 1           CA      TEMPPHS           SET UP POINTER FOR FINDING OUR PLACE IN
 0113    REF  25  LAST 1285   01,3661 54 021 0            TS      SR                THE RESTART TABLES
 0114    REF  26  LAST 1297   01,3662  6 0021 1           AD      SR
 0115   REF   7  LAST 1297   01,3663  50 155 0              NDX     TEMP2G
 0116   REF   1              01,3664  6 2003 0              AD      SIZETAB +1
 0117   REF   1              01,3665  54 156 1              TS      POINTER

 0118                        01,3666  0 0006 1   CONTBL2    EXTEND                    FIND OUT WHAT:S IN THE TABLE
 0119   REF   2  LAST 1298   01,3667  5 0156 0              NDX     POINTER
 0120   REF   1              01,3670  3 2002 1              DCA     CADRTAB           GET THE 2CADR

 0121   REF  15  LAST 1297   01,3671  22 706 0              LXCH    GOLOC +1          STORE THE BB INFORMATION

 0122   REF 403  LAST 1297   01,3672  10 000 0              CCS     A                 IS IT A JOB OR IS IT  TIMED
 0123   REF 404  LAST 1298   01,3673  24 000 1              INCR    A                 POSITIVE, MUST BE A JOB
 0124   REF   1              01,3674  1 3747 1              TCF     ITSAJOB2

 0125   REF 405  LAST 1298   01,3675  24 000 1              INCR    A                 MUST BE EITHER A WAITLIST OR LONGCALL
 0126   REF  16  LAST 1298   01,3676  54 705 1              TS      GOLOC             LET-S STORE THE CORRECT CADR

 0127   REF   2  LAST 1296   01,3677  3 3775 1              CA      WTLTCADR          SET UP OUR EXIT TO WAITLIST
 0128   REF  17  LAST 1298   01,3700  54 704 0              TS      GOLOC -1

 0129   REF  18  LAST 1298   01,3701  3 0706 0              CA      GOLOC +1          NOW FIND OUT IF IT IS A WAITLIST CALL
 0130   REF  38  LAST 1277   01,3702  7 4742 0              MASK    BIT10             THIS SHOULD BE ONE IF WE HAVE -BB
 0131   REF 406  LAST 1298   01,3703  10 000 0              CCS     A                 FOR THAT MATTER SO SHOULD BE BITS 9,8,7,
A0132                                                                                 6,5, AND LAST BUT NOT LEAST (PERHAPS NOT
A0133                                                                                 IN IMPORTANCE ANYWAY. BIT 4
 0134   REF   1              01,3704  1 3742 1              TCF     ITSWTLST          IT IS A WAITLIST CALL

 0135   REF   3  LAST 1298   01,3705  50 156 0              NDX     POINTER           OBTAIN THE ORIGINAL DELTA T
 0136   REF   1              01,3706  3 2000 0              CA      PRDTTAB           ADDRESS FOR THIS LONGCALL

 0137   REF   1              01,3707  1 5445 0              TCF     ITSLGCL1          NOW GO GET THE DELTA TIME

R0138   ***** THIS MUST BE IN FIXED FIXED *****

 0139                            5445                       BLOCK   02
 0140   REF   2  LAST 1296       4000                       SETLOC  FFTAG2
 0141                            5445                       BANK

 0142   REF   2 LAST 1296 TO 1296:   7       7*             COUNT*  $$/RSROU
 0143   REF  19  LAST 1298       5445 22 706 0   ITSLGCL1   LXCH    GOLOC +1          OBTAIN THE CORRECT E BANK
 0144   REF   4  LAST 1296       5446 22 006 1              LXCH    BB
 0145   REF  20  LAST 1298       5447 22 706 0              LXCH    GOLOC +1          AND PRESERVE OUR E AND F BANKS

 0146                            5450 0 0006 1              EXTEND                    GET THE DELTA TIME
 0147   REF 407  LAST 1298       5451 5 0000 1              NDX     A
 0148                            5452 3 0001 0              DCA     0

 0149   REF  21  LAST 1298       5453 22 706 0              LXCH    GOLOC +1          RESTORE OUR E AND F BANK
 0150   REF   5  LAST 1298       5454 22 006 1              LXCH    BB                RESTORE THE TASKS E AND F BANKS
 0151   REF  22  LAST 1298       5455 22 706 0              LXCH    GOLOC +1          AND PRESERVE OUR L
 0152   REF   1                  5456  1 3710 0             TCF     ITSLGCL2          NOW LET:S PROCESS THIS LONGCALL

R0153   ***** YOU  MAY RETURN TO  SWITCHED FIXED *****

 0154                           01,3710                     BANK    01
 0155   REF   4  LAST 1296      01,2000                     SETLOC  RESTART
 0156                           01,3710                     BANK

 0157   REF   3 LAST 1296 TO 1298:       70    113*         COUNT*  $$/RSROU
 0158   REF   8  LAST 1126      01,3710  52'153 0  ITSLGCL2 DXCH    LONGTIME

 0159                           01,3711  0 0006 1           EXTEND                    CALCULATE TIME LEFT
 0160   REF  32  LAST 1293      01,3712  4 0025 1           DCS     TIME2
 0161   REF   9  LAST 1299      01,3713  21'153 0           DAS     LONGTIME
 0162                           01,3714  0 0006 1           EXTEND
 0163   REF   2  LAST 1293      01,3715  3 1151 0           DCA     LONGBASE
 0164   REF  10  LAST 1299      01,3716  21'153 0           DAS     LONGTIME

 0165   REF  11  LAST 1299      01,3717  11'152 1           CCS     LONGTIME          FIND OUT HOW THIS SHOULD BE RESTARTED
 0166   REF   1                 01,3720  1 3730 1           TCF     LONGCLCL
 0167                           01,3721  1 3723 0           TCF     +2
 0168   REF   2  LAST 1296      01,3722  1 3616 1           TCF     IMEDIATE -3
 0169   REF  12  LAST 1299      01,3723  11'153 0           CCS     LONGTIME +1
 0170   REF   2  LAST 1299      01,3724  1 3730 1           TCF     LONGCLCL
 0171                           01,3725  13 726 0           NOOP                      CAN:T GET HERE     *********
 0172   REF   3  LAST 1299      01,3726  1 3616 1           TCF     IMEDIATE -3
 0173   REF   4  LAST 1299      01,3727  1 3621 0           TCF     IMEDIATE

 0174   REF   1                 01,3730  3 3773 1  LONGCLCL CA      LGCLCADR          WE WILL GO TO LONGCALL
 0175   REF  23  LAST 1298      01,3731  54 704 0           TS      GOLOC -1

 0176                           01,3732  0 0006 1           EXTEND                    PREPARE OUR ENTRY TO LONGCALL
 0177   REF  13  LAST 1299      01,3733  3 1153 1           DCA     LONGTIME
 0178   REF  24  LAST 1299      01,3734  0 0704 1           TC      GOLOC -1

 0179   REF   3  LAST 1298      01,3735  3 3775 1  ITSLNGCL CA      WTLTCADR          ASSUME IT WILL GO TO WAITLIST
 0180   REF  25  LAST 1299      01,3736  54 704 0           TS      GOLOC -1

 0181   REF   8  LAST 1298      01,3737  50 155 0           NDX     TEMP2G
 0182   REF   5  LAST 1297      01,3740  4 1053 1           CS      PHSPRDT1          GET THE DELTA T ADDRESS

 0183   REF   2  LAST 1298      01,3741  1 5445 0           TCF     ITSLGCL1          NOW GET THE DELTA TIME

 0184   REF  26  LAST 1299      01,3742  4 0706 1  ITSWTLST CS      GOLOC +1          CORRECT THE BBCON INFORMATION
 0185   REF  27  LAST 1299      01,3743  54 706 1           TS      GOLOC +1

 0186   REF   4  LAST 1298      01,3744  50 156 0           NDX     POINTER           GET THE DT AND FIND OUT IF IT WAS STORED
 0187   REF   2  LAST 1298      01,3745  3 2000 0           CA      PRDTTAB           DIRECTLY OR INDIRECTLY

 0188   REF   1                 01,3746  1 3575 1           TCF     TIMETEST          FIND OUT HOW THE TIME IS STORED
 0189    REF  28  LAST 1299   01,3747  56 705 0  ITSAJOB2 XCH    GOLOC           STORE THE CADR

 0190    REF   5  LAST 1299   01,3750  50 156 0           NDX    POINTER         ADD THE PRIORITY AND LET:S GO
 0191    REF   3  LAST 1299   01,3751   3 2000 0          CA     PRIOTAB

 0192    REF   1              01,3752   1 3640 1          TCF    CHKNOVAC

 0193    REF   3  LAST 1297   01,3753   3 0157 1 ITSEVEN  CA     TEMPSWCH        SET UP FOR EITHER THE SECOND PART OF THE
 0194    REF  29  LAST 1300   01,3754  54 707 0           TS     GOLOC +2        TABLE, OR A RETURN FOR THE NEXT GROUP

 0195    REF   9  LAST 1299   01,3755  50 155 0           NDX    TEMP2G          SET UP POINTER FOR OUR LOCATION WITHIN
 0196    REF   2  LAST 1298   01,3756   3 2002 1          CA     SIZETAB         THE TABLE
 0197    REF   7  LAST 1297   01,3757   6 0154 1          AD     TEMPPHS         THIS MAY LOOK BAD BUT LET:S SEE YOU DO
 0198    REF   8  LAST 1300   01,3760   6 0154 1          AD     TEMPPHS         BETTER IN TIME OR NUMBER OF LOCATIONS
 0199    REF   9  LAST 1300   01,3761   6 0154 1          AD     TEMPPHS
 0200    REF   6  LAST 1300   01,3762  54 156 1           TS     POINTER

 0201    REF   1              01,3763   1 3666 0          TCF    CONTBL2         NOW PROCESS WHAT IS IN THE TABLE

 0202    REF  36  LAST 1277   01,3764   3 6250 0 PHSPART2 CA     THREE           SET THE POINTER FOR THE SECOND HALF OF
 0203    REF   7  LAST 1300   01,3765  26 156 1           ADS    POINTER         THE TABLE

 0204    REF   5  LAST 1297   01,3766   3 3566 1          CA     RTRNCADR        THIS WILL BE OUR LAST TIME THROUGH THE
 0205    REF  30  LAST 1300   01,3767  54 707 0           TS     GOLOC +2        EVEN TABLE , SO AFTER IT  GET THE NEXT
A0206                                                                            GROUP
 0207    REF   2  LAST 1300   01,3770   1 3666 0          TCF    CONTBL2         SO LET:S GET THE SECOND ENTRY IN THE TBL

 0208    REF 779  LAST 1295      0154           TEMPPHS  EQUALS MPAC
 0209    REF 780  LAST 1300      0155           TEMP2G   EQUALS MPAC +1
 0210    REF 781  LAST 1300      0156           POINTER  EQUALS MPAC +2
 0211    REF 782  LAST 1300      0157           TEMPSWCH EQUALS MPAC +3
 0212    REF   1                 0705           GOLOC    EQUALS VAC5 +20D
 0213    REF   8  LAST 1278      7751           MINUS2   EQUALS NEG2
 0214    REF   9  LAST 1104      6077           OCT177   EQUALS LOW7


 0215    REF   1              01,3771   03764 1  PHS2CADR GENADR PHSPART2
 0216    REF   1              01,3772   03542 1  PRT2CADR GENADR GETPART2
 0217    REF   5  LAST 1203   01,3773   05277 0  LGCLCADR GENADR LONGCALL
 0218    REF  43  LAST 1295   01,3774   05105 0  FVACCADR GENADR FINDVAC
 0219    REF  39  LAST 1126   01,3775   05203 0  WTLTCADR GENADR WAITLIST
 0220    REF  27  LAST 1286   01,3776   05072 1  NOVACADR GENADR NOVAC
 0001                          5457                BLOCK   02
 0002    REF    1              4000                SETLOC  FFTAG3
 0003                          5457                BANK

 0004    REF    1           E3,1471                EBANK=  COMMAND

R0005              FIXED-FIXED ROUTINES.

 0006    REF    1                                  COUNT*  $$/IMODE
 0007    REF  228  LAST 1297   5457  3 4755 1  ZEROICDU CAF    ZERO              ZERO ICDU COUNTERS.
 0008    REF   18  LAST 1251   5460 54 032 1           TS      CDUX
 0009    REF    9  LAST 1251   5461 54 033 0           TS      CDUY
 0010    REF   12  LAST 1252   5462 54 034 1           TS      CDUZ
 0011    REF  347  LAST 1293   5463  0 0002 0          TC      Q

 0012    REF   26  LAST 1277   4743            SPSCODE  =      BIT9
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R0013            IMU ZEROING ROUTINE.

 0014                           11,3774                          BANK    11
 0015   REF   1                 07,2000                          SETLOC  MODESW
 0016                           07,2705                          BANK

 0017   REF   1                                                  COUNT*  $$/IMODE
 0018                           07,2705  0 0004 0  IMUZERO    INHINT                     ROUTINE TO ZERO ICDUS.
 0019   REF  42  LAST  529      07,2706  4 1035 1             CS      DSPTAB +11D        DONT ZERO CDUS IF IMU IN GIMBAL LOCK AND
 0020   REF   4  LAST  214      07,2707  7 4771 0             MASK    BITS4&6            COARSE ALIGN (GIMBAL RUNAWAY PROTECTION)
 0021   REF 408  LAST 1298      07,2710  10 000 0             CCS     A
 0022   REF   1                 07,2711  1 2715 1             TCF     IMUZEROA

 0023   REF  44  LAST 1246      07,2712  0 5567 0             TC      ALARM              IF SO.
 0024                           07,2713   00206 0             OCT     00206

 0025   REF   1                 07,2714  1 3650 0             TCF     CAGETSTJ +4        IMMEDIATE FAILURE.

 0032   REF   2  LAST 1302      07,2715  0 3644 1  IMUZEROA TC      CAGETSTJ
R0033            DELETE
 0034   REF  38  LAST  900      07,2716  4 1300 1             CS      IMODES33           DISABLE DAP AUTO AND HOLD MODES
 0035   REF   2  LAST  852      07,2717  7 4773 1             MASK    SUPER011               BIT5 FOR GROUND
 0036   REF  39  LAST 1302      07,2720  27'300 1             ADS     IMODES33

 0037   REF  47  LAST  977      07,2721  4 1277 0             CS      IMODES30           INHIBIT ICDUFAIL AND IMUFAIL (IN CASE WE
 0038   REF   1                 07,2722  7 5741 1             MASK    BITS3&4            JUST CAME OUT OF COARSE ALIGN).
 0039   REF  48  LAST 1302      07,2723  27'277 0             ADS     IMODES30

 0040   REF   5  LAST 1302      07,2724  4 4771 0             CS      BITS4&6            SEND ZERO ENCODE WITH COARSE AND ERROR
 0041                           07,2725  0 0006 1             EXTEND                     COUNTER DISABLED.
 0042   REF  55  LAST  900      07,2726  03 012 1             WAND    CHAN12

 0043   REF   3  LAST  168      07,2727  0 3257 1             TC      NOATTOFF           TURN OFF NO ATT LAMP.

 0044   REF  39  LAST 1277      07,2730  3 4747 1             CAF     BIT5
 0045                           07,2731  0 0006 1             EXTEND
 0046   REF  56  LAST 1302      07,2732  05 012 1             WOR     CHAN12

 00461  REF   3  LAST  168      07,2733  0 5457 1             TC      ZEROICDU
 0047   REF  49  LAST 1277      07,2734  3 4746 0             CAF     BIT6               WAIT 320 MS TO GIVE AGS ADEQUATE TIME TO
 0048   REF  40  LAST 1300      07,2735  0 5203 0             TC      WAITLIST           RECEIVE ITS PULSE TRAIN.
 0049   REF   3  LAST  172      E3,1474                       EBANK=  CDUIND
 0050   REF   1                 07,2736   02750 1             2CADR   IMUZER02
 0050   REF   1                 07,2737   16103 1

 0051   REF  49  LAST 1302      07,2740  4 1277 0             CS      IMODES30           SEE IF IMU OPERATING AND ALARM IF NOT-
 0052   REF  27  LAST 1301      07,2741  7 4743 1             MASK    BIT9
 0053   REF 409  LAST 1302      07,2742  10 000 0             CCS     A
 0054   REF   1                 07,2743  1 2746 1             TCF     MODEEXIT
 0055  REF  45  LAST 1302   07,2744  0 5567 0           TC     ALARM
 0056                       07,2745   00210 1           OCT    210

 0057                       07,2746  0 0003 1  MODEEXIT RELINT                  GENERAL MODE-SWITCHING EXIT.
 0058  REF   7  LAST 1295   07,2747  1 4631 0           TCF    SWRETURN


 0059  REF   1              07,2750  0 3632 0  IMUZERO2 TC     CAGETEST
 0061  REF   4  LAST 1302   07,2751  0 5457 1           TC     ZEROICDU         ZERO CDUX, CDUY, CDUZ

 0062  REF  40  LAST 1302   07,2752  4 4747 0           CS     BIT5             REMOVE ZERO DISCRETE.
 0063                       07,2753  0 0006 1           EXTEND
 0064  REF  57  LAST 1302   07,2754  03 012 1           WAND   CHAN12

 0065  REF  28  LAST 1277   07,2755  3 4741 1           CAF    BIT11            WAIT 10 SECS FOR CTRS TO FIND GIMBALS
 0066  REF  10  LAST  895   07,2756  0 5224 0           TC     VARDELAY

 0067  REF   2  LAST 1303   07,2757  0 3632 0  IMUZERO3 TC     CAGETEST
 0069  REF   2  LAST 1302   07,2760  4 5741 1           CS     BITS3&4          REMOVE IMUFAIL AND ICDUFAIL INHIBIT.
 0070  REF  50  LAST 1302   07,2761  7 1277 0           MASK   IMODES30
 0071  REF  51  LAST 1303   07,2762  55'277 0           TS     IMODES30

 0072  REF   3  LAST 1302   07,2763  4 4773 1           CS     SUPER011         ENABLE DAP AUTO AND HOLD MODES
 0073  REF  40  LAST 1302   07,2764  7 1300 1           MASK   IMODES33             BITS FOR GROUND
 0074  REF  41  LAST 1303   07,2765  55'300 1           TS     IMODES33

 0075  REF  48  LAST  961   07,2766  0 4674 0           TC     IBNKCALL         SET ISS WARNING IF EITHER OF ABOVE ARE
 0076  REF   5  LAST  182   07,2767   14703 0           CADR   SETISSW          PRESENT.

 0077  REF   1              07,2770  1 3622 0           TCF    ENDIMU
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P0078                IMU COARSE ALIGN MODE.

 0079                               07,2771  0 0004 0  IMUCOARS INHINT
 0080   REF   3  LAST 1302          07,2772  0 3644 1           TC       CAGETSTJ
 0081   REF   2  LAST  171          07,2773  0 3135 0           TC       SETCOARS

 0082   REF  22  LAST 1277          07,2774  3 6245 1           CAF      SIX
 0083   REF  41  LAST 1302          07,2775  0 5203 0           TC       WAITLIST
 0084   REF   4  LAST 1302          E3,1474                     EBANK=   CDUIND
 0085   REF   1                     07,2776   03001 0           2CADR    COARS
 0085   REF   1                     07,2777   16103 1

 0086   REF   2  LAST 1302          07,3000  1 2746 1           TCF      MODEEXIT

 0087   REF   3  LAST 1303          07,3001  0 3632 0  COARS    TC       CAGETEST
 0088   REF  50  LAST 1302          07,3002  3 4746 0           CAF      BIT6           ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0089                               07,3003  0 0006 1           EXTEND
 0090   REF  58  LAST 1303          07,3004  05 012 1           WOR      CHAN12-

 0091   REF  79  LAST 1292          07,3005  3 4752 0           CAF      TWO            SET CDU INDICATOR
 0092   REF   5  LAST 1304          07,3006  55'474 0  COARS1   TS       CDUIND

 0093   REF   6  LAST 1304          07,3007  51'474 1           INDEX    CDUIND         COMPUTE THETAD - THETAA IN 1:S
 0094   REF  21  LAST 1246          07,3010  3 0321 1           CA       THETAD           COMPLEMENT FORM
 0095                               07,3011  0 0006 1           EXTEND
 0096   REF   7  LAST 1304          07,3012  5 1474 1           INDEX    CDUIND
 0097   REF  19  LAST 1301          07,3013  20 032 1           MSU      CDUX
 0098                               07,3014  0 0006 1           EXTEND
 0099   REF  43  LAST 1277          07,3015  7 4737 1           MP       BIT13          SHIFT RIGHT 2
 0100   REF 233  LAST 1297          07,3016  56 001 0           XCH      L              ROUND
 0101                               07,3017  6 0000 1           DOUBLE
 0102   REF  41  LAST 1292          07,3020  54 061 1           TS       ITEMP1
 0103                               07,3021  1 3023 1           TCF      +2
 0104   REF 234  LAST 1304          07,3022  26 001 1           ADS      L

 0105   REF   8  LAST 1304          07,3023  51'474 1           INDEX    CDUIND         DIFFERENCE TO BE COMPUTED
 0106   REF   2  LAST 1301          07,3024  23'471 1           LXCH     COMMAND
 0107   REF   9  LAST 1304          07,3025  11'474 0           CCS      CDUIND
 0108   REF   1                     07,3026  0 3006 1           TC       COARS1

 0109   REF  80  LAST 1304          07,3027  3 4752 0           CAF      TWO            MINIMUM OF 4 MS WAIT
 0110   REF  11  LAST 1303          07,3030  0 5224 0           TC       VARDELAY
 0111  REF   4  LAST 1304   07,3031   0 3632 0  COARS2   TC      CAGETEST          DONT CONTINUE IF CAGED.
 0112  REF  42  LAST 1304   07,3032  54 061 1            TS      ITEMP1            SETS TO +0.
 0113  REF  81  LAST 1304   07,3033   3 4752 0           CAF     TWO               SET CDU INDICATOR
 0114  REF  10  LAST 1304   07,3034  55'474 0   +3       TS      CDUIND

 0115  REF  11  LAST 1305   07,3035  51'474 1            INDEX   CDUIND
 0116  REF   3  LAST 1304   07,3036  11'471 0            CCS     COMMAND           NUMBER OF PULSES REQUIRED
 0117  REF   1              07,3037   0 3043 0           TC      COMPOS            GREATER THAN MAX ALLOWED
 0118  REF   1              07,3040   0 3052 0           TC      NEXTCDU +1
 0119  REF   1              07,3041   0 3110 1           TC      COMNEG
 0120  REF   2  LAST 1305   07,3042   0 3052 0           TC      NEXTCDU +1

 0121  REF   1              07,3043   6 3736 0  COMPOS   AD      -COMMAX           COMMAX = MAX NUMBER OF PULSES ALLOWED
 0122                       07,3044   0 0006 1           EXTEND                      MINUS ONE
 0123  REF   1              07,3045   6 3120 1           BZMF    COMZERO
 0124  REF  12  LAST 1305   07,3046  51'474 1            INDEX   CDUIND
 0125  REF   4  LAST 1305   07,3047  55'471 0            TS      COMMAND           REDUCE COMMAND BY MAX NUMBER OF PULSES
 0126  REF   1              07,3050   4 3737 0           CS      -COMMAX-            ALLOWED

 0127  REF  43  LAST 1305   07,3051  24 061 0   NEXTCDU  INCR    ITEMP1
 0128  REF  25  LAST 1278   07,3052   6 4754 0           AD      NEG0
 0129  REF  13  LAST 1305   07,3053  51'474 1            INDEX   CDUIND
 0130  REF   3  LAST  284   07,3054  54 050 0            TS      CDUXCMD           SET UP COMMAND REGISTER.

 0131  REF  14  LAST 1305   07,3055  11'474 0            CCS     CDUIND
 0132  REF   1              07,3056   0 3034 0           TC      COARS2 +3

 0133  REF  44  LAST 1305   07,3057  10 061 1            CCS     ITEMP1            SEE IF ANY PULSES TO GO OUT.
 0134  REF   1              07,3060   1 3124 1           TCF     SENDPULS

 0135  REF  16  LAST 1115   07,3061   0 5221 0           TC      FIXDELAY          WAIT FOR GIMBALS TO SETTLE.
 0136                       07,3062    00226 1           DEC     150


 0137  REF  82  LAST 1305   07,3063   3 4752 0           CAF     TWO               AT END OF COMMAND, CHECK TO SEE THAT
 0138  REF  45  LAST 1305   07,3064  54 061 1   CHKCORS  TS      ITEMP1            GIMBALS ARE WITHIN 2 DEGREES OF THETAD.
 0139  REF 410  LAST 1302   07,3065  50 000 1            INDEX   A
 0140  REF  20  LAST 1304   07,3066   3 0032 0           CA      CDUX
 0141                       07,3067   0 0006 1           EXTEND
 0142  REF  46  LAST 1305   07,3070   5 0061 0           INDEX   ITEMP1
 0143  REF  22  LAST 1304   07,3071  20 321 0            MSU     THETAD
 0144  REF 411  LAST 1305   07,3072  10 000 0            CCS     A
 0145  REF   1              07,3073   1 3101 0           TCF     COARSERR
 0146  REF   1              07,3074   1 3076 1           TCF     CORSCHK2
 0147  REF   2  LAST 1305   07,3075   1 3101 0           TCF     COARSERR
 0148   REF  47  LAST 1305   07,3076  10 061 1  CORSCHK2 CCS     ITEMP1
 0149   REF   1              07,3077  1 3064 1           TCF     CHKCORS
 0150   REF   2  LAST 1303   07,3100  1 3622 0           TCF     ENDIMU               END OF COARSE ALIGNMENT.

 0151   REF   1              07,3101  6 3107 1  COARSERR AD      COARSTOL             2 DEGREES.
 0152                        07,3102  0 0006 1           EXTEND
 0153   REF   2  LAST 1305   07,3103  6 3076 0           BZMF    CORSCHK2

 0154   REF  46  LAST 1303   07,3104  0 5567 0           TC      ALARM                COARSE ALIGN ERROR.
 0155                        07,3105   00211 0           OCT     211

 0156   REF   2  LAST  167   07,3106  1 3630 0           TCF     IMUBAD

 0157                        07,3107   77511 1  COARSTOL DEC     -.01111              2 DEGREES SCALED AT HALF-REVOLUTIONS


 0158   REF   2  LAST 1305   07,3110  6 3736 0  COMMNEG  AD      -COMMAX
 0159                        07,3111  0 0006 1           EXTEND
 0160   REF   2  LAST 1305   07,3112  6 3120 1           BZMF    COMZERO
 0161                        07,3113  4 0000 0           COM
 0162   REF  15  LAST 1305   07,3114  51'474 1           INDEX   COUNO
 0163   REF   5  LAST 1305   07,3115  55'471 0           TS      COMMAND
 0164   REF   2  LAST 1305   07,3116  3 3737 1           CA      -COMMAX-
 0165   REF   3  LAST 1305   07,3117  0 3051 0           TC      NEXTCOU

 0166   REF 229  LAST 1301   07,3120  3 4755 1  COMZERO  CAF     ZERO
 0167   REF  16  LAST 1306   07,3121  51'474 1           INDEX   COUNO
 0168   REF   6  LAST 1306   07,3122  57'471 1           XCH     COMMAND
 0169   REF   4  LAST 1306   07,3123  0 3051 0           TC      NEXTCOU


 0170   REF   3  LAST  536   07,3124  3 7743 0  SENDPULS CAF     13,14,15
 0171                        07,3125  0 0006 1           EXTEND
 0172   REF  16  LAST  900   07,3126  05 014 1           WOR     CHAN14
 0173   REF   1              07,3127  3 3740 1           CAF     600MS
 0174   REF   2  LAST 1305   07,3130  1 3030 0           TCF     COARS2 -1            THEN TO VARDELAY


 0175   REF  51  LAST 1304   07,3131  3 4746 0  CA+ECE   CAF     BIT6                 ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0176                        07,3132  0 0006 1           EXTEND
 0177   REF  59  LAST 1304   07,3133  05 012 1           WOR     CHAN12
 0178   REF  73  LAST 1202   07,3134  0 5261 1           TC      TASKOVER
 0179   REF  43  LAST 1277   07,3125   3 4750 1  SETCOARS CAF     BIT4           BYPASS IF ALREADY IN COARSE ALIGN
 0180                        07,3136   0 0006 1           EXTEND
 0181   REF  60  LAST 1306   07,3137  02 012 0            RAND    CHAN12
 0182   REF 412  LAST 1305   07,3140  10 000 0            CCS     A
 0183   REF 348  LAST 1301   07,3141   0 0002 0           TC      Q

 0184   REF  52  LAST 1306   07,3142   4 4746 1           CS      BIT6           CLEAR ISS ERROR COUNTERS
 0185                        07,3143   0 0006 1           EXTEND
 0186   REF  61  LAST 1307   07,3144  03 012 1            WAND    CHAN12

 0187   REF  39  LAST 1298   07,3145   4 4742 0           CS      BIT10          KNOCK DOWN GYRO ACTIVITY
 0188                        07,3146   0 0006 1           EXTEND
 0189   REF  17  LAST 1306   07,3147  03 014 1            WAND    CHAN14
 0190   REF 230  LAST 1306   07,3150   4 4755 0           CS      ZERO
 0191   REF   2  LAST  177   07,3151  54 047 0            TS      GYROCMD

 0192   REF  44  LAST 1307   07,3152   3 4750 1           CAF     BIT4           PUT ISS IN COARSE ALIGN
 0193                        07,3153   0 0006 1           EXTEND
 0194   REF  62  LAST 1307   07,3154  05 012 1            WOR     CHAN12

 0195   REF  43  LAST 1302   07,3155   4 1035 1           CS      DSPTAB +11D    TURN ON NO ATT LAMP
 0196   REF   1              07,3156   7 3200 1           MASK    OCT40010
 0197   REF  44  LAST 1307   07,3157  27'035 1            ADS     DSPTAB +11D

 0198   REF  42  LAST 1303   07,3160   4 1300 1           CS      IMODES33       DISABLE DAP AUTO AND HOLD MODES
 0199   REF  53  LAST 1307   07,3161   7 4746 1           MASK    BIT6
 0200   REF  43  LAST 1307   07,3162  27'300 1            ADS     IMODES33

 0201   REF  52  LAST 1303   07,3163   4 1277 0           CS      IMODES30       DISABLE IMUFAIL
 0202   REF  45  LAST 1307   07,3164   7 4750 0           MASK    BIT4
 0203   REF  53  LAST 1307   07,3165  27'277 0            ADS     IMODES30

 0204   REF  14  LAST  522   07,3166   4 4747 0  RNDREFDR CS      TRACKBIT       CLEAR TRACK FLAG
 0205   REF  32  LAST  900   07,3167   7 0075 1           MASK    FLAGWRD1
 0206   REF  33  LAST 1307   07,3170  54 075 1            TS      FLAGWRD1

 0207   REF   3  LAST  852   07,3171   4 4735 0           CS      DRFTBIT        CLEAR DRIFT FLAG
 0208   REF  29  LAST 1115   07,3172   7 0076 1           MASK    FLAGWRD2
 0209   REF  30  LAST 1307   07,3173  54 076 1            TS      FLAGWRD2

 0210   REF   6  LAST  970   07,3174   4 4737 1           CS      REFSMBIT       CLEAR REFSMMAT FLAG
 0211   REF  18  LAST  970   07,3175   7 0077 0           MASK    FLAGWRD3
 0212   REF  19  LAST 1307   07,3176  54 077 0            TS      FLAGWRD3

 0213   REF 349  LAST 1307   07,3177   0 0002 0           TC      Q

 0214                        07,3200    40010 1  OCT40010 OCT     40010
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P0215              IMU FINE ALIGN MODE SWITCH.

 0216                             07,3201   0 0004 0   IMUFINE   INHINT
 0217   REF    4  LAST 1304       07,3202   0 3644 1             TC       CAGETSTJ        SEE IF IMU BEING CAGED.

 0218   REF    1                  07,3203   4 3735 1             CS       BITS4-5         RESET ZERO AND COARSE
 0219                             07,3204   0 0006 1             EXTEND
 0220   REF   63  LAST 1307       07,3205  .03 012 1             WAND     CHAN12

 0221   REF   54  LAST 1307       07,3206   4 4746 1             CS       BIT6            INSURE DAP AUTO AND HOLD MODES ENABLED
 0222   REF   44  LAST 1307       07,3207   7 1300 1             MASK     IMODES33
 0223   REF   45  LAST 1308       07,3210   5 5300 1             TS       IMODES33

 0224   REF    4  LAST 1302       07,3211   0 3257 1             TC       NOATTOFF

 0225   REF   40  LAST 1307       07,3212   3 4742 1             CAF      BIT10           IMU FAIL WAS INHIBITED DURING THE
 0226   REF   42  LAST 1304       07,3213   0 5203 0             TC       WAITLIST        PRESUMABLY PRECEDING COARSE ALIGN. LEAVE
 0227   REF   17  LAST 1306       E3,1474                        EBANK=   CDUIND
 0228   REF    1                  07,3214    03225 1             2CADR    IFAILOK         IT ON FOR THE FIRST 5 SECS OF FINE ALIGN
 0228   REF    1                  07,3215    16103 1

 0229   REF    6  LAST  961       07,3216   3 5000 1             CAF      2SECS
 0230   REF   43  LAST 1308       07,3217   0 5203 0             TC       WAITLIST
 0231   REF   18  LAST 1308       E3,1474                        EBANK=   CDUIND
 0232   REF    1                  07,3220    03223 1             2CADR    IMUFINED
 0232   REF    1                  07,3221    16103 1

 0233   REF    3  LAST 1304       07,3222   1 2746 1             TCF      MODEEXIT

 0234   REF    5  LAST 1305       07,3223   0 3632 0   IMUFINED  TC       CAGETEST        SEE THAT NO ONE HAS CAGED THE IMU.
 0235   REF    3  LAST 1306       07,3224   1 3622 0             TCF      ENDIMU
 0236   REF   1             07,3225   0 3637 0   IFAILOK   TC     CAGETSTQ         ENABLE IMU FIAL UNLESS IMU BEING CAGED.
 0237   REF  74   LAST 1306 07,3226   1 5261 0             TCF    TASKOVER         IT IS.

 0238   REF  46   LAST 1307 07,3227   3 4750 1             CAF    BIT4             DONT RESET IMU FAIL INHIBIT IF SOMEONE
 0239                       07,3230   0 0006 1             EXTEND                  HAS GONE INTO COARSE ALIGN.
 0240   REF  64   LAST 1308 07,3231   02 012 0             RAND   CHAN12
 0241   REF 413   LAST 1307 07,3232   10 000 0             CCS    A
 0242   REF  75   LAST 1309 07,3233   1 5261 0             TCF    TASKOVER

 0243   REF  54   LAST 1307 07,3234   4 1277 0             CS     IMODES30         RESET IMUFAIL.
 0244   REF  44   LAST 1304 07,3235   7 4737 1             MASK   BIT13
 0245   REF  55   LAST 1309 07,3236   27'277 0             ADS    IMODES30
 0246   REF  47   LAST 1309 07,3237   4 4750 0             CS     BIT4
 0247   REF  56   LAST 1309 07,3240   7 1277 0   PFAILOK2  MASK   IMODES30
 0248   REF  57   LAST 1309 07,3241   55'277 0             TS     IMODES30
 0249   REF  49   LAST 1303 07,3242   0 4674 0             TC     IBNKCALL         THE ISS WARNING LIGHT MAY COME ON NOW
 0250   REF   6   LAST 1303 07,3243    14703 0             CADR   SETISSW          THAT THE INHIBIT HAS BEEN REMOVED.
 0251   REF  76   LAST 1309 07,3244   1 5261 0             TCF    TASKOVER

 0252   REF   2   LAST 1309 07,3245   0 3637 0   PFAILOK   TC     CAGETSTQ         ENABLE PIP FAIL PROG ALARM.
 0253   REF  77   LAST 1309 07,3246   1 5261 0             TCF    TASKOVER

 0254   REF  58   LAST 1309 07,3247   4 1277 0             CS     IMODES30         RESET IMU AND PIPA FAIL BITS.
 0255   REF  41   LAST 1308 07,3250   7 4742 0             MASK   BIT10
 0256   REF  59   LAST 1309 07,3251   27'277 0             ADS    IMODES30

 0257   REF  46   LAST 1308 07,3252   4 1300 1             CS     IMODES33
 0258   REF  45   LAST 1309 07,3253   7 4737 1             MASK   BIT13
 0259   REF  47   LAST 1309 07,3254   27'300 1             ADS    IMODES33

 0260   REF  41   LAST 1303 07,3255   4 4747 0             CS     BIT5
 0261   REF   1             07,3256   1 3240 0             TCF    PFAILOK2

 0262   REF   2   LAST 1307 07,3257   4 3200 1   NOATTOFF  CS     OCT40010         SUBROUTINE TO TURN OFF NO ATT LAMP.
 0263   REF  45   LAST 1307 07,3260   7 1035 1             MASK   DSPTAB +11D
 0264   REF  44   LAST 1290 07,3261   6 4735 1             AD     BIT15
 0265   REF  46   LAST 1309 07,3262   55'035 1             TS     DSPTAB +11D
 0266   REF 350   LAST 1307 07,3263   0 0002 0             TC     Q
```

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P0267              ROUTINES TO INITIATE AND TERMINATE PROGRAM USE OF THE PIPAS. NO IMUSTALL REQUIRED IN EITHER CASE.

 0272   REF 231  LAST 1307   07,3264  4 4755 0  PIPUSE    CS      ZERO
 0273   REF  15  LAST  947   07,3265  54 037 1            TS      PIPAX
 0274   REF   6  LAST  947   07,3266  54 040 1            TS      PIPAY
 0275   REF   9  LAST  947   07,3267  54 041 0            TS      PIPAZ

 02752  REF   3  LAST 1309   07,3270  0 3637 0  PIPUSE1   TC      CAGETSTQ          DO NOT ENABLE PIPA FAIL IF IMU IS CAGED
 02754  REF   8  LAST 1303   07,3271  1 4631 0            TCF     SWRETURN

 02756                      07,3272  0 0004 0            INHINT
 0276   REF  52  LAST 1277   07,3273  4 4753 0            CS      BIT1              IF PIPA FAILS FROM NOW ON (UNTIL
 0277   REF  60  LAST 1309   07,3274  7 1277 0            MASK    IMODES30          PIPFREE), LIGHT ISS WARNING.
 0278   REF  61  LAST 1310   07,3275  55'277 0            TS      IMODES30

 0279   REF  50  LAST 1309   07,3276  0 4674 0  PIPFREE2  TC      IBNKCALL          ISS WARNING MIGHT COME ON NOW.
 0280   REF   7  LAST 1309   07,3277   14703 0            CADR    SETISSW           (OR GO OFF ON PIPFREE).

 0281   REF   4  LAST 1308   07,3300  1 2746 1            TCF     MODEEXIT

 0282                       07,3301  0 0004 0  PIPFREE   INHINT                    PROGRAM DONE WITH PIPAS. DONT LIGHT
 0283   REF  62  LAST 1310   07,3302  4 1277 0            CS      IMODES30          ISS WARNING.
 0284   REF  53  LAST 1310   07,3303  7 4753 0            MASK    BIT1
 0285   REF  63  LAST 1310   07,3304  27'277 0            ADS     IMODES30

 0286   REF  42  LAST 1309   07,3305  7 4742 0            MASK    BIT10             IF PIP FAIL ON, DO PROG ALARM AND RESET
 0287   REF 414  LAST 1309   07,3306  10 000 0            CCS     A                 ISS WARNING.
 0288   REF   5  LAST 1310   07,3307  1 2746 1            TCF     MODEEXIT

 0289   REF  47  LAST 1306   07,3310  0 5567 0            TC      ALARM
 0290                       07,3311   00212 0            OCT     212

 0291                       07,3312  0 0004 0            INHINT

 0292   REF   1              07,3313  1 3276 0            TCF     PIPFREE2
```

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P0293           THE FOLLOWING ROUTINE TORQUES THE IRIGS ACCORDING TO DOUBLE PRECISION INPUTS IN THE SIX REGISTERS
R0295     BEGINNING AT THE ECADR ARRIVING IN A. THE MINIMUM SIZE OF ANY PULSE TRAIN IS 16 PULSES (.25 CDU COUNTS). THE
R0297     UNSENT PORTION OF THE COMMAND IS LEFT INTACT IN THE INPUT COMMAND REGISTERS.

 0299                         E3,1400                        EBANK= 1400             VARIABLE, ACTUALLY.

 0300     REF 783  LAST 1300  07,3314  54 161 0  IMUPULSE TS      MPAC +5            SAVE ARRIVING ECADR.
 0301     REF   5  LAST 1308  07,3315  0 3644 1           TC      CAGETSTJ           DONT PROCEED IF IMU BEING CAGED.

 0302     REF   2  LAST  224  07,3316  11'311 1           CCS     LGYRO              SEE IF GYROS BUSY.
 0303     REF   1             07,3317  0 3360 1           TC      GYROBUSY           SLEEP.

 0304     REF 784  LAST 1311  07,3320  54 156 1           TS      MPAC +2
 0305     REF  55  LAST 1308  07,3321  3 4746 0           CAF     BIT6               ENABLE THE POWER SUPPLY.
 0306                         07,3322  0 0006 1           EXTEND
 0307     REF  18  LAST 1307  07,3323  05 014 1           WOR     CHAN14

 0308     REF  27  LAST 1277  07,3324  3 4751 0           CAF     FOUR
 0310     REF  44  LAST 1308  07,3325  0 5203 0  GWAKE2   TC      WAITLIST           (IF A JOB WAS PUT TO SLEEP, THE POWER
 0311     REF  19  LAST 1308  E3,1474                     EBANK=  CDUIND             SUPPLY IS LEFT ON BY THE WAKING JOB).
 0312     REF   1             07,3326   03376 0           2CADR   STRTGYRO
 0312     REF   1             07,3327   16103 1

 0313     REF 785  LAST 1311  07,3330  3 0161 1           CA      MPAC +5            SET UP EBANK, SAVING CALLER'S EBANK FOR
 0314     REF  74  LAST 1281  07,3331  56 003 1           XCH     EBANK              RESTORATION ON RETURN.
 0315     REF 786  LAST 1311  07,3332  56 161 1           XCH     MPAC +5
 0316     REF   3  LAST 1311  07,3333  55'311 1           TS      LGYRO              RESERVES GYROS.
 0317     REF  17  LAST 1278  07,3334  7 4357 0           MASK    LOW8
 0318     REF  48  LAST 1306  07,3335  54 061 1           TS      ITEMP1

 0319     REF  83  LAST 1305  07,3336  3 4752 0           CAF     TWO                FORCE SIGN AGREEMENT ON INPUTS.
 0320     REF 787  LAST 1311  07,3337  54 157 0  GYRCAGRE TS      MPAC +3
 0321                         07,3340  6 0000 1           DOUBLE
 0322     REF  49  LAST 1311  07,3341  6 0061 0           AD      ITEMP1
 0323     REF 788  LAST 1311  07,3342  54 160 1           TS      MPAC +4
 0324                         07,3343  0 0006 1           EXTEND
 0325     REF 415  LAST 1310  07,3344  5 0000 1           INDEX   A
 0326                         07,3345  3 1401 0           DCA     1400
 0327     REF 789  LAST 1311  07,3346  52 155 1           DXCH    MPAC
 0328     REF  15  LAST 1217  07,3347  0 7262 0           TC      TPAGREE
 0329     REF 790  LAST 1311  07,3350  52 155 1           DXCH    MPAC
 0330     REF 791  LAST 1311  07,3351  50 160 0           INDEX   MPAC +4
 0331                         07,3352  53'401 1           DXCH    1400

 0332     REF 792  LAST 1311  07,3353  10 157 0           CCS     MPAC +3
 0333     REF   1             07,3354  1 3337 1           TCF     GYRCAGRE

 0334     REF 793  LAST 1311  07,3355  3 0161 1           CA      MPAC +5            RESTORE CALLER'S EBANK.
 0335     REF  75  LAST 1311  07,3356  54 003 0           TS      EBANK
 0336     REF   6  LAST 1310  07,3357  1 2746 1           TCF     MODEEXIT
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P0337              ROUTINES TO ALLOW TORQUING BY ONLY ONE JOB AT A TIME.

 0338                              07,3360  0 0006 1  GYROBUSY EXTEND                      SAVE RETURN 2FCADR.
 0339     REF  22  LAST 1079       07,3361  3 0134 1           DCA     BUF2
 0340     REF 794  LAST 1311       07,3362  52 155 1           DXCH    MPAC
 0341     REF   1                  07,3363  3 3375 0  REGSLEEP CAF     LGWAKE
 0342     REF   5  LAST 1212       07,3364  1 5133 1           TCF     JOBSLEEP

 0343     REF   4  LAST 1311       07,3365  11 311 1  GWAKE    CCS     LGYRO                WHEN AWAKENED, SEE IF GYROS STILL BUSY.
 0344     REF   1                  07,3366  1 3363 0           TCF     REGSLEEP             IF SO, SLEEP SOME MORE.

 0345     REF 795  LAST 1312       07,3367  54 156 1           TS      MPAC +2
 0346                              07,3370  0 0006 1           EXTEND
 0347     REF 796  LAST 1312       07,3371  3 0155 0           DCA     MPAC
 0348     REF  23  LAST 1312       07,3372  52 134 0           DXCH    BUF2                 RESTORE SWRETURN INFO.
 0349     REF 130  LAST 1297       07,3373  3 4753 1           CAF     ONE
 0350     REF   1                  07,3374  1 3325 1           TCF     GWAKE2

 0351     REF   1                  07,3375   17365 1  LGWAKE   CADR    GWAKE
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P0352               GYRO-TORQUING WAITLIST TASKS.

 0353    REF   1                   07,3376   4 3617 0   STRTGYPO CS       GDESELCT            DE-SELECT LAST GYPC.
 0354                              07,3377   0 0006 1            EXTEND
 0355    PEF  19   LAST 1311       07,3400   03 014 1            WAND     CHAN14

 0356    PFF   6   LAST 1308       07,3401   0 3632 0            TC       CAGETEST

 0357    PEF   5   LAST 1312       07,3402   3 1311 0   STPTGYR2 CA       LGYPO               JUMP ON PHASE COUNTEP IN BITS 13-14.
 0358                              07,3403   0 0006 1            EXTEND
 0359    REF  48   LAST 1309       07,3404   7 4750 0            MP       BIT4
 0360    REF 416   LAST 1311       07,3405   50 000 1            INDEX    A
 0361                              07,3406   1 3407 0            TCF      +1
 0362    REF   1                   07,3407   0 3424 0            TC       GSELECT             =0. 00 Y GYPO.
 0363                              07,3410    00202 1            OCT      00202

 0364    REF   2   LAST 1313       07,3411   0 3424 0            TC       GSELECT             =1. 00 Z GYPO.
 0365                              07,3412    00302 0            OCT      00302

 0366    REF   3   LAST 1313       07,3413   0 3422 0            TC       GSELECT -2          =2. 00 X GYRO.
 0367                              07,3414    00100 0            OCT      00100

 0368    REF 232   LAST 1310       07,3415   3 4755 1            CAF      ZEPO                =3. DONE
 0369    PEF   6   LAST 1313       07,3416   55'311 1            TS       LGYRO
 0370    PEF   2   LAST 1312       07,3417   3 3375 0            CAF      LGWAKE              WAKE A POSSIBLE SLEEPING JOB.
 0371    REF   6   LAST 1213       07,3420   0 5137 1            TC       JOBWAKE

 0372    PEF   2   LAST 1308       07,3421   1 3223 0   NORESET  TCF      IMUFINED            DO NOT PESET PCWEP SUPPLY
 0373   REF  28  LAST 1311   07,3422  4 4751 1   -2        CS      FOUR          SPECIAL ENTRY TO REGRESS LGYRO FOR X.
 0374   REF   7  LAST 1313   07,3423  27'311 1             ADS     LGYRO

 0375   REF 351  LAST 1309   07,3424  50 002 0  GSELECT    INDEX   Q             SELECT GYRO.
 0376                        07,3425  3 0000 1             CAF     0             PACKED WORD CONTAINS GYRO SELECT BITS
 0377   REF  12  LAST 1292   07,3426  54 064 1             TS      ITEMP4        AND INCREMENT TO LGYRO.
 0378   REF  19  LAST 1285   07,3427  7 4757 1             MASK    SEVEN
 0379   REF  46  LAST 1309   07,3430  6 4737 0             AD      BIT13
 0380   REF   8  LAST 1314   07,3431  27'311 1             ADS     LGYRO
 0381   REF  76  LAST 1311   07,3432  54 003 0             TS      EBANK
 0382   REF  18  LAST 1311   07,3433  7 4357 0             MASK    LOW8
 0383   REF  50  LAST 1311   07,3434  54 061 1             TS      ITEMP1

 0384   REF  20  LAST 1314   07,3435  4 4757 1             CS      SEVEN
 0385   REF  13  LAST 1314   07,3436  7 0064 1             MASK    ITEMP4
 0386   REF  14  LAST 1314   07,3437  54 064 1             TS      ITEMP4

 0387                        07,3440  0 0006 1             EXTEND                MOVE OP COMMAND TO RUPTREGS FOR TESTING.
 0388   REF  51  LAST 1314   07,3441  5 0061 0             INDEX   ITEMP1
 0389                        07,3442  3 1401 0             DCA     1400
 0390   REF  49  LAST 1292   07,3443  52 071 0             DXCH    RUPTREG1

 0391   REF  50  LAST 1314   07,3444  10 070 1             CCS     RUPTREG1
 0392   REF   1              07,3445  1 3460 1             TCF     MAJ+
 0393                        07,3446  1 3450 1             TCF     +2
 0394   REF   1              07,3447  1 3600 0             TCF     MAJ-

 0395   REF  10  LAST 1292   07,3450  10 071 0             CCS     RUPTREG2
 0396   REF   1              07,3451  1 3455 1             TCF     MIN+
 0397   REF   1              07,3452  1 3402 0             TCF     STRTGYR2
 0398   REF   1              07,3453  1 3575 1             TCF     MIN-
 0399   REF   2  LAST 1314   07,3454  1 3402 0             TCF     STRTGYR2
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L        IMU MODE SWITCHING ROUTINES                                                          USER'S PAGE NO. 15      E3 S4

 0400   REF   1               07,3455  6 3511 1  MIN+      AD      -GYROMIN     SMALL POSITIVE COMMAND. SEE IF AT LEAST
 0401                         07,3456  0 0006 1            EXTEND               16 GYRO PULSES.
 0402   REF   3  LAST 1314    07,3457  6 3402 1            BZMF    STRTGYR2

 0403                         07,3460  0 0006 1  MAJ+      EXTEND               DEFINITE POSITIVE OUTPUT.
 0404   REF   1               07,3461  3 3621 1            DCA     GYROFRAC
 0405   REF  51  LAST 1314    07,3462  20 071 0            DAS     RUPTREG1

 0406   REF  15  LAST 1314    07,3463  3 0064 0            CA      ITEMP4       SELECT POSITIVE TORQUING FOR THIS GYRO.
 0407                         07,3464  0 0006 1            EXTEND
 0408   REF  20  LAST 1313    07,3465  05 014 1            WOR     CHAN14

 0409   REF  10  LAST 1300    07,3466  3 6077 1            CAF     LOW7         LEAVE NUMBER OF POSSIBLE 8192 AUGMENTS
 0410   REF  11  LAST 1314    07,3467  7 0071 0            MASK    RUPTREG2     TO INITIAL COMMAND IN MAJOR PART OF LONG
 0411   REF  12  LAST 1315    07,3470  56 071 1            XCH     RUPTREG2     TERM STORAGE AND TRUNCATED FRACTION
 0412                         07,3471  0 0006 1  GMERGE    EXTEND               IN MINOR PART. THE MAJOR PART WILL BE
 0413   REF  40  LAST 1291    07,3472  7 4744 0            MP      BIT8         COUNTED DOWN TO ZERO IN THE COURSE OF
 0414   REF  21  LAST 1292    07,3473  54 062 1            TS      ITEMP2       PUTTING OUT THE ENTIRE COMMAND.
 0415   REF  52  LAST 1315    07,3474  3 0070 0            CA      RUPTREG1
 0416                         07,3475  0 0006 1            EXTEND
 0417   REF  28  LAST 1302    07,3476  7 4743 1            MP      BIT9
 0418   REF  53  LAST 1315    07,3477  54 070 1            TS      RUPTREG1
 0419   REF 235  LAST 1304    07,3500  3 0001 0            CA      L
 0420                         07,3501  0 0006 1            EXTEND
 0421   REF  72  LAST 1277    07,3502  7 4736 0            MP      BIT14
 0422   REF  22  LAST 1315    07,3503  26 062 1            ADS     ITEMP2       INITIAL COMMAND.

 0423                         07,3504  0 0006 1            EXTEND               SEE IF MORE THAN ONE PULSE TRAIN NEEDED
 0424   REF  54  LAST 1315    07,3505  3 0071 1            DCA     RUPTREG1     (MORE THAN 16383 PULSES).
 0425   REF   1               07,3506  6 7752 0            AD      MINUS1
 0426   REF 417  LAST 1313    07,3507  10 000 0            CCS     A
 0427   REF   1               07,3510  1 3534 1            TCF     LONGGYRO
 0428                         07,3511   77601 0  -GYROMIN  OCT     -176         MAY BE ADJUSTED TO SPECIFY MINIMUM CMD
 0429                         07,3512  1 3516 1            TCF     +4

 0430   REF  73  LAST 1315    07,3513  3 4736 1            CAF     BIT14
 0431   REF  23  LAST 1315    07,3514  26 062 1            ADS     ITEMP2
 0432   REF 233  LAST 1313    07,3515  3 4755 1            CAF     ZERO

 0433   REF  52  LAST 1314    07,3516  50 061 0   +4       INDEX   ITEMP1
 0434                         07,3517  53'401 1            DXCH    1400
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L        IMU MODE SWITCHING ROUTINES                                                                   USER'S PAGE NO. 16      E3 S4

 0435    REF  24  LAST 1315   07,3520  3 0062 0            CA       ITEMP2           ENTIRE COMMAND.
 0436    REF   3  LAST 1307   07,3521  54 047 0  LASTSEG   TS       GYROCMD
 0437                         07,3522  0 0006 1            EXTEND
 0438    REF  43  LAST 1310   07,3523  7 4742 0            MP       BIT10            WAITLIST DT
 0439    REF  37  LAST 1300   07,3524  6 6250 0            AD       THREE            TRUNCATION AND PHASE UNCERTAINTIES.
 0440    REF  45  LAST 1311   07,3525  0 5203 0            TC       WAITLIST
 0441    REF  20  LAST 1311   E3,1474                      EBANK=   CDUIND
 0442    REF   2  LAST 1311   07,3526   03376 0            2CADR    STRTGYRO
 0442                         07,3527   16103 1

 0448    REF  44  LAST 1316   07,3530  3 4742 1  GYROEXIT  CAF      BIT10
 0449                         07,3531  0 0006 1            EXTEND
 0450    REF  21  LAST 1315   07,3532  05 014 1            WOR      CHAN14
 0451    REF  78  LAST 1309   07,3533  1 5261 0            TCF      TASKOVER

 0452    REF  53  LAST 1315   07,3534  50 061 0  LONGGYRO  INDEX    ITEMP1
 0453                         07,3535  53'401 1            DXCH     1400             INITIAL COMMAND OUT PLUS N AUGMENTS OF
 0454    REF  74  LAST 1315   07,3536  3 4736 1            CAF      BIT14            8192. INITIAL COMMAND IS AT LEAST 8192.
 0455    REF  25  LAST 1316   07,3537  6 0062 0            AD       ITEMP2
 0456    REF   4  LAST 1316   07,3540  54 047 0            TS       GYROCMD

 0457                         07,3541  0 0006 1  AUG3      EXTEND                    GET WAITLIST DT TO TIME WHEN TRAIN IS
 0458    REF  45  LAST 1316   07,3542  7 4742 0            MP       BIT10            ALMOST OUT.
 0459    REF   4  LAST 1278   07,3543  6 7750 1            AD       NEG3
 0460    REF  46  LAST 1316   07,3544  0 5203 0            TC       WAITLIST
 0461    REF  21  LAST 1316   E3,1474                      EBANK=   CDUIND
 0462    REF   1              07,3545   03550 1            2CADR    8192AUG
 0462    REF   1              07,3546   16103 1
 0463    REF   1              07,3547  1 3530 0            TCF      GYROEXIT

 0464    REF   7  LAST 1313   07,3550  0 3632 0  8192AUG   TC       CAGETEST

 04641   REF  49  LAST 1313   07,3551  3 4750 1            CAF      BIT4
 04642                        07,3552  0 0006 1            EXTEND
 04643   REF  65  LAST 1309   07,3553  02 012 0            RAND     CHAN12
 04644   REF 418  LAST 1315   07,3554  10 000 0            CCS      A
 04645   REF   3  LAST 1306   07,3555  1 3630 0            TCF      IMUBAD
 0465    REF   9  LAST 1314   07,3556  3 1311 0            CA       LGYRO            ADD 8192 PULSES TO GYROCMD
 0466    REF  77  LAST 1314   07,3557  54 003 0            TS       EBANK
 0467    REF  19  LAST 1314   07,3560  7 4357 0            MASK     LOW8
 0468    REF  54  LAST 1316   07,3561  54 061 1            TS       ITEMP1

 0469    REF  55  LAST 1316   07,3562  50 061 0            INDEX    ITEMP1           SEE IF THIS IS THE LAST AUG.
 0470                         07,3563  11'400 0            CCS      1400
 0471    REF   1              07,3564  1 3570 1            TCF      AUG2             MORE TO COME.

 0472    REF  75  LAST 1316   07,3565  3 4736 1            CAF      BIT14
 0473    REF   5  LAST 1316   07,3566  26 047 0            AOS      GYROCMD
 0474    REF   1              07,3567  1 3522 0            TCF      LASTSEG +1
 0475    REF  56  LAST 1316    07,3570  50 061 0  AUG2      INDEX  ITEMP1
 0476                          07,3571  55 400 0            TS     1400
 0477    REF  76  LAST 1316    07,3572   3 4736 1           CAF    BIT14
 0478    REF   6  LAST 1316    07,3573  26 047 0            ADS    GYROCMD
 0479    REF   1               07,3574   1 3541 0           TCF    AUG3             COMPUTE CT.
 0480   REF   2  LAST 1315   07,3575  6 3511 1  MIN-      AD      -GYROMIN         POSSIBLE NEGATIVE OUTPUT.
 0481                        07,3576  0 0006 1            EXTEND
 0482   REF   4  LAST 1315   07,3577  6 3402 1            BZMF    STRTGYR2

 0483                        07,3600  0 0006 1  MAJ-      EXTEND                   DEFINITE NEGATIVE OUTPUT.
 0484   REF   2  LAST 1315   07,3601  4 3621 0            DCS     GYROFRAC
 0485   REF  55  LAST 1315   07,3602  20 071 0            DAS     RUPTREG1

 0486   REF  16  LAST 1315   07,3603  3 0064 0            CA      ITEMP4           SELECT NEGATIVE TORQUING FOR THIS GYRO.
 0487   REF  29  LAST 1315   07,3604  6 4743 0            AD      BIT9
 0488                        07,3605  0 0006 1            EXTEND
 0489   REF  22  LAST 1316   07,3606  05 014 1            WOR     CHAN14

 0490   REF  56  LAST 1318   07,3607  4 0070 1            CS      RUPTREG1         SET UP RUPTREGS TO FALL INTO GMERGE.
 0491   REF  57  LAST 1318   07,3610  54 070 1            TS      RUPTREG1         ALL NUMBERS PUT INTO GYROCMD ARE
 0492   REF  13  LAST 1315   07,3611  4 0071 0            CS      RUPTREG2         POSITIVE - BIT9 OF CHAN 14 DETERMINES
 0493   REF  11  LAST 1315   07,3612  7 6077 0            MASK    LOW7             THE SIGN OF THE COMMAND.
 0494                        07,3613  4 0000 0            COM
 0495   REF  14  LAST 1318   07,3614  56 071 1            XCH     RUPTREG2
 0496                        07,3615  4 0000 0            COM
 0497   REF   1              07,3616  1 3471 1            TCF     GMERGE

 0498                        07,3617   01700 1  GDESELCT  OCT     1700             TURN OFF SELECT AND ACTIVITY BITS.

 0499                        07,3620   00000 1  GYROFRAC  2DEC    .215 B -21
 0499                        07,3621   00034 0
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P0500              IMU MODE SWITCHING ROUTINES COME HERE WHEN ACTION COMPLETE.

 0501                             07,3622  0 0006 1  ENDIMU    EXTEND                         MODE IS BAD IF CAGE HAS OCCURED OR IF
 0502    REF  33   LAST 1110      07,3623  00 011 1            READ      DSALMOUT             ISS WARNING IS ON.
 0503    REF  54   LAST 1310      07,3624  7 4753 0            MASK      BIT1
 0504    REF 419   LAST 1316      07,3625  10 000 0            CCS       A
 0505    REF   4   LAST 1316      07,3626  1 3630 0            TCF       IMUBAD

 0506    REF   3   LAST  569      07,3627  1 3656 0  IMUGOOD   TCF       GOODEND              WITH C(A) = 0.

 0507    REF 234   LAST 1315      07,3630  3 4755 1  IMUBAD    CAF       ZERO
 0508    REF   2   LAST  569      07,3631  1 3653 0            TCF       BADEND

 0509    REF  56   LAST 1311      07,3632  3 4746 0  CAGETEST  CAF       BIT6                 SUBROUTINE TO TERMINATE IMU MODE
 0510    REF  64   LAST 1310      07,3633  7 1277 0            MASK      IMODES30             SWITCH IF IMU HAS BEEN CAGED.
 0511    REF 420   LAST 1319      07,3634  10 000 0            CCS       A
 0512    REF   5   LAST 1319      07,3635  1 3630 0            TCF       IMUBAD               DIRECTLY.
 0513    REF 352   LAST 1314      07,3636  0 0002 0            TC        Q                    WITH C(A) = +0.

 0514    REF  65   LAST 1319      07,3637  4 1277 0  CAGETSTQ  CS        IMODES30             SKIP IF IMU NOT BEING CAGED.
 0515    REF  57   LAST 1319      07,3640  7 4746 1            MASK      BIT6
 0516    REF 421   LAST 1319      07,3641  10 000 0            CCS       A
 0517    REF 353   LAST 1319      07,3642  24 002 0            INCR      Q
 0518    REF 354   LAST 1319      07,3643  0 0002 0            TC        Q

 0519    REF  66   LAST 1319      07,3644  4 1277 0  CAGETSTJ  CS        IMODES30             IF DURING MODE SWITCH INITIALIZATION
 0520    REF  58   LAST 1319      07,3645  7 4746 1            MASK      BIT6                 IT IS FOUND THAT THE IMU IS BEING CAGED,
 0521    REF 422   LAST 1319      07,3646  10 000 0            CCS       A                    SET IMUCADR TO -0 TO INDICATE OPERATION
 0522    REF 355   LAST 1319      07,3647  0 0002 0            TC        Q                    COMPLETE BUT FAILED. RETURN IMMEDIATELY

 0523    REF 235   LAST 1319      07,3650  4 4755 0            CS        ZERO                 TO SWRETURN.
 0524    REF   4   LAST 1115      07,3651  55 301 0            TS        IMUCADR
 0525    REF   7   LAST 1311      07,3652  1 2746 1            TCF       MODEEXIT
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```
P0526             GENERALIZED MODE SWITCHING TERMINATION. ENTER AT GOODEND FOR SUCCESSFUL COMPLETION OF AN I/O OPERATION
R0528    OR AT BADEND FOR A N UNSUCCESSFUL ONE. C(A) OR ARRIVAL =0 FOR IMU, 1 FOR OPTICS.

 0530    REF  15  LAST 1318    07,3653   54 071 0  BADEND     TS       RUPTREG2          DEVICE INDEX.
 0531    REF 236  LAST 1319    07,3654   4 4755 0             CS       ZERO              FOR FAILURE.
 0532    REF   4  LAST 1319    07,3655   1 3660 0             TCF      GOODEND +2

 0533    REF  16  LAST 1320    07,3656   54 071 0  GOODEND    TS       RUPTREG2
 0534    REF 131  LAST 1312    07,3657   4 4753 0             CS       ONE               FOR SUCCESS.

 0535    REF  13  LAST 1292    07,3660   54 072 0             TS       RUPTREG3
 0536    REF  17  LAST 1320    07,3661   50 071 1             INDEX    RUPTREG2          SEE IF USING PROGRAM ASLEEP.
 0537    REF   6  LAST  947    07,3662   11'301 0             CCS      MODECADR
 0538                          07,3663   1 3667 1             TCF      +4                YES - WAKE IT UP.
 0539    REF   1               07,3664   1 3677 0             TCF      ENDMODE           IF 0, PROGRAM NOT IN YET.

 05392                         07,3665   0 0006 1             EXTEND
 05394   REF   2  LAST 1320    07,3666   1 3700 1             BZF      ENDMODE +1        BZF = TCF IF MODECADR = -0.

 0540    REF 237  LAST 1320    07,3667   3 4755 1             CAF      ZERO              WAKE SLEEPING PROGRAM.
 0541    REF  18  LAST 1320    07,3670   50 071 1             INDEX    RUPTREG2
 0542    REF   7  LAST 1320    07,3671   57'301 1             XCH      MODECADR
 0543    REF   7  LAST 1313    07,3672   0 5137 1             TC       JOBWAKE

 0544    REF  14  LAST 1320    07,3673   4 0072 0             CS       RUPTREG3          ADVANCE LOC IF SUCCESSFUL.
 0545    REF  23  LAST 1213    07,3674   50 064 0             INDEX    LOCCTR
 0546    REF  44  LAST 1259    07,3675   26 164 0             ADS      LOC

 0547    REF  79  LAST 1316    07,3676   1 5261 0             TCF      TASKOVER

 0548    REF  15  LAST 1320    07,3677   3 0072 1  ENDMODE    CA       RUPTREG3          -0 INDICATES OPERATION COMPLETE BUT
 0549    REF  19  LAST 1320    07,3700   50 071 1    +1       INDEX    RUPTREG2          UNSUCCESSFUL: -1 INDICATES COMPLETE AND
 0550    REF   8  LAST 1320    07,3701   55'301 0             TS       MODECADR          SUCCESSFUL.
 0551    REF  80  LAST 1320    07,3702   1 5261 0             TCF      TASKOVER
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P0552            GENERAL STALLING ROUTINE. USING PROGRAMS COME HERE TO WAIT FOR I/O COMPLETION.

R0554   PROGRAM DESCRIPTION                                   DATE- 21 FEB 1967
R0555                                            LOG SECTION IMU MODE SWITCHING
R0556   MOD BY- R.MELANSON TO ADD DOCUMENTATION       ASSEMBLY SUNDISK  REV.  82

R0557   FUNCTIONAL DESCRIPTION-
R0558     TO DELAY FURTHER EXECUTION OF THE CALLING ROUTINE UNTIL ITS SELECTED
R0559     I/O FUNCTION IS COMPLETE.THE FOLLOWING CHECKS ON THE CALLING ROUTINE:S
R0560     MODECADR ARE MADE AND ACTED UPON.-
R0561       1) +0 INDICATES INCOMPLETE I/O OPERATION.CALLING ROUTINE IS PUT TO
R0562          SLEEP.
R0563       2) -1 INDICATES COMPLETED I/O OPERATION. STALL BYPASSES JOBSLEEP
R0564          CALL AND RETURNS TO CALLING ROUTINE AT L+3
R0565       3) -0 INDICATES COMPLETED I/O WITH FAILURE. STALL CLEARS MODECADR
R0566          AND RETURNS TO CALLING ROUTINE AT L+2.
R0567       4) VALUE GREATER THAN 0 INDICATES TWO ROUTINES CALLING FOR USE OF
R0568          SAME DEVICE. STALL EXITS TO ABORT WHICH EXECUTES A PROGRAM
R0569          RESTART WHICH IN TURN CLEARS ALL MODECADR REGISTERS.

R0570    CALLING SEQUENCE-
R0571     L   TC    BANKCALL
R0572     L+1 CADR (ONE OF 5 STALL ADDRESSES I.E. IMUSTALL,OPTSTALL,RADSTALL,
R0573                AOTSTALL,OR ATTSTALL)

R0574    NORMAL-EXIT MODE-
R0575     TCF   JOBSLEEP OR TCF  MODEXIT

R0576   ALARM OR ABORT EXIT MODE-
R0577     TC    ABORT

R0578   OUTPUT-
R0579     MODECADR= CADR IF JOBSLEEP
R0580     MODECADR=+0     IF I/O COMPLETE
R0581     BUF2=L+3        IF I/O COMPLETE AND GOOD.
R0582     BUF2=L+2 IF I/O COMPLETE BUT FAILED.

R0583   ERASABLE INITIALIZATION-
R0584     BUF2 CONTAINS RETURN ADDRESS PLUS 1,(L+2)
R0585     BUF2+1 CONTAINS FBANK VALUE OF CALLING ROUTINE.
R0586     MODECADR OF CALLING ROUTINE CONTAINS +0,-1,-0 OR  CADR RETURN ADDRESS.

R0587   DEBRIS-
R0588     RUPTREG2 AND CALLING ROUTINE MODECADR.

 0589   REF 132  LAST 1320   07,3703  3 4753 1  AOTSTALL CAF     ONE              AOT.
 0590   REF   1              07,3704  0 3710 1           TC      STALL

 0591   REF  84  LAST 1311   07,3705  3 4752 0  RADSTALL CAF     TWO
 0592   REF   2  LAST 1321   07,3706  1 3710 0           TCF     STALL
 0593   REF   3  LAST  955   07,3703              OPTSTALL EQUALS ACTSTALL

 0594   REF 238  LAST 1320   07,3707  3 4755 1  IMUSTALL CAF    ZERO               IMU.

 0595                        07,3710  0 0004 0  STALL    INHINT
 0596   REF  20  LAST 1320   07,3711  54 071 0           TS     RUPTREG2           SAVE DEVICE INDEX.
 0597   REF 423  LAST 1319   07,3712  50 000 1           INDEX  A                  SEE IF OPERATION COMPLETE.
 0598   REF   9  LAST 1320   07,3713  11'301 0           CCS    MODECADR
 0599   REF   1              07,3714  1 3732 0           TCF    MODABORT           ALLOWABLE STATES ARE +0, -1, AND -0.
 0600   REF   1              07,3715  1 3726 0           TCF    MODESLP            OPERATION INCOMPLETE.
 0601   REF   1              07,3716  1 3722 1           TCF    MODEGOOD           COMPLETE AND GOOD IF = -1.

 0602   REF  21  LAST 1322   07,3717  50 071 1  MG2      INDEX  RUPTREG2           COMPLETE AND FAILED IF -0. RESET TO +0.
 0603   REF  10  LAST 1322   07,3720  55'301 0           TS     MODECADR           RETURN TO CALLER.
 0604   REF   8  LAST 1319   07,3721  1 2746 1           TCF    MODEEXIT

 0605   REF 424  LAST 1322   07,3722  10 000 0  MODEGOOD CCS    A                  MAKE SURE INITIAL STATE -1.
 0606   REF   2  LAST 1322   07,3723  1 3732 0           TCF    MODABORT

 0607   REF  24  LAST 1312   07,3724  24 133 0           INCR   BUF2               IF SO, INCREMENT RETURN ADDRESS AND
 0608   REF   1              07,3725  1 3717 1           TCF    MG2                RETURN IMMEDIATELY, SETTING CADR = +0.

 0609   REF  13  LAST  932   07,3726  0 4645 1  MODESLP  TC     MAKECADR           CALL FROM SWITCHABLE FIXED ONLY.
 0610   REF  22  LAST 1322   07,3727  50 071 1           INDEX  RUPTREG2
 0611   REF  11  LAST 1322   07,3730  55'301 0           TS     MODECADR
 0612   REF   6  LAST 1312   07,3731  1 5133 1           TCF    JOBSLEEP

 0613   REF  25  LAST 1322   07,3732  52 134 0  MODABORT DXCH   BUF2
 06132  REF   6  LAST 1120   07,3733  0 5706 0           TC     BAILOUT1           TWO PROGRAMS USING THE SAME DEVICE.
 0614                        07,3734   31210 0           OCT    31210
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P0615           CONSTANTS FOR MODE SWITCHING ROUTINES

 0616  REF  4  LAST  966     5741             BITS3&4  =      OCT14
 0617  REF  3  LAST 1278     4771             BITS4&6  =      OCT50
 0618                    07,3735  00030 1    BITS4-5  OCT    00030
 0619  REF 41  LAST 1315     4744             IMUSEFLG EQUALS BIT8                INTERPRETER SWITCH 7.
 0620                    07,3736  77500 1    -COMMAX  DEC    -191
 0621                    07,3737  77477 0    -COMMAX- DEC    -192
 0622                    07,3740  00074 1    600MS    DEC    60
 0623  REF  4  LAST  947 07,3201              IMUFIN20 =      IMUFINE
 0624  REF  4  LAST  371 07,3741  3 1304 1   GOMANUR  CA     ATTCADR             IS KALCMANU FREE
 0625                    07,3742  0 0006 1            EXTEND
 0626                    07,3743  1 3745 0            BZF    +2
 0627  REF  3  LAST 1322 07,3744  0 3732 1            TC     MODABORT            BAILOUT
 0629                    07,3745  0 0006 1    +2      EXTEND
 0630  REF 26  LAST 1322 07,3746  3 0134 1            DCA    BUF2
 0632  REF  5  LAST 1323 07,3747  53'305 1            DXCH   ATTCADR             SAVE FINAL RETURN FOR KALCMAN3

 0633  REF 44  LAST 1292 07,3750  3 0006 1            CA     BBANK
 0634  REF 21  LAST 1314 07,3751  7 4757 1            MASK   SEVEN
 0635  REF  6  LAST 1323 07,3752  27'305 1            ADS    ATTCADR +1

 0642  REF 32  LAST 1107 07,3753  3 0167 1            CA     PRIORITY
 0643  REF  2  LAST  234 07,3754  7 7730 0            MASK   PRIO37
 0644  REF  2  LAST  371 07,3755  55'306 1            TS     ATTPRIO             SAVE USERS PRIO

 06452 REF  1            07,3756  2 3762 1            CAF    KALEBCON            SET EBANK FOR KALCMAN3
 06453 REF 78  LAST 1316 07,3757  54 003 0            TS     EBANK
 06454 REF 58  LAST 1279 07,3760  0 4635 0            TC     POSTJUMP
 06455 REF  1            07,3761   44004 0            CADR   KALCMAN3
 06456 REF 13  LAST  489 07,3762   03275 1   KALEBCON ECADR  BCDU
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R0646   PROGRAM DESCRIPTION
R0647   IMU STATUS CHECK ROUTINE R02  (SUBROUTINE UTILITY)
R0648   MOD NO - 1
R0649   MOD BY - N.BRODEUR
R0650   FUNCTIONAL DESCRIPTION
R0651
R0652   TO CHECK WHETHER IMU IS ON AND IF ON WHETHER IT IS ALIGNED TO AN
R0653   ORIENTATION KNOWN BY THE CMC. TO REQUEST SELECTION OF THE APPROPRIATE
R0654   PROGRAM IF THE IMU IS OFF OR NOT ALIGNED TO AN ORIENTATION KNOWN BY THE
R0655   CMC. CALLED THROUGH BANKCALL
R0656   CALLING SEQUENCE-
R0657
R0658   L         TC      BANKCALL
R0659   L+1       CADR    R02BOTH
R0660   SUBROUTINES CALLED
R0661
R0662         VARALARM
R0663         FLAGUP
R0664   NORMAL EXIT MODES
R0665
R0666   AT L+2 OF CALLING SEQUENCE
R0667   ALARM OR ABORT EXIT MODES
R0668         GOTOPOOH, WITH ALARM
R0673   ERASABLE INITIALIZATION REQUIRED
R0674
R0675   NONE
R0676   DEBRIS
R0677
R0678   CENTRALS-A,Q,L
 0679                          34,3650                          BANK    34
 0680   REF   1                04,2000                          SETLOC  R02
 0681                          04,3232                          BANK
 0682   REF   1                                                 COUNT*  $$/R02
 0683                          04,3232   00063 1  DEC51         DEC     51
 0684   REF   7  LAST 1307     04,3233  3 4737 0  R02BOTH       CAF     REFSMBIT
 0685   REF  20  LAST 1307     04,3234  7 0077 0                MASK    FLAGWRD3
 0686   REF 425  LAST 1322     04,3235  1 0000 0                CCS     A
 0687   REF   1                04,3236  0 3247 0                TC      R02ZERO          ZERO IMUS

 0688   REF  67  LAST 1319     04,3237  3 1277 1                CA      IMODES30
 0689   REF  30  LAST 1318     04,3240  7 4743 1                MASK    BIT9             IS ISS INITIALIZED
 0690                          04,3241  0 0006 1                EXTEND
 0691                          04,3242  1 3244 1                BZF     +2
 0692   REF  50  LAST 1316     04,3243  4 4750 0                CS      BIT4             SEND IMU ALARM CODE 210
 0693   REF   1                04,3244  6 3252 1                AD      OCT220           SEND REFSMM ALARM
 0694   REF   4  LAST  626     04,3245  0 5734 1                TC      VARALARM

 0695   REF  63  LAST  977     04,3246  0 6001 0                TC      GOTOPOOH

 0700   REF  71  LAST 1246     04,3247  0 5504 0  R02ZERO       TC      UPFLAG
 0701    REF    6  LAST   977    04,3250    00007 0                ADRES    IMUSE
 0702    REF    9  LAST  1310    04,3251  1 4631 0                 TCF      SWRETURN
 07025                           04,3252    00220 1   OCT220       OCT      220
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L        IMU MODE SWITCHING ROUTINES                                                     USER'S PAGE NO.  26       E3 S4

P0703    PROGRAM DESCRIPTION   P06   10FEB67

R0704    TRANSFER THE ISS/CMC FROM THE OPERATE TO THE STANDBY CONDITION.

R0705    THE NORMAL CONDITION OF READINESS OF THE GNCS WHEN NOT IN USE IS STANDBY. IN THIS CONDITION THE IMU
R0707    HEATER POWER IS ON. THE IMU OPERATE POWER IS OFF. THE COMPUTER POWER IS ON. THE OPTICS POWER IS OFF. THE
R0709    CMC  STANDBY ON THE MAIN AND LEB DISKYS IS ON.

R0710    CALLING SEQUENCE:
R0711              ASTRONAUT REQUEST THROUGH DSKY     V37E 06E.

R0712    SUBROUTINES CALLED:
R0713              GOPERF1
R0716              BANKCALL
R0719              FLAGDOWN
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P0810    PRESTAND PREPARES FOR STANDBY BY SNAPSHOTTING THE SCALER AND TIME1 TIME2
R0811    THE LOW 5 BITS OF THE SCALER ARE INSPECTED TO INSURE COMPATABILITY
R0812    BETWEEN THE SCALER READING AND THE TIME1 TIME2 READING.

 08125   REF    1                37,2000                          SETLOC  P05P06
 08126                           37,3652                          BANK

 0813.   REF    2  LAST   99        0314                          EBANK=  TIME2SAV
 0814    REF    1                                                 COUNT*  $$/P06

 08145   REF   72  LAST 1324     37,3652  0 5504 0   P06          TC      UPFLAG           SET NODOV37 BIT
 08146   REF    7  LAST 1203     37,3653   00054 0                ADRES   NODOFLAG

 0815                            37,3654  0 0004 0   PRESTAND     INHINT
 0816                            37,3655  0 0006 1                EXTEND
 0817    REF   33  LAST 1299     37,3656  3 0025 0                DCA     TIME2            SNAPSHOT TIME1TIME2
 0818    REF    3  LAST 1327     37,3657  52 315 1                DXCH    TIME2SAV
 0819    REF    1                37,3660  0 3711 0                TC      SCALPREP
 0820    REF    1                37,3661  0 3654 0                TC      PRESTAND         T1,T2,SCALER NOT COMPATIBLE
 0821    REF  797  LAST 1312     37,3662  52 155 1                DXCH    MPAC             T1,T2 AND SCALER OK
 0822    REF    1                37,3663  52 317 0                DXCH    SCALSAVE         STORE SCALER
 0823                            37,3664  0 0004 0                INHINT
 0824    REF  302  LAST 1257     37,3665  0 4616 1                TC      BANKCALL
 0825    REF    3  LAST  178     37,3666   17166 0                CADR    RNDREFDR         REFSMM, DRIFT, TRACK FLAGS DOWN

 0826    REF   99  LAST 1203     37,3667  0 5516 0                TC      DOWNFLAG
 0827    REF    7  LAST 1325     37,3670   00007 0                ADRES   IMUSE            IMUSE DOWN
 08271   REF  100  LAST 1327     37,3671  0 5516 0                TC      DOWNFLAG
 08272   REF    7  LAST  831     37,3672   00010 0                ADRES   RNDVZFLG         RNDVZFLG DOWN

 0828    REF   29  LAST 1303     37,3673  3 4741 1                CAF     BIT11
 0829                            37,3674  0 0006 1                EXTEND
 0830    REF   20  LAST  987     37,3675  05 013 0                WOR     CHAN13           SET STANDBY ENABLE BIT

 0831    REF  112  LAST 1235     37,3676  0 5353 1                TC      PHASCHNG         SET RESTART TO POSTAND WHEN STANDBY
 0832                            37,3677   07024 0                OCT     07024              RECOVERS
 0833                            37,3700   20000 0                OCT     20000
 08335   REF    2  LAST 1327        0316                          EBANK=  SCALSAVE
 0834    REF    1                37,3701   03731 1                2CADR   POSTAND
 0834    REF    1                37,3702   76060 0
 0835    REF    1                37,3703  3 4774 1                CAF     OCT62
 0836    REF  303  LAST 1327     37,3704  0 4616 1                TC      BANKCALL
 0837    REF   10  LAST  966     37,3705   20624 0                CADR    GOPERF1
 0838                            37,3706  1 3703 1                TCF     -3
 0839                            37,3707  1 3703 1                TCF     -4
 0840                            37,3710  1 3703 1                TCF     -5

 08405   REF    3  LAST  604        4774             OCT62        EQUALS  .5SEC            DEC 50 = OCT 62

R0841    THE LOW 5 BITS OF THE SCALER READS 10000 FOR THE FIRST INTERVAL AFTER A
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R0842    T1 INCREMENT. IF SCALPREP DETECTS THIS INTERVAL THE T1,T2 AND SCALER
R0843    DATA ARE NOT COMPATABLE AND RETURN IS TO L+1 FOR ANOTHER READING OF THE
R0844    DATA. OTHERWISE, THE RETURN IS TO L+2 TO PROCEED. ROUTINE ALSO PREPARES
R0845    THE SCALER READING FOR COMPUTATION OF THE INCREMENT TO UPDATE T1T2. (THE
R0846    10 MS BIT (BIT 6) OF THE SCALER IS INCREMENTED 5 MS OUT OF PHASE FROM
R0847    T1.) ADDITION OF 5 MS (BIT 5) TO THE SCALER READING HAS THE EFFECT OF
R0848    ADJUSTING BIT 6 IN THE SCALER TO BE IN PHASE WITH BIT 1 OF T1. THE LOW 5
R0849    BITS OF THE SCALER READING ARE THEN SET TO ZERO, TO TRUNCATE THE SCALER
R0850    DATA TO 10 MS. RESULTS ARE STORED IN MPAC, +1.

 0851                            37,3711  0 0006 1  SCALPREP EXTEND
 0852    REF 798  LAST 1327      37,3712  22 156 0           QXCH    MPAC     +2
 0853    REF   3  LAST  383      37,3713  0 4103 1           TC      FINETIME +1
 0854                            37,3714  0 0003 1           RELINT
 0855    REF 799  LAST 1328      37,3715  52 155 1           DXCH    MPAC
 0856    REF  42  LAST 1309      37,3716  3 4747 1           CA      BIT5                ADD 5 MS TO THE SCALER READING.
 0857    REF 236  LAST 1315      37,3717  54 001 1           TS      L
 0858    REF 239  LAST 1322      37,3720  3 4755 1           CA      ZERO
 0859    REF 800  LAST 1328      37,3721  20 155 1           ADS     MPAC
 0860    REF  11  LAST  738      37,3722  4 4346 0           CS      LOW5                SET LOW 5 BITS OF (SCALER+5MS) TO ZERO
 0861    REF 801  LAST 1328      37,3723  7 0155 1           MASK    MPAC     +1         AND STORE RESULTS IN MPAC,+1.
 0862    REF 802  LAST 1328      37,3724  56 155 0           XCH     MPAC     +1
 0863    REF  12  LAST 1328      37,3725  7 4346 0           MASK    LOW5                TEST LOW 5 BITS OF SCALER FOR THE FIRST
A0864                                                                                    INTERVAL AFTER THE T1 INCREMENT
A0865                                                                                    (NOW = 00000, SINCE BIT 5 ADDED).
 0866    REF 426  LAST 1324      37,3726  10 000 0           CCS     A                   IS IT 1ST INTERVAL AFTER T1 INCREMENT
 0867    REF 803  LAST 1328      37,3727  24 156 0           INCR    MPAC +2             NO
 0868    REF 804  LAST 1328      37,3730  0 0156 0           TC      MPAC +2             YES

R0869    POSTAND RECOVERS TIME AFTER STANDBY.THE SCALER IS SNAPSHOTTED AND THE
R0870    TIME1 TIME2 COUNTER IS SET TO ZERO. THE LOW 5 BITS OF THE SCALER ARE
R0871    INSPECTED TO INSURE COMPATABILITY BETWEEN THE SCALER READING AND THE
R0872    CLEARING OF THE TIME COUNTER. IT THEN COMPUTES THE DIFFERENCE IN SCALER
R0873    VALUES (IN CP) AND ADDS THIS TO THE PREVIOUSLY SNAPSHOTTED VALUES OF
R0874    TIME1 TIME2 AND PLACES THIS NEW TIME INTO THE TIME1 TIME2 COUNTER.

 0875    REF   1                                             COUNT* $$/P05

 0876    REF  30  LAST 1327      37,3731  4 4741 0  POSTAND  CS      BIT11               RECOVER TIME AFTER STANDBY.
 0877                            37,3732  0 0006 1           EXTEND
 0878    REF  21  LAST 1327      37,3733  03 013 0           WAND    CHAN13              CLEAR STANDBY ENABLE BIT
 0879                            37,3734  0 0004 0           INHINT
 0880    REF 240  LAST 1328      37,3735  3 4755 1           CA      ZERO
 0881    REF 237  LAST 1328      37,3736  54 001 1           TS      L
 0882    REF  34  LAST 1327      37,3737  52 025 1           DXCH    TIME2               CLEAR TIME1TIME2
 0883    REF   2  LAST 1327      37,3740  0 3711 0           TC      SCALPREP            STORE SCALER IN MPAC, MPAC+1
 0884    REF   2  LAST 1327      37,3741  0 3734 1           TC      POSTAND +3          T1,T2,SCALER NOT COMPATIBLE
 0885                            37,3742  0 0006 1           EXTEND                      T1,T2 AND SCALER OK
 0886    REF   3  LAST 1327      37,3743  4 0317 0           DCS     SCALSAVE
 0887    REF 805  LAST 1328      37,3744  20 155 1           DAS     MPAC                FORM CP DIFFERENCE OF POSTSTANDBY SCALER
 0888   REF  46  LAST 1316   37,3745  3 4742 1             CAF    BIT10          MINUS PRESTANDBY SCALER AND SHIFT RIGHT
 0889   REF  11  LAST  877   37,3746  0 7312 0             TC     SHORTMP        5 TO ALIGN BITS WITH TIME1TIME2.
 0890   REF 241  LAST 1328   37,3747  3 4755 1             CAF    ZERO
 0891   REF 806  LAST 1328   37,3750  54 156 1             TS     MPAC     +2    NEEDED FOR TP AGREE
 0892   REF  16  LAST 1311   37,3751  0 7262 0             TC     TPAGREE        MAKE DP DIFF AGREE
 0893   REF 807  LAST 1329   37,3752  10 154 0             CCS    MPAC
 0894   REF   1              37,3753  0 3760 0             TC     POSTCOM        IF DP DIFF NET +, NO SCALER OVERFLOW
 0895   REF   2  LAST 1329   37,3754  0 3760 0             TC     POSTCOM        BETWEEN PRE AND POST STANDBY.
 0896                        37,3755  0 3756 0             TC     +1             IF DP DIFF NET -, SCALER OVERFLOWED. ADD
 0897   REF  47  LAST 1329   37,3756  3 4742 1             CAF    BIT10          BIT 10 TO HIGH DIFF TO CORRECT.
 0898   REF 808  LAST 1329   37,3757  26 154 0             ADS    MPAC
 0899                        37,3760  0 0006 1  POSTCOM    EXTEND                C(MPAC,+1) IS MAGNITUDE OF DELTA SCALER.
 0900   REF   4  LAST 1327   37,3761  3 0315 0             DCA    TIME2SAV       PRESTANDBY TIME1TIME2
 0901   REF 809  LAST 1329   37,3762  20 155 1             DAS    MPAC
 0902   REF  17  LAST 1329   37,3763  0 7262 0             TC     TPAGREE        FORCE SIGN AGREEMENT
 0903   REF 810  LAST 1329   37,3764  52 155 1             DXCH   MPAC           UPDATED VALUE FOR T1,T2.
 0904   REF  35  LAST 1328   37,3765  20 025 1             DAS    TIME2          LOAD UPDATED VALUE INTO T1,T2, WITH
 09045  REF 101  LAST 1327   37,3766  0 5516 0             TC     DOWNFLAG       CLEAR NODOFLAG
 09046  REF   8  LAST 1327   37,3767   00054 0             ADRES  NODOFLAG

 0905   REF  64  LAST 1324   37,3770  0 6001 0             TC     GOTOPOOH
 0001                         14,3775                          BANK    14
 0002    REF    1             04,2000                          SETLOC  KEYRUPT
 0003                         04,3253                          BANK
 0004    REF    1                                              COUNT*  $$/KEYUP

 0005    REF    9  LAST 1123  04,3253  54 016 1  KEYRUPT1 TS      BANKRUPT
 0006    REF  356  LAST 1319  04,3254  56 002 0           XCH     Q
 0007    REF    8  LAST 1123  04,3255  54 012 0           TS      QRUPT
 0008    REF    2  LAST  442  04,3256  0 4400 1           TC      LODSAMPT       TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0009    REF   13  LAST 1328  04,3257  3 4346 1           CAF     LOW5
 0010                         04,3260  0 0006 1           EXTEND
 0011    REF    2  LAST  220  04,3261  02 015 1           RAND    MNKEYIN        CHECK IF KEYS 5M-1M ON
 0012    REF    6  LAST 1292  04,3262  54 073 1  KEYCOM   TS      RUPTREG4
 0013    REF   29  LAST  910  04,3263  4 0101 0           CS      FLAGWRD5
 0014    REF    1             04,3264  7 4735 0           MASK    DSKYFBIT
 0015    REF   30  LAST 1330  04,3265  26 101 0           ADS     FLAGWRD5

 0016    REF    6  LAST 1093  04,3266  3 4355 0  ACCEPTUP CAF     CHRPRIO        (NOTE: RUPTREG4 = KEYTEMP1)
 0017    REF   28  LAST 1300  04,3267  0 5072 1           TC      NOVAC
 0018    REF   66  LAST  462      0776                    EBANK=  DSPCOUNT
 0019    REF    1             04,3270   02077 0           2CADR   CHARIN
 0019    REF    1             04,3271   60101 1
 0020    REF    7  LAST 1330  04,3272  3 0073 0           CA      RUPTREG4
 0021    REF   24  LAST 1320  04,3273  50 064 0           INDEX   LOCCTR
 0022    REF  811  LAST 1329  04,3274  54 154 0           TS      MPAC           LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
 0023    REF   22  LAST  989  04,3275  0 5270 1           TC      RESUME
```

```
L        KEYRUPT, UPRUPT                                                                           USER'S PAGE NO.   2      EO S3

P0024    UPRUPT PROGRAM

 0025    REF  10  LAST 1330    04,3276   54 016 1  UPRUPT    TS     BANKRUPT
 0026    REF 357  LAST 1330    04,3277   56 002 0            XCH    Q
 0027    REF   9  LAST 1330    04,3300   54 012 0            TS     QRUPT
 0028    REF   3  LAST 1330    04,3301   0 4400 1            TC     LODSAMPT           TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0029    REF 242  LAST 1329    04,3302   3 4755 1            CAF    ZERO
 0030    REF   2  LAST  224    04,3303   56 045 0            XCH    INLINK
 0031    REF   2  LAST  156    04,3304   54 073 1            TS     KEYTEMP1
 0032    REF  35  LAST 1277    04,3305   3 4751 0            CAF    BIT3               TURN ON UPACT LIGHT
 0033                          04,3306   0 0006 1            EXTEND                    (BIT 3 OF CHANNEL 11)
 0034    REF  34  LAST 1319    04,3307   05 011 1            WOR    DSALMOUT
 0035    REF  14  LAST 1330    04,3310   3 4346 1  UPRPT1    CAF    LOW5               TEST FOR TRIPLE CHAR REDUNDANCY
 0036    REF   3  LAST 1331    04,3311   7 0073 1            MASK   KEYTEMP1           LOW5 OF WORD
 0037    REF   4  LAST 1331    04,3312   56 073 0            XCH    KEYTEMP1           LOW5 INTO KEYTEMP1
 0038                          04,3313   0 0006 1            EXTEND
 0039    REF  48  LAST 1329    04,3314   7 4742 0            MP     BIT10              SHIFT RIGHT 5
 0040    REF   1               04,3315   54 332 1            TS     KEYTEMP2
 0041    REF  15  LAST 1331    04,3316   7 4346 0            MASK   LOW5               MID 5
 0042    REF   1               04,3317   6 3353 1            AD     HI10
 0043    REF   1               04,3320   0 3350 1            TC     UPTEST
 0044    REF  49  LAST 1331    04,3321   3 4742 1            CAF    BIT10
 0045                          04,3322   0 0006 1            EXTEND
 0046    REF   2  LAST 1331    04,3323   7 0332 1            MP     KEYTEMP2           SHIFT RIGHT 5
 0047    REF  16  LAST 1331    04,3324   7 4346 0            MASK   LOW5               HIGH 5
 0048                          04,3325   4 0000 0            COM
 0049    REF   2  LAST 1331    04,3326   0 3350 1            TC     UPTEST

 0050    REF   1               04,3327   4 3356 0  UPCK      CS     ELRCODE            CODE IS GOOD. IF CODE = 'ERROR RESET',
 0051    REF   5  LAST 1331    04,3330   6 0073 0            AD     KEYTEMP1           CLEAR UPLOCKFL(SET BIT4 OF FLAGWRD7 = 0)
 0052                          04,3331   0 0006 1            EXTEND                    IF CODE DOES NOT = 'ERROR RESET', ACCEPT
 0053    REF   1               04,3332   1 3340 1            BZF    CLUPLOCK           CODE ONLY IF UPLOCKFL IS CLEAR (=0).

 0054    REF   1               04,3333   3 4750 1            CAF    UPLOCBIT           TEST UPLOCKFL FOR 0 OR 1
 0055    REF  26  LAST  891    04,3334   7 0103 1            MASK   FLAGWRD7
 0056    REF 427  LAST 1328    04,3335   10 000 0            CCS    A
 0057    REF  23  LAST 1330    04,3336   0 5270 1            TC     RESUME             UPLOCKFL = 1
 0058    REF   1               04,3337   0 3266 0            TC     ACCEPTUP           UPLOCKFL = 0

 0059    REF   2  LAST 1331    04,3340   4 4750 0  CLUPLOCK  CS     UPLOCBIT           CLEAR UPLOCKFL (I.E.,SET BIT 4 OF )
 0060    REF  27  LAST 1331    04,3341   7 0103 1            MASK   FLAGWRD7           FLAGWRD7 = 0)
 0061    REF  28  LAST 1331    04,3342   54 103 1            TS     FLAGWRD7
 0062    REF   2  LAST 1331    04,3343   0 3266 0            TC     ACCEPTUP

A0063                                                                                  CODE IS BAD
 0064    REF  29  LAST 1331    04,3344   4 0103 1  TMFAIL2   CS     FLAGWRD7           LOCK OUT FURTHER UPLINK ACTIVITY
 0065    REF   3  LAST 1331    04,3345   7 4750 0            MASK   UPLOCBIT           (BY SETTING UPLOCKFL = 1) UNTIL
 0066    REF  30  LAST 1331    04,3346   26 103 1            ADS    FLAGWRD7           'ERROR RESET' IS SENT VIA UPLINK.
 0067    REF  24  LAST 1331    04,3347   0 5270 1            TC     RESUME
 0069    REF   6  LAST 1331    04,3350   6 0073 0  UPTEST    AD     KEYTEMP1
```

```
L        KEYRUPT, UPRURT                                                                         USER'S RAGE NO.   3      EO S3

 0070    REF 428  LAST 1331    04,3351  10 000 0              CCS     A
 0071    REF   1               04,3352  C 3344 1              TC      TMFAIL2
 0072                          04,3353   77740 1  HITO        OCT     77740
 0073    REF   2  LAST 1332    04,3354  0 3344 1              TC      TMFAIL2
 0074    REF 359  LAST 1331    04,3355  C 3002 0              TC      Q

 0075                          04,3356   00022 1  ELRCODE     OCT     22

R0076    'LPLINK ACTIVITY LIGHT' IS TURNED CFF BY .....
R0077              1.      VBRELDSP
R007B              2.      ERFCR RESET
R0079              3.      UPDATE RRCGRAM(P27) ENTEREC BY V70,V71,V72,AND V73.


R0080
R0081    THE RECERTICN CF A BAC CCDE(I.E  CCC FAILURE) LOCKS OUT FURTHER UPLINK ACTIVITY BY SETTING BIT4 CF FLAGWRD7 = 1.
R0083    THIS INDICATION WILL BE TRANSFERRED TO THE GRCUNC BY THE DOWNLINK WHICH DOWNLINKS ALL FLAGWOROS.
R0085    WHEN URLINK ACTIVITY IS LOCKEC OUT ,IT CAN BE ALLOWED WHEN THE GROUND UPLINKS AND 'ERRCR RESFT' CODE.
R0087    (IT IS RECOMMENDED THAT THE 'ERRCR LIGHT RESET' COCE IS PRECEEDED BY 16 BITS THE FIRST OF WHICH IS 1 FOLLOWED
R0089    BY 15 ZEROES. THIS WILL ELIMINATE EXTRANEOUS BITS FROM INLINK WHICH MAY HAVE BEEN LEFT OVER FROM THE ORIGINAL
R0091    FAILURE)
R0092    UPLINK ACTIVITY IS ALSO ALLOWED(UNLOCKED) CURING FRESH START WHEN FRESH START SETS BIT4 OF FLAGWRD7 = 0.
```

```
R0001    DISPLAYS CAN BE CLASSIFIED INTO THE FOLLOWING CATEGORIES-

R0002        1. PRIORITY DISPLAYS- DISPLAYS WHICH TAKE PRIORITY OVER ALL OTHER DISPLAYS. USUALLY THESE DISPLAYS ARE SENT
R0004           OUT UNDER CRITICAL ALARM CONDITIONS.
R0005        2. EXTENDED VERB DISPLAYS- ALL EXTENDED VERBS AND MARK ROUTINES SHOULD USE EXTENDED VERB (MARK) DISPLAYS.
R0007        3. NORMAL DISPLAYS- ALL MISSION PROGRAM DISPLAYS WHICH INTERFACE WITH THE ASTRONAUT DURING THE NORMAL
R0009           SEQUENCE OF EVENTS.
R0010        4. MISC. DISPLAYS- ALL DISPLAYS NOT HANDLED BY THE DISPLAY INTERFACEROUTINES. THESE INCLUDE SUCH DISPLAYS AS
R0012           MM DISPLAYS AND SPECIAL PURPOSE DISPLAYS HANDLED BY PINBALL.


R0013        5. ASTRONAUT INITIATED DISPLAYS- ALL DISPLAYS INITIATED EXTERNALLY.
R0014    THE FOLLOWING TERMS ARE USED TO DESCRIBE THE STATUS OF DISPLAYS-

R0015        1. ACTIVE-THE DISPLAY WHICH IS (1) BEING DISPLAYED TO THE ASTRONAUT AND WAITING FOR A RESPONSE OR
R0017           (2) WAITING FIRST IN LINE FOR THE ASTRONAUT TO FINISH USING THE DSKY OR (3) BEING DISPLAYED ON THE DSKY
R0019           BUT NOT WAITING FOR A RESPONSE.
R0020        2. INACTIVE -A DISPLAY WHICH HAS (1) BEEN ACTIVE BUT WAS INTERRUPTEDBY A DISPLAY OF HIGHER PRIORITY,
R0022           (2) BEEN PUT INTO THE WAITING LIST AT TIME IT WAS REQUESTED DUE TO THE FACT A HIGHER PRIORITY DISPLAY
R0024           WAS ALREADY GOING, (3) BEEN INTERRUPTED BY THE ASTRONAUT (CALLED A PINBRANCH CONDITION, SINCE THIS TYPE
R0026           OF INACTIVE DISPLAY IS USUALLY REACTIVATED ONLY BY PINBALL) OR (4) A DISPLAY WHICH HAS FINISHED BUT STILL
R0028           HAS INFO SAVED FOR RESTART PURPOSES.


R0029    DISPLAY PRIORITIES WORK AS FOLLOWS-

R0030      INTERRUPTS-
R0031        1. THE ASTRONAUT CAN INTERRUPT ANY DISPLAY WITH AN EXTERNAL DISPLAY REQUEST.
R0033        2. INTERNAL DISPLAYS CAN NOT BE SENT OUT WHEN THE ASTRONAUT IS USING THE DSKY.
R0035        3. PRIORITY DISPLAYS INTERRUPT ALL OTHER TYPES OF INTERNAL DISPLAYS. A PRIORITY DISPLAY INTERRUPTING ANOTHER
R0037           PRIORITY DISPLAY WILL CAUSE AN ABORT UNLESS BIT14 IS SET FOR THE LINUS ROUTINE.
R0039        4. A MARK DISPLAY INTERRUPTS ANY NORMAL DISPLAY.
R0040        5. A MARK THAT INTERRUPTS A MARK COMPLETELY REPLACES IT.

R0041      ORDER OF WAITING DISPLAYS-
R0042        1. ASTRONAUT EXTERNAL USE
R0043        2. PRIORITY
R0044        3. INTERRUPTED MARK
R0045        4. INTERRUPTED NORMAL

R0046        5. MARK TO BE REQUESTED (SEE DESCRIPTION OF ENDMARK)
R0047        6. MARK WAITING
R0048        7. NORMAL WAITING
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R0049   THE DISPLAY ROUTINES ARE INTENDED TO SERVE AS AN INTERFACE BETWEEN THE USER AND PINBALL.  THE
R0051   FOLLOWING STATEMENTS CAN BE MADE ABOUT NORMAL DISPLAYS AND PRIORITY DISPLAYS (A DESCRIPTION OF MARK ROUTINES
R0053   WILL FOLLOW LATER):

R0054        1.  ALL ROUTINES THAT END IN R HAVE AN IMMEDIATE RETURN TO THE USER.  FOR ALL FLASHING DISPLAYS THIS RETURN
R0056            IS TO THE USERS CALL CADR +4.  FOR THE ONLY NON FLASHING IMMEDIATE RETURN DISPLAY (GODSPR) THIS RETURN
R0058            IS TO THE USERS CALLING LOC +1.
R0059        2.  ALL ROUTINES NOT ENDING IN R DO NOT DO AN IMMEDIATE RETURN TO THE USER.
R0061        3.  ALL ROUTINES THAT END IN R START A SEPARATE JOB (MAKEPLAY) WITH USERS JOB PRIORITY.
R0063        4.  ALL ROUTINES NOT ENDING IN R BRANCH DIRECTLY TO MAKEPLAY WHICH MAKES THESE DISPLAYS A PART OF THE
R0065            USERS JOB.
R0066        5.  ALL DISPLAY ROUTINES ARE CALLED VIA BANKCALL.
R0067        6.  TO RESTART A DISPLAY THE USER WILL GENERALLY USE A PHASE OF ONE WITH DESIRED RESTART GROUP (SEE
R0069            DESCRIPTION OF RESTARTS).
R0070        7.  ALL FLASHING DISPLAYS HAVE 3 RETURNS TO THE USER FROM ASTRONAUT RESPONSES.  A TERMINATE (V34) BRANCHES
R0072            TO THE USERS CALL CADR +1.  A PROCEED (V33) BRANCHES TO THE USERS CALL CADR +2.  AN ENTER OR RECYCLE
R0074            (V32) BRANCHES TO THE USERS CALL CADR +3.
R0075        8.  ALL ROUTINES MUST BE USED UNDER EXECUTIVE CONTROL.

R0076   A DESCRIPTION OF EACH ROUTINE WITH AN EXAMPLE FOLLOWS:

R0077   GODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A.  NO RETURN IS MADE TO THE USER.

R0079        1.  GODSP IS NOT RESTARTABLE
R0080        2.  A VERB PASTE WITH GODSP ALWAYS TURNS ON THE FLASH.
A0081                                                   CAF      VXXNYY
A0082                                                   TC       BANKCALL
A0083                                                   CADR     GODSP

A0084                                           VXXNYY  OCT      0XXYY

R0085   GODSPR IS THE SAME AS GODSP ONLY RETURN IS TO THE USER.

A0086                                                   CAF      VXXNYY
A0087                                                   TC       BANKCALL
A0088                                                   CADR     GODSPR

A0089                                                   ...      ...             IMMEDIATE RETURN OF GODSPR

R0090   GOFLASH DISPLAYS A FLASHING VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0092   THE ASTRONAUT (SEE NO. 7 ABOVE).

A0093                                                   CAF      VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN.
A0094                                                   TC       BANKCALL
A0095                                                   CADR     GOFLASH
A0096                                                   ...      ...             TERMINATE RETURN
A0097                                                   ...      ...             PROCEED RETURN
A0098                                                   ...      ...             ENTER OR RECYCLE RETURN

R0099   GOPERF1 IS ENTERED WITH DESIRED CHECKLIST VALUE IN A.  GOPERF1 WILL DISPLAY THIS VALUE IN R1 BY MEANS OF A
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R0101   V01 N25. A FLASHING PLEASE PERFORM ON CHECKLIST ( V50 N25) IS THEN DISPLAYED.  NO IMMEDIATE RETURN IS MADE TO
R0103   USER (SEE NO. 7 ABOVE).

R0104   GOPERF1 BLANKS REGISTERS R2 AND R3

A0105                                                       CAF     OCTXX           CODE FOR CHECKLIST VALUE XX
A0106                                                       TC      BANKCALL
A0107                                                       CADR    GOPERF1
A0108                                                       ...     ...             TERMINATE RETURN
A0109                                                       ...     ...             PROCEED RETURN
A0110                                                       ...     ...             ENTER RETURN

R0111   GOPERF2 IS ENTERED WITH A VARIABLE NOUN AND V01 ( V00 FOR N10 OR N11) IN A.  GOPERF2 WILL FIRST DISPLAY THE
R0113   REQUESTED NOUN BY MEANS OF A V01NYY OR A V00NYY. PLEASE PERFORM ON NOUN (V50 NYY) THEN BECOMES A FLASHING
R0115   DISPLAY.  NO IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0116   GOPERF2 DOES NOT BLANK ANY REGISTERS

A0117                                                       CAF     VXXNYY          VARIABLE NOUN YY. XX=00 OR 01.
A0118                                                       TC      BANKCALL
A0119                                                       CADR    GOPERF2
A0120                                                       ...     ...             TERMINATE RETURN
A0121                                                       ...     ...             PROCEED RETURN
A0122                                                       ...     ...             ENTER RETURN

R0123   GOPERF3 IS USED FOR A PLEASE PERFORM ON A PROGRAM NUMBER.  THE DESIRED PROGRAM NO. IS ENTERED IN A.  GOPERF3
R0125   DISPLAYS THE NO. BY MEANS OF A V06 N07 FOLLOWED BY A FLASHING V50 N07 FOR A PLEASE PERFORM. NO IMMEDIATE RETURN
R0127   IS MADE TO THE USER (SEE NO. 7 ABOVE).

R0128   GOPERF3 BLANKS REGISTERS R2 AND R3

A0129                                                       CAF     DECXX           REQUEST PERFORM ON PXX
A0130                                                       TC      BANKCALL
A0131                                                       CADR    GOPERF3
A0132                                                       ...     ...             TERMINATE RETURN
A0133                                                       ...     ...             PROCEED RETURN
A0134                                                       ...     ...             ENTER RETURN

R0135   GOPERF4 IS USED FOR A PLEASE PERFORM ON AN OPTION. THE DESIRED OPTION ISENTERED IN A AND STORED IN OPTION1.
R0137   GOPERF4 DISPLAYS R1 AND R2 BY MEANS OF A V04N06 FOLLOWED BY A FLASHING  V50N06 FOR A PLEASE PERFORM. NO
R0139   IMMEDIATE RETURN IS MADE TO THE USER (SEE NO. 7 ABOVE).

A0140                                                       CAF     OCTXX           REQUEST PERFORM ON OPTION XX
A0141                                                       TC      BANKCALL
A0142                                                       CADR    GOPERF4
A0143                                                       ...     ...             TERMINATE RETURN
A0144                                                       ...     ...             PROCEED RETURN
A0145                                                       ...     ...             ENTER RETURN

R0146   GOPERF4 BLANKS REGISTER R3
```

```
R0147    GODSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN TO THE USER AFTER THE DISPLAY HAS BEEN SENT
R0149    OUT.

A0150                                                        CAE      VXXNYY
A0151                                                        TC       BANKCALL
A0152                                                        CADR     GODSPRET

A0153                                                        ...      ...              RETURN TO USER

R0154    REGODSP IS USED TO DISPLAY A VERB NOUN ARRIVING IN A.  REGODSP IS THE SAME AS GODSP ONLY REGODSP REPLACES ANY
R0156    ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0157                                                        CAE      VXXNYY
A0158                                                        TC       BANKCALL
A0159                                                        CADR     REGODSP

R0160    REFLASH IS THE SAME AS GOFLASH ONLY REFLASH REPLACES ANY ACTIVE NORMAL DISPLAY IF ONE WAS ACTIVE.

A0162                                                        CAF      VXXNYY           VXX NYY WILL BE A FLASHING VERB NOUN
A0163                                                        TC       BANKCALL
A0164                                                        CADR     REFLASH
A0165                                                        ...      ...              TERMINATE RETURN
A0166                                                        ...      ...              PROCEED RETURN
A0167                                                        ...      ...              ENTER RETURN

R0168    GOFLASHR IS SAME AS GOFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0170                                                        CAF      VXXNYY
A0171                                                        TC       BANKCALL
A0172                                                        CADR     GOFLASHR
A0173                                                        ...      ...              TERMINATE RETURN
A0174                                                        ...      ...              PROCEED RETURN
A0175                                                        ...      ...              ENTER OR RECYCLE RETURN

A0176                                                        ...      ...              IMMEDIATE RETURN FROM GOFLASHR

R0177    GOPERF1R IS THE SAME AS GOPERF1 ONLY GOPERF1R HAS AN IMMEDIATE RETURN TOUSERS CALL CADR +4.

R0179    GOPERF1R BLANKS REGISTERS R2 AND R3

A0180                                                        CAF      CCTXX            CODE FOR CHECKLIST VALUE XX.
A0181                                                        TC       BANKCALL
A0182                                                        CADR     GOPERF1R
A0183                                                        ...      ...              TERMINATE RETURN
A0184                                                        ...      ...              PROCEED RETURN
A0185                                                        ...      ...              ENTER RETURN

A0186                                                        ...      ...              IMMEDIATE RETURN FROM GOPERF1R

R0187    GOPERF2R IS THE SAME AS GOPERF2 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.
```

```
L       DISPLAY INTERFACE ROUTINES                                      USER'S PAGE NO.  5       EC S3

R0189   GOPERF2R DOES NOT BLANK ANY REGISTERS

A0190                                                   CAF     VXXNYY          VARIABLE NOUN YY REQUESTED.  XX=00 OR 01
A0191                                                   TC      BANKCALL
A0192                                                   CADR    GOPERF2R
A0193                                                   ...     ...             TERMINATE RETURN
A0194                                                   ...     ...             PROCEED RETURN
A0195                                                   ...     ...             ENTER RETURN

A0196                                                   ...     ...             IMMEDIATE RETURN HERE FROM GOPERF2R

R0197   GOPERF3R IS THE SAME AS GOPERF3 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

R0199   GOPERF3R BLANKS REGISTERS R2 AND R3

A0200                                                   CAF     PROGXX          PERFORM PROGRAM XX
A0201                                                   TC      BANKCALL
A0202                                                   CADR    GOPERF3R
A0203                                                   ...     ...             TERMINATE RETURN
A0204                                                   ...     ...             PROCEED RETURN
A0205                                                   ...     ...             ENTER RETURN

A0206                                                   ...     ...             GOPERF3R IMMEDIATELY RETURNS HERE

R0207   GOPERF4R IS THE SAME AS GOPERF4 ONLY AN IMMEDIATE RETURN IS MADE TO USERS CALL CADR +4.

A0209                                                   CAF     OCTXX           REQUEST PERFORM OPTIONXX
A0210                                                   TC      BANKCALL
A0211                                                   CADR    GOPERF4R
A0212                                                   ...     ...             TERMINATE RETURN
A0213                                                   ...     ...             PROCEED RETURN
A0214                                                   ...     ...             ENTER RETURN

A0215                                                   ...     ...             IMMEDIATE RETURN TO USER

R0216   GOPERF4R BLANKS REGISTER R3

R0217   REFLASHR IS THE SAME AS REFLASH ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +4.

A0219                                                   CAF     VXXNYY          VXX NYY WILL BE A FLASHING VERB NOUN
A0220                                                   TC      BANKCALL
A0221                                                   CADR    REFLASHR
A0222                                                   ...     ...             TERMINATE RETURN
A0223                                                   ...     ...             PROCEED RETURN
A0224                                                   ...     ...             ENTER RETURN

A0225                                                   ...     ...             IMMEDIATE RETURN TO USER

R0226   REGODSPR IS THE SAME AS REGODSP ONLY A RETURN (IMMEDIATE) IS MADE TO THE USER.
```

```
A0228                                        CAF     VXXNYY
A0229                                        TC      BANKCALL
A0230                                        CADR    REGODSPR

A0231                                        ...     ...              IMMEDIATE RETURN TO USER
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```
P0232   GOMARK IS USED TO DISPLAY A MARK VERB NOUN ARRIVING IN A. NO RETURN IS MADE TO THE USER.

R0234   GOXDSP = GOMARK

A0235                                             CAF     VXXNYY          VXXNYY CONTAINS VERB AND NOUN
A0236                                             TC      BANKCALL
A0237                                             CADR    GOMARK          OTHER EXTENDED VERBS USE CADR GOXDSP

R0238   GOMARKR IS THE SAME AS GOMARK ONLY RETURN IS TO THE USER.

R0239   GOXDSPR = GOMARKR

A0240                                             CAF     VXXNYY
A0241                                             TC      BANKCALL
A0242                                             CADR    GOMARKR         OTHER EXTENDED VERBS USE CADR GOXDSPR

A0243                                             ...     ...             IMMEDIATE RETURN OF GOMARKR

R0244   GOMARKF DISPLAYS A FLASHING MARK VERB NOUN WITH NO IMMEDIATE RETURN TO THE USER. 3 RETURNS ARE POSSIBLE FROM
R0246   THE ASTRONAUT (SEE NO. 7 ABOVE ).

R0247   GOXDSPF = GOMARKF

A0248                                             CAF     VXXNYY          VXXNYY WILL BE A FLASHING MARK VERB NOUN
A0249                                             TC      BANKCALL
A0250                                             CADR    GOMARKF         OTHER EXTENDED VERBS USE CADR GOXDSPF
A0251                                             ...     ...             TERMINATE RETURN
A0252                                             ...     ...             PROCEED RETURN
A0253                                             ...     ...             ENTER OR RECYCLE RETURN

R0254   GOMARKFR IS THE SAME AS GOMARKF ONLY AN IMMEDIATE RETURN IS MADE TO THE USER CALL CADR +4.

R0256   GOXDSPFR = GOMARKFR

A0257                                             CAF     VXXNYY          FLASHING MARK VERB NOUN
A0258                                             TC      BANKCALL
A0259                                             CADR    GOMARKFR        OTHER EXTENDED VERBS USE CADR GOXDSPFR
A0260                                             ...     ...             TERMINATE RETURN
A0261                                             ...     ...             PROCEED RETURN
A0262                                             ...     ...             ENTER OR RECYCLE RETURN

A0263                                             ...     ...             IMMEDIATE RETURN TO THE USER

R0264   GOMARK1 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH ONLY 1 ASTRONAUT RETURN TO THE USER. NO IMMEDIATE
R0266   RETURN IS MADE. THE DESIRED MARK PLEASE PERFORM VERB AND DESIRED NOUN ISENTERED IN A. GOMARK1 DISPLAYS R1, R2, R
R0268   MEANS OF A V05NYY FOLLOWED BY A FLASHING V5XNYY FOR A PLEASE PERFORM. THE ASTRONAUT WILL RESPOND WITH A MARK
R0270   OR MARK REJECT OR AN ENTER. THE ENTER IS THE ONLY ASTRONAUT RESPONSE THAT WILL COME BACK TO THE USER.

A0272                                             CAF     V5XNYY          X=1,2,3,4   Y= NOUN
A0273                                             TC      BANKCALL
```

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A0274                                                       CADR    GDMARK1

A0275                                                       ...     ...               ENTER RETURN

R0276   *** IF BLANKING DESIRED ON NON P ROUTINES, NOTIFY DISPLAYER.

R0277   GDMARK1R IS THE SAME AS A GDMARK1 ONLY AN IMMEDIATE RETURN IS MADE TO THE USERS CALL CADR +2.
A0279                                                       CAF     V5XNYY            X=1,2,3,4     YY = NOUN
A0280                                                       TC      BANKCALL
A0281                                                       CADR    GDMARK1R

A0282                                                       ...     ...               ASTRONAUT ENTER RETURN
A0283                                                       ...     ...               IMMEDIATE RETURN TO USER

R0284   GDMARK2 IS THE SAME AS GDMARK1 ONLY 3 RETURNS ARE MADE TO THE USER FROM THE ASTRONAUT.
A0286                                                       CAF     V5XNYY            X=1,2,3,4    YY=NOUN
A0287                                                       TC      BANKCALL
A0288                                                       CADR    GDMARK2
A0289                                                       ...     ...               TERMINATE RETURN
A0290                                                       ...     ...               PROCEED RETURN
A0291                                                       ...     ...               ENTER RETURN
R0292   GDMARK2R IS THE SAME AS GDMARK1R ONLY 3 ASTRONAUT RETURNS ARE MADE TO THE USER.

A0294                                                       CAF     V5XNYY            X=0,1,2,3,4    YY=NOUN
A0295                                                       TC      BANKCALL
A0296                                                       CADR    GDMARK2R
A0297                                                       ...     ...               TERMINATE RETURN
A0298                                                       ...     ...               PROCEED RETURN
A0299                                                       ...     ...               ENTER RETURN

A0300                                                       ...     ...               IMMEDIATE RETURN TO THE USER

R0301   GDMARK3 IS USED FOR A PLEASE PERFORM ON A MARK REQUEST WITH A 3 COMP. DEC DISPLAY. THE DESIRED MARK PLEASE
R0303   PERFORM VERB AND NOUN ARE ENTERED IN A. GDMARK3 DISPLAYS R1, R2, R3 BY MEANS OF A V06NYY FOLLOWED BY A FLASHING
R0305   V5XNYY FOR A PLEASE PERFORM, GDMARK3 HAS 3 ASTRONAUT RETURNS TO THE USER WITH NO IMMEDIATE RETURN.

A0307                                                       CAF     V5XNYY            X=1, 2,3,4 YY=NOUN
A0308                                                       TC      BANKCALL
A0309                                                       CADR    GDMARK3
A0310                                                       ...     ...               TERMINATE RETURN
A0311                                                       ...     ...               PROCEED RETURN
A0312                                                       ...     ...               ENTER RETURN

R0313   GDMARK4 IS THE SAME AS GDMARK3 ONLY R2 AND R3 ARE BLANKED AND R1 IS DISPLAYED IN OCTAL.

A0315                                                       CAF     V5XNYY            X=1,2,3,4 YY=NOUN
A0316                                                       TC      BANKCALL
A0317                                                       CADR    GDMARK4
A0318                                                       ...     ...               TERMINATE RETURN
A0319                                                       ...     ...               PROCEED RETURN
```

```
L          DISPLAY INTERFACE ROUTINES                                                     USER'S PAGE NO.   9       EQ S3

A0320                                                  ...     ...            ENTER RETURN

R0321      EXDSPRET IS USED TO DISPLAY A VERB NOUN ARRIVING IN A WITH A RETURN MADE TO THE USER AFTER THE DISPLAY HAS BEEN
R0323      SENT OUT.

A0324                                                  CAF     VXXNYY
A0325                                                  TC      BANKCALL
A0326                                                  CADR    EXDSPRET

A0327                                                  ...     ...            RETURN TO USER

R0328      KLEENEX CLEANS OUT ALL MARK DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER THE MARK DISPLAYS
R0330      HAVE BEEN CLEANED OUT.

A0331                                                  TC      BANKCALL
A0332                                                  CADR    KLEENEX

A0333                                                  ...     ...            RETURN TO USER

R0334      MARKBRAN IS A SPECIAL PURPOSE ROUTINE USED FOR SAVING JOB VAC AREAS (SEE DESCRIPTION OF MARKBRAN BELOW).

A0336                                                  TC      BANKCALL
A0337                                                  CADR    MARKBRAN

A0338                                                  ...     ...            BAD RETURN IF MARK DISPLAY NOT ACTIVE

A0339                                                                         (GOOD RETURN TO IMMEDIATE RETURN LOC OF
A0340                                                                         LAST FLASHING MARK R ROUTINE)

R0341      PINBRNCH REESTABLISHES THE LAST ACTIVE FLASHING DISPLAY. IF THERE IS NO ACTIVE FLASHING DISPLAY, THE DSKY IS
R0343      BLANKED AND CONTROL IS SENT TO ENDOFJOB.

A0344                                                  TC      POSTJUMP
A0345                                                  CADR    PINBRNCH

R0346      PRIODSP IS USED AS A PRIORITY DISPLAY.  IT WILL DISPLAY A GOFLASH TYPE DISPLAY WITH THREE POSSIBLE RETURNS FROM
R0348      THE ASTRONAUT(SEE NO.7 ABOVE).

R0349           THE MAIN PURPOSE OF PRIODSP IS TO REPLACE THE PRESENT DISPLAY WITH A DISPLAY OF HIGHER PRIORITY AND TO
R0351      PROVIDE A MEANS FOR RESTORING THE OLD DISPLAY WHEN THE PRIORITY DISPLAY
R0352      IS RESPONDED TO BY THE ASTRONAUT.

R0353           THE FORMER DISPLAY IS RESTORED BY AN AUTOMATIC BRANCH TO WAKE UP THE DISPLAY THAT WAS INTERRUPTED BY THE
R0355      PRIO DISPLAY.

A0356                                                  CAF     VXXNYY         VXXNYY WILL BE A FLASHING VERB NOUN
A0357                                                  TC      BANKCALL
A0358                                                  CADR    PRIODSP
A0359                                                  ...     ...            TERMINATE RETURN
A0360                                                  ...     ...            PROCEED RETURN
```

```
L        DISPLAY INTERFACE ROUTINES                                          USER'S PAGE NO. 10        ED S3

A0361                                                   ...      ...           ENTER OR RECYCLE RETURN

R0362    PRIODSPR IS THE SAME AS PRIOLDSPONLY AN IMMEDIATE RETURN IS MADE TO THE  USERS CALL CADR +4.

A0364                                                   CAF      VXXNYY        VXXNYY WILL BE A FLASHING VERB NOUN
A0365                                                   TC       BANKCALL
A0366                                                   CADR     PRIODSPR
A0367                                                   ...      ...           TERMINATE RETURN
A0368                                                   ...      ...           PROCEED RETURN
A0369                                                   ...      ...           ENTER OR RECYCLE RETURN

A0370                                                   ...      ...           IMMEDIATE RETURN

R0371    PRIOLARM DOES A V05N09 PRIOLDSP.
R0372    CLEANDSP CLEANS OUT ALL NORMAL DISPLAYS (ACTIVE AND INACTIVE). A RETURN IS MADE TO THE USER AFTER NORMAL
R0374    DISPLAYS ARE CLEANED OUT.

A0375                                                   TC       BANKCALL
A0376                                                   CADR     CLEANDSP

A0377                                                   ...      ...           RETURN TO USER
```

```
P0378   GENERAL INFORMATION
R0379   ------- -----------


R0380   ALARM OR ABORT EXIT MODES--

A0381                                         PRIOBORT TC      ABORT
A0382                                                  OCT     1502

R0383   PRIOBORT IS BRANCED TO WHEN (1)  A NORMAL DISPLAY IS REQUESTED AND  ANOTHER NORMAL DISPLAY IS ALREADY ACTIVE
R0385   (REFLASH AND REGODSP ARE EXCEPTIONS) OR (2) A PRIORITY DISPLAY IS REQUESTED WHEN ANOTHER PRIORITY DISPLAY IS
R0387   ALREADY ACTIVE (A PRIORITY WITH LINUS BIT14 IS AN EXCEPTION).


R0388   ERASABLE INITIALIZATION REQUIRED--

R0389       ACCOMPLISHED BY FRESH START- 1. FLAGWRD4 (USED EXCLUSIVELY BY DISPLAY INTERFACE ROUTINES)
R0391                                    2. NVSAVE = NORMAL VERB AND NOUN       REGISTER.
R0393                                    3. EBANKTEM = NORMAL  INACTIVE FLAGWORD(ALSO CONTAINS NORMALS EBANK)


R0395                                    5. R1SAVE = MARKBRAN CONTROL WORD
R0396                                    4. RESTREG = PRIORITY 30 AND SUPERBANK 3.
R0398   OUTPUT--

R0399       NVWORD = PRIO VERB AND NOUN
R0400       NVWORD +1(MARKNV) = MARK VERB AND NOUN
R0401       NVWORD +2(NVSAVE) = NORMAL VERB AND NOUN

R0402       DSPFLG(EBANKSAV) = PRIO FLAGWORD (INCLUDING EBANK)
R0403       DSPFLG +1(MARKEBAN) = MARK FLAGWORD (INCLUDING EBANK)
R0404       DSPFLG +2(EBANKTEM) = NORMAL FLAGWORD (INCLUDIG EBANK)

R0405       CADRFLSH = PRIO USERS CALL CADR +1 LOCATION
R0406       CADRFLSH +1(MARKFLSH) = MARK USERS CALL CADR +1 LOCATION
R0407       CADRFLSH +2(TEMPFLSH) = NORMAL USERS CALL CADR +1 LOCATION

R0408       PRIOTIME = TIME EACH PRIO REQUEST FIRST SENT OUT
R0409       OPTION1 = DESIRED OPTION FROM GOPERF4
R0410       FLAGWRD4 = BIT INFO FOR CONTROL OF ALL DISPLAY ROUTINES
R0411       DSPTEM1 = R1 INFO FOR ASTRONAUT FROM PERFORM DISPLAYS(NORMAL)
R0412   SUBROUTINES USED-- NVSUB, FLAGUP, FLAGDOWN, ENDOFJOB, BLANKSUB, ABORT, JOBWAKE, JOBSLEEP, FINDVAC, PRIOCHNG,
R0414   JAMTERM, NVSUBUSY, FLASHON, ENDIDLE, CHANG1, BANKJUMP, MAKECADR, NOVAC,
R0415   DEBRIS-- (STORED INTO)

R0416       TEMPORARY TEMPORARIES- A, Q, L, MPAC +2, MPAC +3, MPAC +4, MPAC +5, MPAC +6, RUPTREG2, RUPTREG3, CYL,
R0418   EBANK, RUPTREG4, LOC, BANKSET, MODE, MPAC, MPAC +1                             4, FACEREG
R0420       ERASABES(SHARED AND USED WITH OTHER PROGRAMS) CADRSTOR, DSPLIST, LOC, DSPTEM1, OPTION1

R0422       ERASABLES(USED ONLY BY DISPLAY ROUTINES)- NVWORD,+1,+2, DSPFLG,+1,+2, CADRFLSH,+1,+2, PRIOTIME, FLAGWRD4,
R0424    RISAVE, MARK2RAC,


R0425    DEBRIS-- (USED BUT NOT STORED INTO)- NOUNREG, VERBREG, LOCCTR, MONSAVE1
R0426    FLAGWORD DESCRIPTIONS--
R0427        FLAGWRD4- SEE DESCRIPTION UNDER LOG SECTION ERASABLE ASSIGNMENTS

R0428        DSPFLG, DSPFLG+1, DSPFLG +2-
R0429        ----------------------------
R0430    BITS 1 BLANK R1
R0431         2 BLANK R2
R0432         3 BLANK R3
R0433         4 FLASHING DISPLAY REQUESTED
R0434         5 PERFORM DISPLAY REQUESTED
R0435         6 -----                EXDSPRET             GODSPRET
R0436         7 PRIO DISPLAY        -----                  -----
R0437         8 -----            DEC MARK PERFORM         -----
R0438         9 EBANK
R0439        10 EBANK
R0440        11 EBANK
R0441        12 -----               -----         V99PASTE
R0442        13 2ND PART OF PERFORM
R0443        15 REFLASH OR REDO  -----              REFLASH OR REDO
R0444        15 -----             MARK REQUEST          -----
R0445    RESTARTING DISPLAYS--

R0446    RULES FOR THE DSKY OPERATOR--

R0447         1. PROCEED AND TERMINATE SERVE AS RESPONSES TO REQUESTS FOR OPERATOR RESPONSE (FLASHING V/N).  AS LONG
R0449            AS THERE IS ANY REQUEST AWAITING OPERATOR RESPONSE, ANY USE OF PROCEED OR TERMINATE WILL SERVE AS
R0451            RESPONSES TO THAT REQUEST.  CARE SHOULD BE EXERCISED IN ATTEMPTING TO KILL AN OPERATOR INITIATED MONITOR
R0453            WITH PROCEED AND TERMINATE FOR THIS REASON.
R0454         2. THE ASTRONAUT MUST RESPOND TO A PRIORITY DISPLAY NO            SOONER THAN 2 SECONDS FROM THE TIME THE
R0456            PROGRAM SENT OUT THE REQUEST FOR OPERATOR RESPONSE (THE ASTRONAUT WOULD SEE THIS DISPLAY FOR LESS TIME
R0458            DUE TO TIME IT TAKES TO GET DISPLAY SENT OUT.) IF THE ASTRONAUT RESPONDS TOO SOON, THE PRIORITY DISPLAY
R0460             IS SENT OUT AGAIN -- AND AGAIN UNTIL AN ACCUMULATED 2 SECS     FROM THE TIME THE FIRST PRIORITY DISPLAY
R0462            OUT. THE SAME 2 SEC. DELAY WILL OCCUR AT 163.84 SECS OR IN ANY  MULTIPLE OF THAT TIME DUE TO PROGRAM
R0464            CONSIDERATION.
R0465         3. KEY RELEASE BUTTON-
R0466            A) IF THE KEY RELEASE LIGHT IS ON, IT SIMPLY RELEASES THE KEYBOARD AND DISPLAY FOR INTERNAL USE.
R0468            B) IF THE KEY RELEASE LIGHT IS OFF, AND IF SOME REQUEST FOR OPERATOR RESPONSE (FLASHING V/N) IS STILL
R0470               AWAITING RESPONSE  THEN IT RE-ESTABLISHES THE DISPLAYS THAT ORIGINALLY REQUESTED RESPONSE,
R0472            IF AN OPERATOR WANTS THEREFORE TO RE-ESTABLISH BUT CONDITION (A) IS ENCOUNTERED, A SECOND DEPRESSION OF
R0474            KEY RELEASE BUTTON MAY BE NECESSARY.
R0475         4. IT IS IMPORTANT TO ANSWER ALL REQUESTS FOR OPERATOR RESPONSE.
R0476         5. IT IS ALWAYS GOOD PRACTICE TO TERMINATE AN EXTENDED VERB BEFORE ASKING FOR ANOTHER ONE OR THE SAME ONE
R0478            OVER AGAIN.


R0479    SPECIAL CONSIDERATIONS--
```

```
R0480         1. MPAC +2  SAVED ONLY IN MARK DISPLAYS
R0481         2. GODSP(R),REGODSP(R),GOMARK(R) ALWAYS TURN ON THE FLASH IF ENTERED WITH A PASTE VERB REQUEST.
R0483         3. ALL NORMAL DISPLAYS ARE RESTARTABLE EXCEPT GODSP(R), REGODSP(R)
R0484         4. ALL EXTENDED VERBS WITH DISPLAYS SHOULD START WITH A TC TESTXACT AND FINISH WITH A TC ENDEXT.
R0486         5. GODSP(R) AND REGODSP(R) MUST BE IN THE SAME EBANK AND SUPERBANK AS THE LAST NORMAL DISPLAY RESTARTED
R0488            BY A .1 RESTART PHASE CHANGE.
R0489         6. IN ORDER TO SET UP A NON DISPLAY .1 RESTART POINT, THE USER MUST MAKE CERTAIN THAT RESTREG CONTAINS THE
R0491            CORRECT PRIORITY AND SUPERBANK AND THAT EBANKTEM CONTAINS THE CO
R04911        7. IF CLEANDSP IS RESTARTED VIA A .1 PHASE CHANGE, CAF ZERO SHOULD BE EXECUTED  BEFORE THE TC BANKCALL.
```

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P0492   CALLING SEQUENCE FOR BLANKING
A0493                                                         CAF     BITX            X=1,2,3 BLANK R1,R2,R3 RESPECTIVELY
A0494                                                         TC      BLANKET
A0495                                                         ...     ...             RETURN TO USER HERE

R0496   IN ORDER TO USE BLANKET CORRECTLY THE USER MUST USE A DISPLAY ROUTINE THAT ENDS IN R FIRST FOLLOWED BY THE CALL
R0498   TO BLANKET AT THE IMMEDIATE RETURN LOC.

 0499                              5464                       BLOCK   02
 0500   REF   1                    4000                       SETLOC  FFTAG4
 0501                              5464                       BANK

 0502   REF   1                                               COUNT*  $$/DSPLA
 0503   REF 812  LAST 1330         5464  54 162 0   BLANKET   TS      MPAC +6
 0504   REF   1                    5465  4 0160 1             CS      PLAYTEM4
 0505   REF 813  LAST 1346         5466  7 0162 0             MASK    MPAC +6
 0506   REF 814  LAST 1346         5467  50 161 1             INDEX   MPAC +5
 0507   REF   2  LAST 1346         5470  26 160 1             ADS     PLAYTEM4

 0508   REF 359  LAST 1332         5471  0 0002 0             TC      Q

 0511   REF  59  LAST 1323         5472  0 4635 0   ENDMARK   TC      POSTJUMP
 0512   REF   1                    5473   20326 1             CADR    MARKEND

 05121  REF 243  LAST 1331         5474  3 4755 1   CLEARMRK  CAF     ZERO
 05122  REF  17  LAST  720         5475  [illegible] 0        TS      EXTVBACT

 05123                             5476  0 0004 0       +2    INHINT
 05124  REF   1                    5477  4 4753 0             CS      XDSPBIT
 05125  REF   5  LAST  479         5500  7 0100 1             MASK    FLAGWRD4
 05126  REF   6  LAST 1346         5501  54 100 1             TS      FLAGWRD4

 05127                             5502  0 0003 1             RELINT
 05128  REF 360  LAST 1346         5503  0 0002 0             TC      Q
R0513   ***ALL EXTENDED VERB ROUTINES THAT HAVE AT LEAST ONE FLASHING DISPLAY MUST TCF ENDMARK OR TCF ENDEXT WHEN
R0515   FINISHED.

 0516                           10,2326                       BANK    10
 0517   REF   1                 10,2000                       SETLOC  DISPLAYS
 0518                           10,2326                       BANK

 0519   REF   1                                               COUNT*  $$/DSPLA
R0520   NTERONLY IS USED TO DIFFERENTIATE THE MARK ROUTINE WITH ONLY ONE RETURN TO THE USER FROM THE MARKING ROUTINE WIT
R0522   3 RETURNS TO THE USER. THIS ROUTINE IS ONLY USED BY GOMARK1 AND GOMARK1R.

 05291  REF   2  LAST  227      10,2326  0 5474 0   MARKEND   TC      CLEARMRK
 05292  REF   1                 10,2327  1 3422 1             TCF     MARKOVER

 0530   REF   1                 10,2330  54 155 1   GOMARK    TS      PLAYTEM1        ENTRANCE FOR MARK GODSP
```

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L       DISPLAY INTERFACE ROUTINES                                                                 USER'S PAGE NO. 15     EO S3

 0531    REF  45  LAST 1309   10,2331  3 4735 1  GOMARS    CAF      BIT15           BIT15 SET FOR ALL MARK REQUESTS
 0532    REF   1              10,2332  1 2501 0            TCF      GOFLASH2

 0533    REF 244  LAST 1346   10,2333  3 4755 1  KLEENEX   CAF      ZERO            CLEAN OUT EXTENDED VERBS
 0534    REF   2  LAST 1346   10,2334  54 155 1  GOMARKF   TS       PLAYTEM1        ENTRANCE FOR MARK GOFLASH

 0535    REF   1              10,2335  3 3032 0            CAF      MARKFMSK        MARK,FLASH
 0536    REF   2  LAST 1347   10,2336  1 2501 0            TCF      GOFLASH2

 0539    REF   3  LAST 1347   10,2337  54 155 1  GOMARK2   TS       PLAYTEM1        MARK GOPERFS-3 AST. RETURNS
 0540    REF   1              10,2340  3 3521 1  MARKFORM  CAF      MPERFMSK        MARK, PERFORM, FLASH
 0541    REF   3  LAST 1347   10,2341  1 2501 0            TCF      GOFLASH2

 0542    REF   4  LAST 1347   10,2342  54 155 1  GOMARK3   TS       PLAYTEM1        USED FOR 3COMP DECIMAL PERFORM
 0543    REF   1              10,2343  3 3506 1            CAF      MARK3MSK
 0544    REF   4  LAST 1347   10,2344  1 2501 0            TCF      GOFLASH2

 0545    REF   5  LAST 1347   10,2345  54 155 1  GOMARK4   TS       PLAYTEM1
 0546    REF   1              10,2346  3 3507 0            CAF      MARK4MSK        MARK,PERFORM,FLASH,BLANK
 0547    REF   5  LAST 1347   10,2347  1 2501 0            TCF      GOFLASH2

 0548    REF   6  LAST 1347   10,2350  54 155 1  GOMARKR   TS       PLAYTEM1        ENTRANCE FOR MARK GODSPR

 0549    REF  46  LAST 1347   10,2351  3 4735 1            CAF      BIT15
 0550    REF   1              10,2352  1 2454 1            TCF      GODSPR2

 0551    REF   7  LAST 1347   10,2353  54 155 1  GOMARKFR  TS       PLAYTEM1        ENTRANCE FOR MARK GOFLASHR

 0552    REF   2  LAST 1347   10,2354  3 3032 0            CAF      MARKFMSK
 0553    REF   1              10,2355  1 2640 0            TCF      GODSPRS

 0559    REF   8  LAST 1347   10,2356  54 155 1  GOMARK2R  TS       PLAYTEM1        MARK GOPERFS-3 AST. RETS+ IMMEDIATE RET.
 0560    REF   2  LAST 1347   10,2357  3 3521 1            CAF      MPERFMSK        MARK, PERFORM, FLASH
 0561    REF   2  LAST 1347   10,2360  1 2640 0            TCF      GODSPRS

 056105  REF   3  LAST  961   10,2361  6 5023 0  -1        AD       PRIO13
 05611   REF   9  LAST 1347   10,2362  54 155 1  GOMARK3R  TS       PLAYTEM1
 05612   REF   2  LAST 1347   10,2363  3 3506 1            CAF      MARK3MSK
 05613   REF   3  LAST 1347   10,2364  1 2640 0            TCF      GODSPRS

 0562    REF 133  LAST 1321   10,2365  3 4753 1  MAKEMARK  CAF      ONE
 0563    REF   1              10,2366  0 2736 1            TC       COPIES

 0564    REF   7  LAST 1346   10,2367  3 0100 0            CA       FLAGWRD4        IS NORM OR PRIO BUSY OR WAITING
 0565    REF   1              10,2370  7 3522 0            MASK     OCT34300
 0566    REF 429  LAST 1332   10,2371  10 000 0            CCS      A
 0567    REF   1              10,2372  1 2430 0            TCF      CHKPRIO

 0568    REF   8  LAST 1347   10,2373  3 0100 0            CA       FLAGWRD4        IS MARK SLEEPING DUE TO ASTRO BUSY
 0569    REF   1              10,2374  7 4743 1            MASK     MRKNVBIT
 0570                              10,2375  0 0006 1          EXTEND
 0571   REF   1                    10,2376  1 2400 0          BZF      MARKPLAY          NO

 0572   REF 145  LAST 1203         10,2377  1 5155 1          TCF      ENDOFJOB

 0594                              10,2400  0 0004 0 MARKPLAY INHINT
 0595   REF  21  LAST 1277         10,2401  4 4756 0          CS       FIVE              RESET MARK OVER NORM, SET MARK
 0596   REF   9  LAST 1347         10,2402  7 0100 1          MASK     FLAGWRD4
 05965  REF 134  LAST 1347         10,2403  6 4753 1          AD       ONE
 0597   REF  10  LAST 1348         10,2404  54 100 1          TS       FLAGWRD4
 0598                              10,2405  0 0003 1          RELINT

 0599   REF   1                    10,2406  4 1070 0 GOGOMARK CS       MARKFLAG          PERFORM
 0600   REF  43  LAST 1328         10,2407  7 4747 0          MASK     BIT5
 0601   REF 430  LAST 1347         10,2410  10 000 0          CCS      A
 0602   REF   1                    10,2411  1 2414 0          TCF      MARKCOP
 0603   REF   1                    10,2412  4 0370 1          CS       MARKNV
 0604   REF   2  LAST 1348         10,2413  54 370 1          TS       MARKNV

 0605   REF 135  LAST 1348         10,2414  3 4753 1 MARKCOP  CAF      ONE               MARK INDEX
 0606   REF   1                    10,2415  1 2617 1          TCF      PRIOPLAY

 0607   REF   1                    10,2416  3 0165 0 COPYTOGO CA       MPAC2SAV
 0608   REF 815  LAST 1346         10,2417  54 156 1          TS       MPAC +2

 0609   REF   1                    10,2420  50 164 1 COPYPACS INDEX    COPINDEX
 0610   REF   1                    10,2421  3 3532 0          CAF      PRIOOCT
 0611   REF   1                    10,2422  54 162 0          TS       GENMASK

 0612   REF   2  LAST 1348         10,2423  50 164 1          INDEX    COPINDEX
 0613   REF   1                    10,2424  3 1067 1          CAF      EBANKSAV
 0614   REF   1                    10,2425  54 160 1          TS       TEMPOR2           ACTIVE EBANK AND FLAG

 0615   REF  79  LAST 1323         10,2426  54 003 0          TS       EBANK

 0616   REF 361  LAST 1346         10,2427  0 0002 0          TC       Q

R0617   PINCHEK CHECKS TO SEE IF THE CURRENT MARK REQUEST IS MADE BY THE ASTRONAUT WHILE INTERRUPTING A GOPLAY DISPLAY
R0619   (A NORMAL OR A PRIO). IF THE ASTRONAUT TRIES TO MARK DURING A PRIO, THE CHECK FAIL LIGHT GOES ON AND THE MARK
R0621   REQUEST IS ENDED. IF HE TRIES TO MARK DURING A NORM, THE MARK IS ALLOWED. IN THIS CASE THE NORM IS PUT TO SLEEP
R0623   UNTIL ALL MARKING IS FINISHED.

R0624        IF THE MARK REQUEST COMES FROM THE PROGRAM DURING A TIME THE ASTRONAUT IS NOT INTERRUPTING A NORMAL OR A
R0626   PRIO, THE MARK REQUEST IS PUT TO SLEEP UNTIL THE PRESENT ACTIVE DISPLAY IS RESPONDED TO BY THE ASTRONAUT.

 0628   REF  11  LAST 1348         10,2430  3 0100 0 CHKPRIO  CA       FLAGWRD4          MARK ATTEMPT DURING PRIO
 0629   REF   1                    10,2431  7 3255 1          MASK     OCT24100
 0630   REF 431  LAST 1348         10,2432  10 000 0          CCS      A
 0631   REF   1                    10,2433  1 3455 1          TCF      MARSLEEP
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L        DISPLAY INTERFACE ROUTINES                                                          USER'S PAGE NO. 17      FO S3

 0632    REF  12  LAST 1348   10,2434  4 0100 1             CS       FLAGWRD4
 0633    REF   1              10,2435  7 4751 1             MASK     MKOVBIT           SET MARK OVER NORM
 0634                         10,2436  0 0004 0             INHINT
 0635    REF  13  LAST 1349   10,2437  26 100 1             ADS      FLAGWRD4

 0636    REF   1              10,2440  1 2535 1             TCF      SETNORM

 0637    REF   3  LAST 1348   10,2441  3 0370 0  MARKPERF   CA       MARKNV
 0638    REF   1              10,2442  7 4144 0             MASK     VERBMASK
 0639    REF   1              10,2443  1 3121 1             TCF      NV50DSP

 0640    REF  10  LAST 1347   10,2444  54 155 1  GODSP      TS       PLAYTEM1

 0641    REF 245  LAST 1347   10,2445  3 4755 1  GODSP2     CAF      ZERO
 0642    REF   6  LAST 1347   10,2446  1 2501 0             TCF      GOFLASH2

 0643    REF  11  LAST 1349   10,2447  54 155 1  GODSPRET   TS       PLAYTEM1          ENTRANCE FOR A GODSP WITH A PASTE

 0644    REF  59  LAST 1319   10,2450  3 4746 0             CAF      BIT6              SET BIT6 TO GO BACK TO USER AFTER NVSUB
 0645    REF   7  LAST 1349   10,2451  1 2501 0             TCF      GOFLASH2

 0646    REF  12  LAST 1349   10,2452  54 155 1  GODSPR     TS       PLAYTEM1

 0647    REF 246  LAST 1349   10,2453  3 4755 1  GODSPR1    CAF      ZERO
 0648    REF   3  LAST 1346   10,2454  54 160 1  GODSPR2    TS       PLAYTEM4

 0649    REF 247  LAST 1349   10,2455  3 4755 1             CAF      ZERO              * DONT MOVE
 0650    REF   1              10,2456  1 2642 1             TCF      GODSPRS1

R0651          CLEANDSP IS USED FOR CLEARING OUT A NORMAL DISPLAY THAT IS PRESENTLY ACTIVE OR A NORMAL DISPLAY THAT IS
R0653    SET UP TO BE STARTED OR RESTARTED.

R0654          NORMALLY THE USER WILL NOT NEED TO USE THIS ROUTINE SINCE A NEW NORMAL DISPLAY AUTOMATICALLY CLEARS OUT AN
R0656    OLD DISPLAY.

R0657          CALLING SEQUENCE FOR CLEANDSP-

A0658                                                       TC       BANKCALL
A0659                                                       CADR     CLEANDSP

 0660    REF 248  LAST 1349   10,2457  3 4755 1  CLEANDSP   CAF      ZERO
 0661    REF  13  LAST 1349   10,2460  54 155 1  REFLASH    TS       PLAYTEM1

 0662    REF   1              10,2461  3 3505 1             CAF      REDOMASK          FLASH AND PERMIT
 0663    REF   8  LAST 1349   10,2462  1 2501 0             TCF      GOFLASH2

 0664    REF  14  LAST 1349   10,2463  54 155 1  REFLASHR   TS       PLAYTEM1

 0665    REF   2  LAST 1349   10,2464  3 3505 1             CAF      REDOMASK          FLASH AND PERMIT
 0666    REF   4  LAST 1347   10,2465  1 2640 0             TCF      GODSPRS
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L       DISPLAY INTERFACE ROUTINES                                                             USER'S PAGE NO. 18      EO S3

 0667   REF  15  LAST 1349   10,2466  54 155 1  REGODSP  TS      PLAYTEM1

 0668   REF  77  LAST 1317   10,2467   3 4736 1           CAF     BIT14
 0669   REF   9  LAST 1349   10,2470   1 2501 0           TCF     GOFLASH2

 0670   REF  16  LAST 1350   10,2471  54 155 1  REGODSPR TS      PLAYTEM1

 0671   REF  78  LAST 1350   10,2472   3 4736 1           CAF     BIT14
 0672   REF   2  LAST 1347   10,2473   1 2454 1           TCF     GODSPR2

 06721  REF  17  LAST 1350   10,2474  54 155 1  CLOCPLAY TS      PLAYTEM1
 06722  REF   1              10,2475   3 3544 1           CAF     CLOCKCON
 06723  REF  10  LAST 1350   10,2476   1 2501 0           TCF     GOFLASH2

 0673   REF  18  LAST 1350   10,2477  54 155 1  GOFLASH  TS      PLAYTEM1

 0674   REF  51  LAST 1324   10,2500   3 4750 1           CAF     BIT4                LEAVE ONLY FLASH BIT SET
 0675   REF   4  LAST 1349   10,2501  54 160 1  GOFLASH2 TS      PLAYTEM4

 0676   REF   1              10,2502   0 2723 0           TC      SAVELOCS

 0677                        10,2503   0 0003 1           RELINT

 0678   REF   1              10,2504   1 2547 1           TCF     MAKEPLAY            BRANCH DIRECT WITH NO SEPARATE JOB CALL

 0679   REF  19  LAST 1350   10,2505  54 155 1  PRIODSPR TS      PLAYTEM1

 0680   REF   1              10,2506   3 3524 1           CAF     BITS7+4
 0681   REF   5  LAST 1349   10,2507   1 2640 0           TCF     GODSPRS

 0682   REF  20  LAST 1350   10,2510  54 155 1  PRIODSP  TS      PLAYTEM1

 0683   REF   2  LAST 1350   10,2511   3 3524 1  SETPRIO  CAF     BITS7+4
 0684   REF  11  LAST 1350   10,2512   1 2501 0           TCF     GOFLASH2

 0685   REF 249  LAST 1349   10,2513   3 4755 1  MAKEPRIO CAF     ZERO
 0686   REF   3  LAST 1348   10,2514  54 164 0           TS      COPINDEX

 0687   REF   1              10,2515   0 3375 0           TC      LINUSCHR
 0688   REF   1              10,2516   1 2523 0           TCF     HIPRIO              LINUS RETURN
 0689   REF  14  LAST 1349   10,2517   3 0100 0           CA      FLAGWRD4
 0690   REF   1              10,2520   7 3543 1           MASK    OCT20100            IS PRIO IN ENDIDLE OR BUSY
 0691   REF 432  LAST 1348   10,2521  10 000 0            CCS     A
 0692   REF   1              10,2522   1 2576 0           TCF     PRIOBORT            YES, ABORT

 0693   REF  15  LAST 1350   10,2523   3 0100 0  HIPRIO   CA      FLAGWRD4            MARK ACTIVE
 0694   REF   1              10,2524   7 5632 1           MASK    OCT40400
 0695                        10,2525   0 0006 1           EXTEND
 0696   REF   1              10,2526   1 2531 0           BZF     ASKIFNRM            NO
 0697    REF 250  LAST 1350   10,2527  3 4755 1  SETMARK  CAF    ZERO
 0698    REF   1              10,2530  1 2775 1           TCF    JOBXCHS

 0699    REF  16  LAST 1350   10,2531  3 0100 0  ASKIFNRM CA     FLAGWR04          NORMAL ACTIVE
 0700    REF   1              10,2532  7 3541 0           MASK   OCT10200          BITS 13+8
 0701                         10,2533  0 0006 1           EXTEND
 0702    REF   1              10,2534  1 2537 0           BZF    OKTOCOPY          NO

 0703    REF 136  LAST 1348   10,2535  3 4753 1  SETNORM  CAF    ONE
 0704    REF   2  LAST 1351   10,2536  1 2775 1           TCF    JOBXCHS

 0705    REF   1              10,2537  0 2735 1  OKTOCOPY TC     COPYNORM
 0706    REF   1              10,2540  0 3206 0           TC     WITCHONE

 0707    REF   8  LAST 1320   10,2541  0 5137 1           TC     JOBWAKE

 0708    REF   1              10,2542  0 3223 1           TC     XCHTOEND

 0709    REF  20  LAST 1296   10,2543  3 0025 0  REDOPRIO CA     TIME1             SAVE TIME PRIODSP SENT OUT
 0710    REF   1              10,2544  55'164 1           TS     PRIOTIME

 0711    REF 251  LAST 1351   10,2545  3 4755 1  KEEPPRIO CAF    ZERO              START UP PRIO DISPLAY
 0712    REF   2  LAST 1348   10,2546  1 2617 1           TCF    PRIOPLAY

 0713    REF  33  LAST 1323   10,2547  3 0167 1  MAKEPLAY CA     PRIORITY          SAVE USERS PRIORITY
 07131   REF   3  LAST 1323   10,2550  7 7730 0           MASK   PRIO37
 07132   REF   1              10,2551  54 163 1           TS     USERPRIO

 07133   REF   1              10,2552  3 7724 1           CAF    PRIO33            RAISE PRIORITY FOR FAST JOBS AFTER WAKE
 07134   REF  17  LAST  888   10,2553  0 5146 1           TC     PRIOCHNG

 07135   REF   5  LAST 1350   10,2554  3 0160 0           CA     PLAYTEM4          IS IT MARK OR PRIO OR NORM
 0714    REF   1              10,2555  7 3523 1           MASK   BITS15+7
 0715    REF 433  LAST 1350   10,2556  10 000 0           CCS    A
 0716    REF   1              10,2557  1 2513 0           TCF    MAKEPRIO          ITS PRIO
 0717    REF   1              10,2560  1 2562 0           TCF    IFLEGAL
 0718    REF   1              10,2561  1 2365 1           TCF    MAKEMARK          ITS MARK

 0719    REF  85  LAST 1321   10,2562  3 4752 0  IFLEGAL  CAF    TWO
 0720    REF   4  LAST 1350   10,2563  54 164 0           TS     COPINDEX

 0721    REF   2  LAST 1350   10,2564  0 3375 0           TC     LINUSCHR

 0722    REF   1              10,2565  1 2600 1           TCF    OKTOPLAY          LINUS RETURN
 0723    REF   3  LAST  232   10,2566  4 1071 1           CS     EBANKTEM
 0724    REF  52  LAST 1350   10,2567  7 4750 0           MASK   BIT4
 0725    REF 434  LAST 1351   10,2570  10 000 0           CCS    A
 0726    REF   2  LAST 1351   10,2571  1 2600 1           TCF    OKTOPLAY          NO

 0727    REF  17  LAST 1351   10,2572  3 0100 0           CA     FLAGWR04          WAS NORM ASLEEP
 0728   REF   1               10,2573  7 3514 0              MASK    NBUSMASK        ARE ANY NORMS ASLEEP
 0729                         10,2574  0 0006 1              EXTEND
 0730   REF   3  LAST 1351    10,2575  1 2600 1              BZF     OKTOPLAY        NO

 0731   REF   2  LAST  459    10,2576  0 5624 1   PRIOBORT   TC      BAILOUT
 0732                         10,2577   31502 1              OCT     31502

 0733   REF   1               10,2600  0 2737 0   OKTOPLAY   TC      COPIES2

 07331  REF   2  LAST 1351    10,2601  3 0163 0              CA      USERPRIO
 07332                        10,2602  0 0006 1              EXTEND
 07333  REF  25  LAST 1291    10,2603  04 007 1              ROR     SUPERBNK
 07334  REF   3  LAST  229    10,2604  54 366 0              TS      RESTREG

 0737   REF  18  LAST 1351    10,2605  3 0100 0              CA      FLAGWRD4        PRIO OR MARK GOING
 0738   REF   1               10,2606  7 3515 1              MASK    PMMASK
 0739   REF 435  LAST 1351    10,2607  10 000 0              CCS     A
 0740   REF   1               10,2610  1 2755 0              TCF     GOSLEEPS        YES

 0741                         10,2611  1 2613 0              TCF     +2
 0742   REF   2  LAST 1352    10,2612  1 2755 0              TCF     GOSLEEPS        MARK GOING

R0743   COULD PUT NORM BUSY CHECK HERE TO SAVE TIME
 0744   REF   2  LAST 1351    10,2613  0 3206 0              TC      WITCHONE        IS IT NVSUB BUSY, ENDIDLE OR NOONE
 0745   REF   9  LAST 1351    10,2614  0 5137 1              TC      JOBWAKE

 0746   REF   2  LAST 1351    10,2615  0 3223 1              TC      XCHTOEND

 0747   REF  86  LAST 1351    10,2616  3 4752 0   PLAYJUM1   CAF     TWO
 0748   REF   5  LAST 1351    10,2617  54 164 0   PRIOPLAY   TS      COPINDEX

 0749   REF   1               10,2620  1 3071 0              TCF     GOPLAY

 0750   REF  21  LAST 1350    10,2621  54 155 1   EXDSPRET   TS      PLAYTEM1

 0751   REF   1               10,2622  3 7737 0              CAF     BIT15+6
 0752   REF  12  LAST 1350    10,2623  1 2501 0              TCF     GOFLASH2

 0753   REF   2  LAST  941    10,2624  55 044 1   GOPERF1    TS      NORMTEM1        STORE DESIRED CHECKLIST VALUE
 0754   REF   1               10,2625  3 3477 0              CAF     V01N25          USED TO DISPLAY CHECKLIST VALUE IN R1

 0755   REF  22  LAST 1352    10,2626  54 155 1   GOPERF4    TS      PLAYTEM1

 0756   REF   1               10,2627  3 3476 1              CAF     PERFMASK        LEAVE ONLY FLASH, PERFORM, BLANKING
 0757   REF  13  LAST 1352    10,2630  1 2501 0              TCF     GOFLASH2

 0758   REF  23  LAST 1352    10,2631  54 155 1   GOPERF2    TS      PLAYTEM1        DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

 0759   REF   1               10,2632  3 3502 0              CAF     PERF2MSK
 0760   REF  14  LAST 1352    10,2633  1 2501 0              TCF     GOFLASH2
 0764   REF   1                10,2634  C 2716 G  GOPERF4   TC      PURRS4

 0765   REF  15   LAST 1352    10,2635  1 2501 0            TCF     GOFLASH2

 0766   REF  24   LAST 1352    10,2636  54 155 1  GCFLASHR  TS      PLAYTEMI

 0767   REF  53   LAST 1351    10,2637  3 4750 1            CAF     BIT4          LEAVE ONLY FLASH BIT SET
 0768   REF   6   LAST 1351    10,2640  54 160 1  GOCSPRS   TS      PLAYTEM4

 0769   REF  38   LAST 1316    10,2641  3 6250 0            CAF     THREE

 0770                          10,2642  0 0004 0  GOCSPRS1  INHINT                IMMFOIATE RETURN IS CALL CAOR +4
 0771   REF  16   LAST 1320    10,2643  54 072 0            TS      RUPTREG3

 0772   REF  34   LAST 1351    10,2644  3 0167 1            CA      PRIORITY      MAKE OISPLAY ONE HIGHER THAN USER
 0773   REF   4   LAST 1351    10,2645  7 7730 0            MASK    PRIO37
 0774   REF  11   LAST 1106    10,2646  54 063 C            TS      NEWPRIC

 07741  REF   7   LAST 1353    10,2647  3 0160 0            CA      PLAYTEM4      IS THIS A FLASHING R OISPLAY
 07742  REF  54   LAST 1353    10,2650  7 4750 0            MASK    BIT4
 07743  REF 436   LAST 1352    10,2651  1C C00 C            CCS     A
 07744  REF   1                10,2652  1 2660 1            TCF     VACOSP        YES, MAKE OSPLAY JCB A VAC
 07745  REF  12   LAST 1353    10,2653  3 0063 1            CA      NEWPRIO       NO, MAKE OSPLAY JOB A NOVAC
 07746  REF  29   LAST 1330    10,2654  C 5072 1            TC      NOVAC
 07747  REF   4   LAST  776    E7,1471                      EBANK=  WHOCARES
 07748  REF   2   LAST 1350    10,2655   C2547 0            2CAOR   MAKEPLAY
 07748                         10,2656   20067 1
 07749  REF   1                10,2657  1 2666 1            TCF     BOTHJOBS

 0775   REF  45   LAST 1323    10,266G  3 0006 1  VACOSP    CA      BBANK
 0776                          10,2661  0 0006 1            EXTENO
 0777   REF  26   LAST 1352    10,2662  04 007 1            RCR     SUPERBNK
 077B   REF 238   LAST 132B    10,2663  54 001 1            TS      L
 0779   REF   1                10,2664  3 3540 0            CAF     MAKEGEN
 0760   REF   3   LAST  371    10,2665  0 5116 1            TC      SPVAC

 07B1   REF   2   LAST 1350    10,2666  0 2723 0  BOTHJOBS  TC      SAVELOCS      COPY TEMPS INTC PERMANENT REGISTERS

 07B2                          10,2667  0 0006 1            EXTENO                SAVE NVWORO ANO USERS MPAC +2
 0783   REF B16   LAST 134B    10,267C  3 C156 C            OCA     MPAC +1
 0784   PEF  25   LAST 1330    10,2671  50 064 0            INOEX   LOCCTP
 0785   REF 817   LAST 1353    10,2672  52 156 1            OXCH    MPAC +1

 0786                          10,2673  0 0006 1            EXTENO                SAVE USERS CAOR, FLAGS AND EBANK
 0787   REF B1B   LAST 1353    10,2674  3 0160 0            OCA     MPAC +3
 07B8   REF  26   LAST 1353    10,2675  5C C64 0            INDEX   LCCCTR
 07B9   REF 819   LAST 1353    10,2676  52 160 1            DXCH    MPAC +3

 C790   REF  27   LAST 1353    10,2677  3 0064 0            CA      LCCCTR
 0791   REF B20   LAST 1353    10,2700  54 161 0            TS      MPAC +5
 0792   REF   1                10,2701   0 2730 1            TC       SAVELCCR
 0793                          10,2702   0 0003 1            RELINT

 0794   REF  17  LAST 1286     10,2703   1 4640 0            TCF      BANKJUMP      CALL CADR +4

 0795   REF   3  LAST 1352     10,2704  55'044 1  GOPERF1R  TS       NORMTEM1      DESIRED CHECKLIST VALUE

 0796   REF   2  LAST 1352     10,2705   3 3477 0            CAF      V01N25        DISPLAYS CHECKLIST VALUE IN R1

 0797   REF  25  LAST 1353     10,2706  54 155 1  GOPERFRS  TS       PLAYTEM1

 0798   REF   2  LAST 1352     10,2707   3 3476 1            CAF      PERFMASK      LEAVE ONLY FLASH, PERFORM, BLANKING
 0799   REF   6  LAST 1350     10,2710   1 2640 0            TCF      GODSPRS

 0800   REF  26  LAST 1354     10,2711  54 155 1  GOPERF2R  TS       PLAYTEM1      DESIRED VERB-NOUN TO DISPLAY R1,R2,R3

 0801   REF   2  LAST 1352     10,2712   3 3502 0            CAF      PERF2MSK
 0802   REF   7  LAST 1354     10,2713   1 2640 0            TCF      GODSPRS

 0806   REF   2  LAST 1353     10,2714   0 2716 0  GOPERF4R  TC       PURRS4

 0807   REF   8  LAST 1354     10,2715   1 2640 0            TCF      GODSPRS

 0808   REF   7  LAST  970     10,2716  55'143 1  PURRS4    TS       OPTIONX1      DESIRED OPTION CODE

 0809   REF   1                10,2717   3 3503 1            CAF      V04N06
 0810   REF  27  LAST 1354     10,2720  54 155 1            TS       PLAYTEM1

 0811   REF   1                10,2721   3 3504 0            CAF      PERF4MSK      FLASH,PERFORM AND BLANK R3
 0812   REF 362  LAST 1348     10,2722   0 0002 0            TC       Q

 0813                          10,2723   0 0004 0  SAVELOCS  INHINT

 0815   REF   1                10,2724   4 3513 1            CS       OCT34000      EBANK BITS
 0816   REF   8  LAST 1353     10,2725   7 0160 1            MASK     PLAYTEM4
 0817   REF  80  LAST 1348     10,2726   6 0003 1            AD       EBANK
 0818   REF   9  LAST 1354     10,2727  54 160 1            TS       PLAYTEM4

 0819   REF 363  LAST 1354     10,2730  22 002 0  SAVELOCR  LXCH     Q

 0820   REF  14  LAST 1322     10,2731   0 4645 1            TC       MAKECADR
 0821   REF   1                10,2732  54 157 0            TS       PLAYTEM3

 0822   REF  17  LAST 1353     10,2733   6 0072 1            AD       RUPTREG3      NOT USED FOR NON R ROUTINES
 0823   REF 239  LAST 1353     10,2734   0 0001 0            TC       L

 0824   REF 252  LAST 1351     10,2735   3 4755 1  COPYNORM  CAF      ZERO
 0825   REF   6  LAST 1352     10,2736  54 164 0  COPIES    TS       COPINDEX
 0826                          10,2737   0 0004 0  COPIES2   INHINT
 0827   REF  10  LAST 1354     10,2740   3 0160 0            CA       PLAYTEM4      FLAGWORD
 0828    REF    7  LAST 1354    10,2741   50 164 1                INDEX    COPINDEX
 0829    REF    2  LAST 1348    10,2742   55 067 0                TS       EBANKSAV           EQUIV TO DSPFLG

 0830    REF    1               10,2743   7 3531 1                MASK     CADRMASK           FLASH AND GCOSPPET
 0831                           10,2744   0 0006 1                EXTEND
 0832    REF    1               10,2745   1 2751 1                BZF      SKIPADD

 0833    REF    2  LAST 1354    10,2746   3 0157 1                CA       PLAYTEM3
 0834    REF    8  LAST 1355    10,2747   50 164 1                INDEX    COPINDEX
 0835    REF    2  LAST  197    10,2750   54 372 0                TS       CADRFLSH

 0836    REF   28  LAST 1354    10,2751   3 0155 0    SKIPADD     CA       PLAYTEM1           VERB NOUN
 0837    REF    9  LAST 1355    10,2752   50 164 1                INDEX    COPINDEX
 0838    REF    2  LAST  739    10,2753   54 367 1                TS       NVWORD

 0842    REF    1               10,2754   1 3232 0                TCF      RELINTC

 0843    REF   10  LAST 1355    10,2755   50 164 1    GOSLEEPS    INDEX    COPINDEX
 0844    REF    2  LAST 1348    10,2756   3 3532 0                CA       PRIOOCT
 0845    REF    1               10,2757   7 2761 1                MASK     WAITMASK
 0846    REF    1               10,2760   0 3545 0                TC       UPENT2
 0847                           10,2761    03004 0    WAITMASK    OCT      3004
 0848    REF  137  LAST 1351    10,2762   4 4753 0                CS       ONE
 0849    REF   11  LAST 1355    10,2763   6 0164 1                AD       COPINDEX
 0850    REF    1               10,2764   54 154 0                TS       FACEREG

 0851    REF    2  LAST 1355    10,2765   50 154 1    XCHSLEEP    INDEX    FACEREG
 0852    REF    1               10,2766   3 3511 1                CAF      WAKECADR
 0853                           10,2767   0 0004 0                INHINT
 0854    REF   10  LAST 1352    10,2770   0 5137 1                TC       JOBWAKE            FIND CADR IN JOB AREA

 0855    REF    3  LAST 1352    10,2771   0 3223 1                TC       XCHTOEND           CAUSES AWAKENED JOB TO GO TO ENDOFJOB

 0858    REF    3  LAST 1355    10,2772   50 154 1                INDEX    FACEREG            REPLACE SAME CADR BUT NEW JOB AREA
 0859    REF    2  LAST 1355    10,2773   3 3511 1                CAF      WAKECADR
 0860    REF    7  LAST 1322    10,2774   1 5133 1                TCF      JOBSLEEP

 0861    REF    4  LAST 1355    10,2775   54 154 0    JOBXCHS     TS       FACEREG            CONTROLS TYPE OF DISPLAY PUT TO SLEEP
 0862    REF    3  LAST 1352    10,2776   0 3206 0                TC       WITCHONF
 0863    REF   11  LAST 1355    10,2777   0 5137 1                TC       JOBWAKE
 0864    REF    5  LAST 1355    10,3000   3 0154 1                CA       FACEREG
 0865    REF   28  LAST 1353    10,3001   50 064 0                INDEX    LOCCTR
 0866    REF    6  LAST 1355    10,3002   54 154 0                TS       FACEREG

 0867    REF    1               10,3003   3 3016 0                CAF      XCHQADD
 0868    REF    1               10,3004   0 3224 0                TC       XCHNYLOC

 0869    REF    7  LAST 1355    10,3005   50 154 1                INDEX    FACEREG
 0870    REF    1               10,3006   3 3533 1                CA       MARKCCT
 0871    REF    1               10,3007   7 3535 0                MASK     IDLESLEP
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L        DISPLAY INTERFACE ROUTINES                                                              USER'S PAGE NO.  24       EO S3

 0872    REF    1                10,3010  0 3555 1              TC      DOWNENT2
 0873                            10,3011   74004 0   IDLEMASK OCT     74004                 * DONT MOVE

 0874    REF    8  LAST 1355     10,3012  50 154 1              INDEX   FACEREG               BIT SHOWS PRIO INTERRUPTED NORM OR MARK
 0875    REF   44  LAST 1348     10,3013  3 4747 1              CA      BIT5                  BIT5 FOR MARK, BIT4 FOR NORMAL
 0876    REF   29  LAST 1314     10,3014  6 4751 0              AD      FOUR
 0877    REF    2  LAST 1355     10,3015  0 3545 0              TC      UPENT2                FLAG ROUTINE DOES RELINT
 0878    REF    1                10,3016   02765 1   XCHQADD  GENADR  XCHSLEEP              * DONT MOVE
 0879    REF   19  LAST 1352     10,3017  3 0100 0              CA      FLAGWRD4
 0880    REF    2  LAST 1349     10,3020  7 4751 1              MASK    MKOVBIT               MARK OVER NORM ?
 0881    REF  437  LAST 1353     10,3021  10 000 0              CCS     A
 0882    REF    2  LAST 1348     10,3022  0 2400 1   GENMARK  TC      MARKPLAY              USED AS GENADR FOR JOBWAKE
 0883    REF    2  LAST 1351     10,3023  1 2537 0              TCF     OKTOCOPY

 0884    REF  253  LAST 1354     10,3024  3 4755 1   MARKWAKE CAF     ZERO
 0885    REF    2  LAST 1348     10,3025  54 160 1   WAKEPLAY TS      TEMPOR2

 0886    REF    3  LAST 1356     10,3026  50 160 0              INDEX   TEMPOR2
 0887    REF    1                10,3027  3 3525 0              CA      BITS5+11
 0888    REF   30  LAST 1356     10,3030  6 4751 0              AD      FOUR
 0889    REF    2  LAST 1356     10,3031  0 3555 1              TC      DOWNENT2
 0890                            10,3032   40010 1   MARKFMSK OCT     40010                 ***DONT MOVE

 0891    REF    4  LAST 1356     10,3033  50 160 0              INDEX   TEMPOR2
 0892    REF    3  LAST 1355     10,3034  3 3511 1              CAF     WAKECADR
 0893                            10,3035  0 0004 0              INHINT
 0894    REF   12  LAST 1355     10,3036  0 5137 1              TC      JOBWAKE

 0895    REF    1                10,3037  1 3336 0              TCF     ENDRET

R0896          ALL -1 RESTARTS BRANCH DIRECTLY TO INITDSP. NORMAL DISPLAYS ARE THEONLY DISPLAYS ALLOWED TO USE -1 RESTARTS
R0898    INITDSP FIRST RESTORES THE EBANK AND THE SUPERBANK TO THE MOST RECENT NORMAL EBANK AND SUPERBANK.
R0900          IF THE MOST RECENT NORMAL DISPLAY REQUEST WAS NOT FINISHED, CONTROLIS SENT BACK TO THE LAST NORMAL USER.
R0902    OTHERWISE THE NORMAL DISPLAY SET UP IN THE NORMAL DISPLAY REGS IS STARTED UP IMMEDIATELY.

 0904    REF    4  LAST 1351     10,3040  3 1071 0   INITDSP  CA      EBANKTEM              RESTORE MOST RECECT NORMAL EBANK
 0905    REF   81  LAST 1354     10,3041  54 003 0              TS      EBANK

 0906    REF    4  LAST 1352     10,3042  3 0366 1              CA      RESTREG               SUPERBANK AND JOB PRIORITY
 0907    REF    1                10,3043  0 4727 1              TC      SUPERSW               RESTORE SUPERBANK

 0908    REF    5  LAST 1353     10,3044  7 7730 0              MASK    PRIO37
 0909    REF   18  LAST 1351     10,3045  0 5146 1              TC      PRIOCHNG

 0910    REF   39  LAST 1353     10,3046  4 6250 1              CS      THREE
 0911    REF    3  LAST  233     10,3047  6 0374 1              AD      TEMPFLSH
 0912    REF   18  LAST 1354     10,3050  1 4640 0              TCF     BANKJUMP

 0913                            10,3051  0 0003 1   PINBRNCH RELINT                        FOR GOPIN USERS
 09135   REF    1                10,3052  3 1072 0              CA      MARK2PAC              NEEDED TO SAVE MPAC +2 FOR MARK USERS
 0914    REF B21  LAST 1353   10,3053  54 156 1              TS      MPAC +2          ONLY

 0915    REF  20  LAST 1356   10,3054  3 0100 0              CA      FLAGWR04         PINBRANCH CONDITION
 0916    REF   1              10,3055  7 7743 1              MASK    PINMASK
 0917    REF 438  LAST 1356   10,3056  10 000 0              CCS     A
 0918                         10,3057  1 3062 1              TCF     +3
 0919    REF   1              10,3060  1 3472 1              TCF     ERASER           ** NOTHING IN ENOIDLE
 0920    REF   3  LAST 1356   10,3061  1 2400 0              TCF     MARKPLAY

 0921    REF  73  LAST 1327   10,3062  0 5504 0   NCRMBNCH   TC      UPFLAG           SET PINBRANCH BIT
 0922    REF   1              10,3063   00105 0              ADRES   PINBRFLG

 0923    REF   1              10,3064  3 4736 1              CAF     PRIO0BIT         PRIO INTERRUPTED
 0924    REF  21  LAST 1357   10,3065  7 0100 1              MASK    FLAGWR04
 0925    REF 439  LAST 1357   10,3066  10 000 0              CCS     A
 0926    REF   1              10,3067  1 2545 0              TCF     KEEPPRIO

 0927    REF   1              10,3070  1 2616 0              TCF     PLAYJUM1

 0928    REF   1              10,3071  0 2420 0   NVOSP      TC      COPYPACS

 09281   REF   5  LAST 1356   10,3072  3 0160 0              CA      TEMPOR2          SET UP BLANK BITS FOR NVMONOPT IN CASE
 09282   REF  22  LAST 1323   10,3073  7 4757 1              MASK    SEVEN            USER REQUESTS BLANKING MONITOR
 09283   REF 240  LAST 1354   10,3074  54 001 1              TS      L

 0929    REF  47  LAST 1314   10,3075  4 4737 1              CS      BIT13
 0930    REF  12  LAST 1355   10,3076  50 164 1              INDEX   COPINOEX
 0931    REF   1              10,3077  7 1067 0              MASK    OSPFLG
 0932    REF  13  LAST 1357   10,3100  50 164 1              INDEX   COPINDEX
 0933    REF   2  LAST 1357   10,3101  55'067 0              TS      DSPFLG

 0934    REF  42  LAST 1323   10,3102  7 4744 0              MASK    BIT8             BIT8 SET IF DEC MARK PERFORM DISPLAY
 0935    REF  33  LAST 1259   10,3103  54 141 1              TS      TEM1

 0936    REF 822  LAST 1357   10,3104  3 0156 0              CA      MPAC +2
 0937    REF   2  LAST 1348   10,3105  54 165 1              TS      MPAC2SAV

 0938    REF   2  LAST 1356   10,3106  55'072 1              TS      MARK2PAC         * FOR OISK ONLY *
 0939    REF  14  LAST 1357   10,3107  50 164 1              INOEX   COPINDEX
 0940    REF   3  LAST 1355   10,3110  10 367 1              CCS     NVWORO
 0941    REF   1              10,3111  1 3120 0              TCF     NVOSP1
 0942    REF   1              10,3112  1 3234 0              TCF     CLEANENO
 0943    REF   4  LAST 1349   10,3113  4 0370 1              CS      MARKNV
 0944    REF   5  LAST 1357   10,3114  54 370 1              TS      MARKNV           IN CASE MARKPLAY AWAKENEO AFTER SLEEPING
 0945    REF  12  LAST 1318   10,3115  7 6077 0              MASK    LOW7
 0946    REF   1              10,3116  6 3516 0              AD      V05N00M1
 0947    REF  34  LAST 1357   10,3117  6 0141 0              AD      TEM1
 0948    REF 138  LAST 1355   10,3120  6 4753 1   NVOSP1     AD      ONE
 0949    REF   1              10,3121  0 4155 1   NV500SP    TC      NVMONOPT
 0950    REF   1              10,3122  1 3246 0              TCF     REST             IF BUSY
 0951   REF   6  LAST  473   10,3123  0 4433 1            TC     FLASHOFF        IN CASE OF EXTENDED VERB NON FLASH

 0952   REF   1              10,3124  0 2416 0            TC     COPYTOGO        MPACS DESTROYED BY NVSUB
 0953   REF 102  LAST 1329   10,3125  0 5516 0            TC     DOWNFLAG        UNSET SLEEPING BITS
 0954   REF   1              10,3126   00102 1            ADRES  MRKNVFLG
 09541  REF 103  LAST 1358   10,3127  0 5516 0            TC     DOWNFLAG
 09542  REF   1              10,3130   00103 0            ADRES  NRMNVFLG
 09543  REF 104  LAST 1358   10,3131  0 5516 0            TC     DOWNFLAG
 09544  REF   1              10,3132   00104 1            ADRES  PRONVFLG
 0955   REF   6  LAST 1357   10,3133  3 0160 0  BLANKCHK  CA     TEMPOR2         BLANK BITS 1,2,3 IF SET
 0956   REF   2  LAST  443   10,3134  0 4255 1            TC     BLANKSUB
 0957   REF   1              10,3135  1 3071 0            TCF    NVDSP
 0958   REF  45  LAST 1356   10,3136  3 4747 1  PERFCHEK  CAF    BIT5            BIT 5 FOR PERFORM
 0959   REF   7  LAST 1358   10,3137  7 0160 1            MASK   TEMPOR2
 0960   REF 440  LAST 1357   10,3140  10 000 0            CCS    A               IS THIS A GOPERF DISPLAY
 0961   REF   1              10,3141  1 3164 0            TCF    1STOR2ND        YES

 0962   REF  55  LAST 1353   10,3142  3 4750 1  GOANIDLE  CAF    BIT4
 0963   REF   8  LAST 1358   10,3143  7 0160 1            MASK   TEMPOR2
 0964   REF 441  LAST 1358   10,3144  10 000 0            CCS    A
 0965   REF   1              10,3145  1 3261 0            TCF    FLASHSUB        IT IS

 0966   REF   9  LAST 1358   10,3146  4 0160 1            CS     TEMPOR2         IS THIS A GODSPRFT
 0967   REF  60  LAST 1349   10,3147  7 4746 1            MASK   BIT6
 0968   REF 442  LAST 1358   10,3150  10 000 0            CCS    A
 0969   REF   1              10,3151  1 3156 1            TCF    ISITNDD

 09691  REF  15  LAST 1357   10,3152  50 164 1            INDEX  COPINDEX
 09692  REF   3  LAST 1355   10,3153  3 0372 1            CA     CADRFLSH
 09693  REF 823  LAST 1357   10,3154  54 157 0            TS     MPAC +3
 09694  REF   1              10,3155  1 3354 1            TCF    ENDIT

 0972   REF  16  LAST 1358   10,3156  50 164 1  ISITNDD   INDEX  COPINDEX        IS THIS A PASTE
 0973   REF   4  LAST 1357   10,3157  3 0367 0            CA     NVWORD
 0974   REF  13  LAST 1357   10,3160  7 6077 0            MASK   LOW7            CHECK MADE FOR PINBRNCH AND PRIO ON MARK
 0975                        10,3161  0 0006 1            EXTEND
 0976   REF   2  LAST 1358   10,3162  1 3261 0            BZF    FLASHSUB        YES, ASSUME PASTE ALWAYS ON FLASH

 0977   REF 146  LAST 1348   10,3163  1 5155 1            TCF    ENDOFJOB        NOT FLASH, NOT GOPERF, THERFORE EXIT

 0978   REF  10  LAST 1358   10,3164  3 0160 0  1STOR2ND  CA     TEMPOR2
 0979   REF  48  LAST 1357   10,3165  7 4737 1            MASK   BIT13
 0980   REF 443  LAST 1358   10,3166  10 000 0            CCS    A
 0981   REF   1              10,3167  1 3142 1            TCF    GOANIDLE        SECOND

 0982   REF  49  LAST 1358   10,3170  3 4737 0            CA     BIT13
 0983   REF  17  LAST 1358   10,3171  50 164 1            INDEX  COPINDEX
 0984   REF   3  LAST 1357   10,3172  27 067 0            ADS    DSPFLG

 09845                       10,3173  22 007 0            ZL
 0985                             10,3174  0 0006 1            EXTEND             IS IT MARK
 0986    REF    1                 10,3175  6 2441 1            BZMF    MARKPERF   YES

 0987    REF   35  LAST 1294      10,3176  7 4740 1            MASK    BIT12
 09871                            10,3177  0 0006 1            EXTEND
 09872   REF    1                 10,3200  1 3204 0            BZF     V50PASTE
 09874   REF    3  LAST  739      10,3201  4 1066 1            CS      NVWORD1    NVWORD1= -0 IS V97. NVWORD1= -400 IS V99
 098741  REF    1                 10,3202  6 3542 1            AD      V97N00
 09875   REF    2  LAST 1349      10,3203  1 3121 1            TCF     NV50DSP
 0988    REF    1                 10,3204  3 3501 0  V50PASTE  CAF     V50N00
 0989    REF    3  LAST 1359      10,3205  1 3121 1            TCF     NV50DSP    DISPLAY SECOND PART OF GOPERF

 0990    REF   46  LAST 1358      10,3206  4 4747 0  WITCHONE  CS      BIT5       TURN OFF KEY RELEASE LIGHT
 0991                             10,3207  0 0006 1            EXTEND
 0992    REF   35  LAST 1331      10,3210  03 011 1            WAND    DSALMOUT

 0993    REF   22  LAST 1357      10,3211  3 0100 0            CA      FLAGWRD4
 0994    REF    1                 10,3212  7 3517 0            MASK    NVSUBMSK   IS IT NVSUB ASLEEP
 0995    REF  444  LAST 1358      10,3213  10 000 0            CCS     A
 0996    REF  139  LAST 1357      10,3214  3 4753 1            CAF     ONE
 0997    REF  241  LAST 1357      10,3215  54 001 1            TS      L
 0998    REF  254  LAST 1356      10,3216  3 4755 1            CAF     ZERO
 0999    REF  242  LAST 1359      10,3217  50 001 0            INDEX   L
 1000    REF   11  LAST  462      10,3220  57 041 0            XCH     CADRSTOR

 1001                             10,3221  0 0004 0            INHINT
 1002    REF  364  LAST 1354      10,3222  0 0002 0            TC      Q

 1003    REF    6  LAST  451      10,3223  3 4217 1  XCHTOFNO  CAF     ENDINST    TC ENDOFJOB REPLACES GENADR IN LOC FOR
 1004    REF   29  LAST 1355      10,3224  56 064 0  XCHNYLOC  XCH     LOCCTR     WAS THIS ADDRESS SLEEPING
 1005                             10,3225  0 0006 1            EXTEND
 1006    REF    2  LAST 1355      10,3226  6 3232 1            BZMF    RELINTO    NO
 1007    REF   30  LAST 1359      10,3227  56 064 0            XCH     LOCCTR     YES
 1008    REF   31  LAST 1359      10,3230  50 064 0            INDEX   LOCCTR
 1009    REF   45  LAST 1320      10,3231  54 164 0            TS      LOC

 1010                             10,3232  0 0003 1  RELINTO   RELINT
 1011    REF  365  LAST 1359      10,3233  0 0002 0            TC      Q          BACK TO USER

 1012    REF    4  LAST  882      10,3234  3 7723 0  CLEANEND  CAF     PRIO32     ONE LOWER THAN DISPLAYS SLEEPING
 1014    REF   44  LAST 1300      10,3235  0 5105 0            TC      FINDVAC
 1015    REF    2  LAST  213         0371                      EBANK=  NVSAVE
 1016    REF    1                 10,3236   04231 0            2CADR   JAMTERM
 1016    REF    1                 10,3237   04060 0

 1017    REF    3  LAST 1358      10,3240  1 3262 0            TCF     FLASHSUB +1

 1018    REF   23  LAST 1359      10,3241  3 0100 0  ISITPRIO  CA      FLAGWRD4
 1019    REF    1                 10,3242  7 3267 0            MASK    ITISMASK   IS PINBRFLG, MARKIDFLG SET
 1020                             10,3243  0 0006 1            EXTEND
 1021   REF   2  LAST 1350   10,3244  1 2576 0            BZF     PRIOBORT
 1022   REF 147  LAST 1358   10,3245  1 5155 1            TCF     ENDOFJOB

 1023   REF  12  LAST 1359   10,3246  11'041 1  REST      CCS     CADRSTOR       IS SOMEONE IN ENDIDLE
 1024   REF 148  LAST 1360   10,3247  1 5155 1            TCF     ENDOFJOB       YES
 1025   REF   1              10,3250  1 3252 0            TCF     RESTSLEP

 1026   REF 149  LAST 1360   10,3251  1 5155 1            TCF     ENDOFJOB

 1027   REF   2  LAST 1348   10,3252  3 0162 1  RESTSLEP  CA      GENMASK        SET NVSLEEP BITS
 1028   REF   1              10,3253  7 3520 1            MASK    ASTROMSK
 1029   REF   3  LAST 1356   10,3254  0 3545 0            TC      UPENT2
 1030                        10,3255   24100 0  OCT24100  OCT     24100          *** DONT MOVE

 1031   REF  18  LAST 1358   10,3256  50 164 1            INDEX   COPINDEX
 1032   REF   1              10,3257  3 3510 0            CAF     NVCADR
 1033   REF   2  LAST  468   10,3260  0 4442 1            TC      NVSUBUSY       BUSY OR ABORT IF ILLEGAL

 1034   REF   4  LAST  451   10,3261  0 4427 1  FLASHSUB  TC      FLASHON

 1035   REF  19  LAST 1360   10,3262  3 0164 1            CA      COPINDEX       COPINDEX DESTROYED BY ENDIDLE
 1036   REF   1              10,3263  54 157 0            TS      COPMPAC

 1037   REF   3  LAST 1360   10,3264  3 0162 1            CA      GENMASK
 1038   REF   1              10,3265  7 3011 0            MASK    IDLEMASK
 1039   REF   4  LAST 1360   10,3266  0 3545 0            TC      UPENT2
 1040                        10,3267   40040 1  ITISMASK  OCT     40040          *** ENDIDLE ALLOW *** DONT MOVE

 1041   REF   2  LAST  224   10,3270  3 1073 1            CA      K1SAVE         IS THIS A REPEAT AND RETURN DISPLAY
 1042   REF  20  LAST 1360   10,3271  50 164 1            INDEX   COPINDEX
 1043   REF  36  LAST 1331   10,3272  7 4751 1            MASK    BIT3
 1044   REF 445  LAST 1359   10,3273  10 000 0            CCS     A
 1045   REF   1              10,3274  1 3361 1            TCF     UNSETR1        YES

 1046   REF  13  LAST 1360   10,3275  11'041 1            CCS     CADRSTOR       SEE IF SOMEONE ALREADY IN ENDIDLE
 1047   REF   1              10,3276  1 3241 1            TCF     ISITPRIO
 1048                        10,3277  1 3301 1            TCF     +2
 1049   REF   2  LAST 1360   10,3300  1 3241 1            TCF     ISITPRIO

 1050   REF   1              10,3301  0 4207 0            TC      ENDIDLE
 1051   REF   1              10,3302  1 3373 1  IDLERET1  TCF     TERMATE

 1052   REF   1              10,3303  1 3412 1            TCF     PROCEED        ENDIDLE RETURNS HERE ON PROCEED

 1053   REF   1              10,3304  4 3527 0            CS      LOWLCAD
 1054   REF 824  LAST 1358   10,3305  6 0154 1            AD      MPAC           VERBREG
 1055                        10,3306  0 0006 1            EXTEND
 1056   REF 446  LAST 1360   10,3307  26 000 0            DIM     A
 1057                        10,3310  0 0006 1            EXTEND
 1058   REF   1              10,3311  1 3462 0            BZF     LOADITIS       V21 OR V22 OR V23 ON DSKY
 1059   REF  87  LAST 1352   10,3312   3 4752 0  OKTOENT  CAF    TWO
 1060   REF   1              10,3313  54 161  0  ENDOUT   TS     OUTHERE

 1061   REF  24  LAST 1359   10,3314   3 0100 0           CA     FLAGWRD4          CHECK NATURE OF ENDIDLE RETURN
 1062   REF   2  LAST 1292   10,3315   7 4101 1           MASK   OCT60000
 1063   REF 447  LAST 1360   10,3316  10 000  0           CCS    A
 1064   REF   1              10,3317   1 3322 0           TCF    TIMECHEK          PRIO ENDIDLE RETURN
 1065   REF   1              10,3320   1 3430 1           TCF    NORMRET           NORMAL ENDIDLE RETURN
 1066   REF   1              10,3321   1 3414 1           TCF    MARKRET           MARK ENDIDLE RETURN

 1067   REF  21  LAST 1351   10,3322   4 0025 1  TIMECHEK CS     TIME1
 1068   REF   2  LAST 1351   10,3323   6 1164 0           AD     PRIOTIME
 1069   REF 448  LAST 1361   10,3324  10 000  0           CCS    A
 1070                        10,3325   4 0000 0           COM
 1071   REF   3  LAST 1297   10,3326   6 7734 0           AD     OCT37776
 1072   REF 140  LAST 1359   10,3327   6 4753 1           AD     ONE
 1073   REF   1              10,3330   6 3571 1           AD     -2SEC
 1074                        10,3331   0 0006 1           EXTEND
 1075   REF   2  LAST 1357   10,3332   6 2545 1           BZMF   KEEPPRIO

 1076   REF   2  LAST 1361   10,3333   1 3430 1           TCF    NORMRET

 1084   REF 141  LAST 1361   10,3334   3 4753 1  NORMWAKE CAF    ONE
 1085   REF   1              10,3335   1 3025 1           TCF    WAKEPLAY

 1086   REF   2  LAST 1361   10,3336  10 161  0  ENDRET   CCS    OUTHERE
 1087   REF 142  LAST 1361   10,3337   6 4753 1           AD     ONE
 1088                        10,3340   1 3342 0           TCF    +2                NORMAL ENDIDLE EXIT
 1089   REF 150  LAST 1360   10,3341   1 5155 1           TCF    ENDOFJOB
 1090   REF   2  LAST 1360   10,3342  50 157  1           INDEX  COPMPAC
 1091   REF   4  LAST 1358   10,3343   6 0372 1           AD     CADRFLSH
 1092   REF 825  LAST 1360   10,3344  54 157  0           TS     MPAC +3

 1093   REF   4  LAST 1360   10,3345   3 0162 1           CA     GENMASK           REMOVE ENDIDLE AND PINBRANCH BITS
 1094   REF   1              10,3346   7 3350 0           MASK   PINIOMSK
 1095   REF   3  LAST 1356   10,3347   0 3555 1           TC     DOWNENT2
 1096                        10,3350    74044 1  PINIOMSK OCT    74044             *** DONT MOVE

 1097   REF  40  LAST 1356   10,3351   4 6250 1           CS     THREE             BLANK EVERYTHING EXCEPT MM
 1098   REF   2  LAST  264   10,3352   0 4154 0           TC     NVSUB
 1099                        10,3353   1 3354 1           TCF    +1

 1100   REF   3  LAST 1352   10,3354   3 0163 0  ENDIT    CA     USERPRIO          RETURN TO USERS PRIORITY
 1101   REF   6  LAST 1356   10,3355   7 7730 0           MASK   PRIO37
 1102   REF  19  LAST 1356   10,3356   0 5146 1           TC     PRIOCHNG
 1103   REF 826  LAST 1361   10,3357   3 0157 1           CA     MPAC +3
 1104   REF  19  LAST 1356   10,3360   1 4640 0           TCF    BANKJUMP

 1105   REF  21  LAST 1360   10,3361  50 164  1  UNSETR1  INDEX  CORINDEX          RESET REPEAT AND RETURN REQUEST
 1106   REF  37  LAST 1360   10,3362   4 4751 1           CS     BIT3
 1107    REF   3   LAST 1360   10,3363  7 1073 0            MASK    R1SAVE
 1108    REF   4   LAST 1362   10,3364  55'073 0            TS      R1SAVE

 1109    REF 255   LAST 1359   10,3365  3 4755 1            CAF     ZERO           *** 205 ONLY MARKBRAN USERS IN
 1110    REF   2   LAST 1356   10,3366  0 4727 1            TC      SUPERSW        SUPERBANK 0

 1111    REF  41   LAST 1361   10,3367  3 6250 0  -1        CAF     THREE          RETURN TO USERS IMMEDIATE RETURN LOC
 1112    REF  22   LAST 1361   10,3370  50 164 1  IMMEDRET  INDEX   COPINDEX
 1113    REF   5   LAST 1361   10,3371  6 0372 1            AD      CADRFLSH
 1114    REF  20   LAST 1361   10,3372  1 4640 0            TCF     BANKJUMP

 1115    REF 256   LAST 1362   10,3373  3 4755 1  TERMATE   CAF     ZERO           ASTRONAUT TERMINATE (V34) RETURNS TO
 1116    REF   1               10,3374  1 3313 1            TCF     ENDOUT

 1117    REF  11   LAST 1354   10,3375  4 0160 1  LINUSCHR  CS      PLAYTEM4       IS THIS A LINUS
 1118    REF  79   LAST 1350   10,3376  7 4736 0            MASK    BIT14
 1119    REF 449   LAST 1361   10,3377  10 000 0            CCS     A
 1120    REF   6   LAST 1286   10,3400  1 6742 1            TCF     Q+1            NO
 1121    REF   3   LAST 1355   10,3401  4 0157 0            CS      PLAYTEM3       YES, IS IT ALREADY IN ENDIDLE
 1122    REF  23   LAST 1362   10,3402  50 164 1            INDEX   COPINDEX
 1123    REF   6   LAST 1362   10,3403  6 0372 1            AD      CADRFLSH
 1124                          10,3404  0 0006 1            EXTEND
 1125                          10,3405  1 3407 0            BZF     +2             YES

 1126    REF 366   LAST 1359   10,3406  0 0002 0            TC      Q              NO
 1127    REF  12   LAST  474   10,3407  11'011 1            CCS     DSPLOCK        IS THE ASTRONAUT BUSY
 1128    REF 151   LAST 1361   10,3410  0 5155 0            TC      ENDOFJOB       END THE NEW DISPLAY, ITS ALREADY ACTIVE
 1129    REF 367   LAST 1362   10,3411  0 0002 0            TC      Q

R1130    MORE LOGIC COULD BE INCORPORATED HERE TO MAKE SURE A RECYCLE IS A RECYCLAND CONVERSLY THAT A LOAD IS A LOAD.
 1132    REF 143   LAST 1361   10,3412  3 4753 1  PROCEED   CAF     ONE            ASTRONAUT PROCEED (V33) RETURNS
 1133    REF   2   LAST 1362   10,3413  1 3313 1            TCF     ENDOUT

R1138          LASTPLAY CHECKS TO SEE IF (1) THE LAST NORMAL DISPLAY WAS EITHER INTERRUPTED BY A PRIO OR A MARK (MARK
R1140    COULD ONLY HAPPEN DURING PINBRANCH) OR IF (2) THE LAST NORMAL DISPLAY WAS REQUESTED WHILE A HIGHER PRIORITY
R1142    DISPLAY WAS GOING RESULTING IN THE NORMAL BEING PUT TO SLEEP.

R1143          IF EITHER OF THE ABOVE 2 CONDITIONS EXISTS , THE NORMAL DISPLAY IS AWAKENED TO GO TO PLAYJUM1 WHICH STARTS
R1145    UP THE MOST RECENT VALID NORMAL DISPLAY. IF THESE 2 CONDITIONS DO NOT EXIST, CONTROL GOES TO PLAYJUM1 WHICH IS
R1147    STARTED IMMEDIATELY WITH THE ASSUMPTION THAT THE MOST RECENT NORMAL DISPLAY IS ALREADY IN-ENDIDLE(DURING A
R1149    PINBRANCH) OR THAT A RESTART HAS OCCURRED AND THE DISPLAY CAN BE STARTED AS A .1 RESTART.

 1163    REF  23   LAST 1304   10,3414  4 6245 0  MARKRET   CS      SIX
 1164    REF  25   LAST 1361   10,3415  7 0100 1            MASK    FLAGWRD4
 1165                          10,3416  0 0004 0            INHINT                 *** MAY MOVE DISPLAY FLAGWORD OUT OF
 1166    REF  26   LAST 1362   10,3417  54 100 1            TS      FLAGWRD4

 1167                          10,3420  0 0003 1            RELINT                 INHINT REALM
 1168    REF   2   LAST 1356   10,3421  1 3336 0            TCF     ENDRET
 1169    REF    2  LAST 1315   10,3422  3 7752 0  MARKOVER CAF     MINUS1          RUPTREG2 IS - MEANS ENDOFJOB TC ENDRET
 1170    REF    3  LAST 1361   10,3423 54 161  0           TS      OUTHERE

 1171    REF   27  LAST 1362   10,3424  3 0100 0           CA      FLAGWRD4        IS ENDIOFLG SET
 1172    REF   12  LAST 1286   10,3425  7 4355 1           MASK    PRIO30          IS NORMAL OR PRIO IN ENDIDLE
 1173    REF  450  LAST 1362   10,3426 10 000  0           CCS     A
 1174    REF    1              10,3427  1 3062 1           TCF     NORMBNCH

 1175    REF   28  LAST 1363   10,3430  3 0100 0  NORMRET  CA      FLAGWRD4        IS MARK SLEEPING
 1176    REF    2  LAST 1356   10,3431  7 3525 1           MASK    BITS5+11        OR WAITING
 1177    REF  451  LAST 1363   10,3432 10 000  0           CCS     A
 1178    REF    1              10,3433  1 3024 0           TCF     MARKWAKE

 1179    REF   29  LAST 1363   10,3434  3 0100 0           CA      FLAGWRD4        NO
 1180    REF    1              10,3435  7 3526 1           MASK    BITS4+10        IS NORMAL INTERRUPTED OR WAITING
 1181    REF  452  LAST 1363   10,3436 10 000  0           CCS     A
 1182    REF    1              10,3437  1 3334 1           TCF     NORMWAKE        YES

 1183    REF    5  LAST 1356   10,3440  3 1071 0           CA      EBANKTEM        NO, WAS IT A FLASH REQUEST
 1184    REF    4  LAST 1323   10,3441  7 4771 0           MASK    OCT50           OR A GODSPRET
 1185    REF  453  LAST 1363   10,3442 10 000  0           CCS     A
 1186    REF    3  LAST 1362   10,3443  1 3336 0           TCF     ENDRET          YES
 1187    REF    3  LAST 1359   10,3444  3 0371 1           CA      NVSAVE
 1188                          10,3445  0 0006 1           EXTEND
 1189    REF    4  LAST 1363   10,3446  1 3336 0           BZF     ENDRET

 1190    REF    5  LAST  472   10,3447  3 5025 0           CAF     PRIO15
 1191                          10,3450  0 0004 0           INHINT
 1192    REF   30  LAST 1353   10,3451  0 5072 1           TC      NOVAC
 1193    REF    5  LAST 1358      0367                     EBANK=  NVWORD
 1194    REF    2  LAST 1357   10,3452    02616 1          2CADR   PLAYJUM1
 1194                          10,3453    20060 0

 1195    REF    5  LAST 1363   10,3454  1 3336 0           TCF     ENDRET

 1196    REF   30  LAST 1363   10,3455  3 0100 0  MARSLEEP CA      FLAGWRD4        IS MARK ALREADY IN
 1197    REF    3  LAST 1363   10,3456  7 3525 1           MASK    BITS5+11
 1198    REF  454  LAST 1363   10,3457 10 000  0           CCS     A
 1199    REF  152  LAST 1362   10,3460  1 5155 1           TCF     ENDOFJOB        YES
 11991   REF    3  LAST 1352   10,3461  1 2755 0           TCF     GOSLEEPS

 1200    REF    3  LAST 1361   10,3462 50 157  1  LEADITIS INDEX   COPMPAC
 1201    REF    6  LAST 1363   10,3463  3 0367 0           CA      NVWORD
 1202    REF   14  LAST 1358   10,3464  7 6077 0           MASK    LOW7
 1203                          10,3465  4 0000 0           COM
 1204    REF  827  LAST 1361   10,3466  6 0155 0           AD      MPAC +1         NOUNREG
 1205                          10,3467  0 0006 1           EXTEND
 1206    REF    1              10,3470  1 3312 0           BZF     CKTCENT         NO, THEN LOAD IS VALID
 1207    REF    7  LAST  829   10,3471  1 3051 1           TCF     PINBRNCH        YES, ACCEPT LOAD BUT ASK FOR LAST AGAIN
 1208  REF  42  LAST 1362   10,3472   4 6250 1  ERASER    CS      THREE        BLANK EVERYTHINGEXCEPT MM
 1209  REF   3  LAST 1361   10,3473   0 4154 0            TC      NVSUB
 1210  REF 153  LAST 1363   10,3474   1 5155 1            TCF     ENDOFJOB
 1211  REF 154  LAST 1364   10,3475   1 5155 1            TCF     ENDOFJOB

 1212                       10,3476   00036 1  PERFMASK  OCT     0036         FLASH,PERFORM,BLANK R2 AND R3
 1213                       10,3477   00231 1  V01N25    VN      00125
 1214                       10,3500   01407 0  V06N07    VN      00607        GOPERF3 VN DISPLAY BEFORE V50
 1215                       10,3501   14400 0  V50N00    VN      5000
 1216                       10,3502   00030 1  PERF2MSK  OCT     00030        FLASH, PERFORM
 1217                       10,3503   01006 0  V04N06    VN      00406
 1218                       10,3504   00014 1  PERF4MSK  OCT     14           FLASH, BLANK R3
 1219  REF   8  LAST 1363   10,3051            GOAGIN    EQUALS  PINBRNCH
 1220                       10,3505   20010 1  REDOMASK  OCT     20010        BITS 4 AND 14
 1221                       10,3506   40230 1  MARK3MSK  OCT     40230        MARK,DECIMAL NOUN, PERFORM,FLASH
 1222                       10,3507   40036 0  MARK4MSK  OCT     40036        MARK,PERFORM,FLASH,BLANK 2 AND 3
 1223  REF   1              10,3510   20543 1  NVCADR    CADR    RECDPRIO
 1224  REF   4  LAST 1357   10,3511   20400 1  WAKECADR  CADR    MARKPLAY
 1225  REF   3  LAST 1363   10,3512   20616 1            CADR    PLAYJUM1

 1226                       10,3513   03400 0  OCT3400   OCT     3400         EBANK MASK
 1227                       10,3514   11210 1  NBUSMASK  OCT     11210
 1228                       10,3515   66521 1  PMMASK    OCT     66521
 1229  REF   4  LAST  450      4144            VERBMASK  =       MI07         (OCT 37600)
 1230                       10,3516   01177 1  V05N00M1  OCT     1177         V05 MINUS ONE
 1231  REF   1              10,2330            GOXDSP    EQUALS  GOMARK
 1232  REF   1              10,2350            GOXDSPR   EQUALS  GOMARKR
 1233  REF  12  LAST  705   10,2334            GOXDSPF   EQUALS  GOMARKF
 1234  REF   6  LAST  493   10,2353            GOXDSPFR  EQUALS  GOMARKFR
 1235  REF   2  LAST  254      5472            ENDEXT    EQUALS  ENDMARK
 1236  REF  14  LAST 1105      0165            MPAC2SAV  EQUALS  BANKSET
 1238                       10,3517   00700 0  NVBLSMSK  OCT     700
 12385                      10,3520   00704 1  ASTPOMSK  OCT     704
 1239                       10,3521   40030 0  MPERFMSK  OCT     40030        BIT 15,5,4 FOR MARK,PERFORM,FLASH
 1240                       10,3522   34300 0  OCT34300  OCT     34300
 1241                       10,3523   40100 1  BITS15+7  OCT     40100
 1242                       10,3524   00110 1  BITS7+4   OCT     110
 1243  REF   3  LAST 1355      1067            DSPFLG    EQUALS  EBANKSAV
 1244  REF   1                 1070            MARKFLAG  EQUALS  MARKEBAN
 1245  REF   6  LAST 1363      1071            SAVEFLAG  EQUALS  EBANKTEM
 1246                       10,3525   02020 1  BITS5+11  OCT     2020         * DONT MOVE
 1247                       10,3526   01010 1  BITS4+10  OCT      1010        * DONT MOVE
 1249                       10,3527   00026 0  LOWLOAD   DEC     22
 1250                       10,3530   77730 0  BUSYMASK  OCT     77730
 1252                       10,3531   00050 1  CADRMASK  OCT     50
 1253  REF   4  LAST 1306      7743            PINMASK   EQUALS  13,14,15
 1254  REF   2  LAST 1358   10,3071            GOPLAY    EQUALS  NVDSP
A1255                                          PRIOSAVE  EQUALS  R1SAVE
 1256  REF 828  LAST 1363      0157            COPMPAC   EQUALS  MPAC +3
 1257  REF 829  LAST 1364      0160            TEMPOR2   EQUALS  MPAC +4
 1258    REF 830  LAST 1364      0161              OUTHERE  EQUALS MPAC +5
 1259    REF  46  LAST 1359      0164              CODINDEX EQUALS LOC
 1260    REF  37  LAST 1071      0163              USERPRIO EQUALS MODE
 1261    REF 831  LAST 1365      0162              GENMASK  EQUALS MPAC +6
 1262                        10,3532    20144 1    PRIOOCT  OCT    20144                PRIO
 1263                        10,3533    42424 0    MARKOCT  OCT    42424                MARK
 1264                        10,3534    11254 1             OCT    11254                NORM

 1265                        10,3535    74704 1    IDLESLEP OCT    74704
 1266                        10,3536    67777 1    OCT67777 OCT    67777
 1267    REF   9  LAST  493      5464              LINUS    EQUALS BLANKET
 1268    REF 832  LAST 1365      0154              FACEREG  EQUALS MPAC
 1269    REF 833  LAST 1365      0155              PLAYTEM1 EQUALS MPAC +1
 1270    REF 834  LAST 1365      0157              PLAYTEM3 EQUALS MPAC +3
 1271    REF 835  LAST 1365      0160              PLAYTEM4 EQUALS MPAC +4
 1273                        10,3537    40420 0    OCT40420 OCT    40420
 1274    REF   3  LAST 1353  10,3540    02547 0    MAKEGEN  GENADR MAKEPLAY
 1275                        10,3541    10200 1    OCT10200 OCT    10200
 1276                        10,3542    30200 0    V97N00   VN     09700                PASTE FOR V97 OR V99
 12761                       10,3543    20100 1    OCT20100 OCT    20100
 12762                       10,3544    24030 1    CLOCKCON OCT    24030                FLASH, PERFORM, V99 OR V97 PASTE,REFLASH
 0001                           10,3545                            BANK    10
 0002   REF   2  LAST 1346      10,2000                            SETLOC  DISPLAYS
 0003                           10,3545                            BANK
 0004   REF   2 LAST 1346 TO 1366:     655   655*                  COUNT*  $$/DSPLA

 0005                           10,3545   0 0004 0  UPENT2         INHINT
 0006   REF   3  LAST 1278      10,3546   7 5650 0                 MASK    OCT77770
 0007   REF 243  LAST 1359      10,3547   54 001 1                 TS      L
 0008   REF  31  LAST 1363      10,3550   4 0100 1                 CS      FLAGWRD4
 0009   REF 244  LAST 1366      10,3551   7 0001 1                 MASK    L
 0010   REF  32  LAST 1366      10,3552   26 100 1                 ADS     FLAGWRD4
 0011                           10,3553   0 0003 1  JOIN           RELINT
 0012   REF   7  LAST 1362      10,3554   1 6742 1                 TCF     Q+1

 0013                           10,3555   0 0004 0  DOWNENT2       INHINT
 0014   REF   4  LAST 1366      10,3556   7 5650 0                 MASK    OCT77770
 0015                           10,3557   4 0000 0                 COM
 0016   REF  33  LAST 1366      10,3560   7 0100 1                 MASK    FLAGWRD4
 0017   REF  34  LAST 1366      10,3561   54 100 1                 TS      FLAGWRD4
 0018   REF   1                 10,3562   1 3553 0                 TCF     JOIN

 0032   REF  23  LAST 1357    .    4757             OCT7           EQUALS  SEVEN
```

```
P0033
R0034         UPFLAG AND DOWNFLAG ARE ENTIRELY GENERAL FLAG SETTING ANC CLEARING SUBROUTINES.   USING THEM, WHETHER OR
R0036     NOT IN INTERRUPT, ONE MAY SET OR CLEAR ANY SINGLE, NAMED BIT IN ANY ERASABLE REGISTER, SUBJECT CF COURSE TO
R0038     EBANK SETTING.   A "NAMED" BIT, AS THE WORO IS USEO HERE, IS ANY BIT WITH A NAME FORMALLY ASSIGNEO BY THE YUL
R0040     ASSEMBLER.

R0041         AT PRESENT THE ONLY NAMEO BITS ARE THOSE IN THE FLAGWORDS.   ASSEMBLER CHANGES WILL MAKE IT PCSSIBLE TO
R0043     NAME ANY BIT IN ERASABLE MEMCRY.

R0044         CALLING SEQUENCES ARE AS FOLLOWS:-

R0045                         TC      UPFLAG                        TC      DOWNFLAG
R0046                         AORES   NAME OF FLAG                  AORES   NAME OF FLAG

R0047         RETURN IS TO THE LOCATION FOLLOWING THE "AORES" ABOUT .58 MS AFTER THE "TC".

R0049         LPON RETURN A CCNTAINS THE CURRENT FLAGWRC SETTING.

 0050                           5504                      BLCCK  02
 0051     REF   3  LAST 1286    4000                      SETLOC FFTAG1
 0052                           5504                      BANK
 0053     REF   1                                         COUNT* $$/FLAG

 0054     REF 368  LAST 1362    5504  3 0002 0  UPFLAG    CA     Q
 0055     REF   2  LAST  737    5505  0 5522 1            TC     OEBIT
 0056                           5506  4 0000 0            COM                      +(15 - BIT)
 0057                           5507  0 0006 1            EXTEND
 0058     REF  16  LAST 1020    5510  04 001 1            ROR    LCHAN             SET BIT
 0059     REF  57  LAST 1317    5511  50 061 0  COMFLAG   INDEX  ITEMP1
 0060     REF  29  LAST  960    5512  54 074 0            TS     FLAGWRCO
 0061     REF  26  LAST 1292    5513  22 063 1            LXCH   ITEMP3
 0062                           5514  0 0003 1            RELINT
 0063     REF 245  LAST 1366    5515  0 0001 0            TC     L


 0064     REF 369  LAST 1367    5516  3 0002 0  DOWNFLAG  CA     Q
 0065     REF   3  LAST 1367    5517  0 5522 1            TC     OEBIT
 0066     REF 246  LAST 1367    5520  7 0001 1            MASK   L                 RESET BIT
 0067     REF   2  LAST  737    5521  1 5511 0            TCF    COMFLAG


 0068     REF 144  LAST 1362    5522  6 4753 1  DEBIT     AD     ONE               CET DE BITS
 0069                           5523  0 0004 0            INHINT
 0070     REF  27  LAST 1367    5524  54 063 0            TS     ITEMP3
 0071     REF   3  LAST 1086    5525  3 4762 0            CA     LOW4              CEC15
 0072     REF  58  LAST 1367    5526  54 061 1            TS     ITEMP1
 0073     RFF  28  LAST 1367    5527  50 063 1            INOEX  ITEMP3
 0074                           5530  2'7777 0            CA     0 -1              ADRES
 0075     REF 247  LAST 1367    5531  54 001 1            TS     L
 0076     REF 257  LAST 1362    5532  3 4755 1            CA     ZERO
```

```
L         SERVICE ROUTINES                                                             USER'S PAGE NO.   3      EO S3

 0077                                  5533  0 0006 1          EXTEND
 0078   REF  59  LAST 1367             5534  10 061 1          DV       ITEMP1           A = FLAGWRD, L = (15 - BIT)
 0079   REF  60  LAST 1368             5535  52 062 1          DXCH     ITEMP1
 0080   REF  61  LAST 1368             5536  50 061 0          INDEX    ITEMP1
 0081   REF  30  LAST 1367             5537  3 0074 1          CA       FLAGWRD0
 0082   REF 248  LAST 1367             5540  54 0001 1         TS       L                CURRENT STATE
 0083   REF  26  LAST 1316             5541  50 062 0          INDEX    ITEMP2
 0084   REF  47  LAST 1347             5542  4 4735 0          CS       BIT15            -(15 - BIT)
 0085   REF 370  LAST 1367             5543  0 0002 0          TC       Q
```

```
P0086    DELAYJOB- A GENERAL ROUTINE TO DELAY A JOB A SPECIFIC AMOUNT OF TIME BEFORE PICKING UP AGAIN.

R0088    ENTRANCE REQUIREMENTS...
A0089                                                          CAF      DT                DELAY JOB FOR DT CENTISECS
A0090                                                          TC       BANKCALL
A0091                                                          CADR     DELAYJOB

 0092                             06,3772                      BANK     06
 0093    REF   1                  00,2000                      SETLOC   DLAYJOB
 0094                             00,3735                      BANK

R0095    THIS MUST REMAIN IN BANK 0 ****************************************
 0096    REF   1                                               COUNT*   $$/DELAY
 00965   REF   7  LAST 1308       00,3735  3 5000 1  2SECDELY  CAF      2SECS
 0097                             00,3736  0 0004 0  DELAYJOB  INHINT
 0098    REF 371  LAST 1368       00,3737  54 002 1            TS       Q                 STORE DELAY DT IN Q FOR DLY -1 IN

 0099    REF   1                  00,3740  3 4752 0            CAF      DELAYNUM          WAITLIST
 0100    REF  58  LAST 1318       00,3741  54 070 1  DELLOOP   TS       RUPTREG1
 0101    REF 455  LAST 1363       00,3742  50 000 1            INDEX    A
 0102    REF   4  LAST  224       00,3743  3 1323 1            CA       DELAYLOC          IS THIS DELAYLOC AVAILABLE
 0103                             00,3744  0 0006 1            EXTEND
 0104    REF   1                  00,3745  1 3753 1            BZF      OK2DELAY          YES

 0105    REF  59  LAST 1369       00,3746  10 070 1            CCS      RUPTREG1          NO, TRY NEXT DELAYLOC
 0106    REF   1                  00,3747  1 3741 1            TCF      DELLOOP

 0107    REF  27  LAST 1323       00,3750  52 134 0            DXCH     BUF2
 0108    REF   7  LAST 1322       00,3751  0 5706 0            TC       BAILOUT1          NO AVAILABLE LOCS.
 0109                             00,3752   31104 0            OCT      31104

 0110    REF   1                  00,3753  3 3773 1  OK2DELAY  CA       TCSLEEP           SET WAITLIST IMMEDIATE RETURN
 0111    REF   7  LAST 1126       00,3754  54 061 1            TS       WAITEXIT

 0112    REF  31  LAST 1099       00,3755  3 0004 0            CA       FBANK
 0113    REF  60  LAST 1369       00,3756  6 0070 0            AD       RUPTREG1          STORE BBANK FOR TASK CALL
 0114    REF 249  LAST 1368       00,3757  54 001 1            TS       L

 0115    REF   1                  00,3760  3 3774 0            CAF      WAKECAD           STORE CADR FOR TASK CALL
 0116    REF   2  LAST 1113       00,3761  1 5211 1            TCF      DLY2 -1           DLY IS IN WAITLIST ROUTINE

 0117    REF  15  LAST 1354       00,3762  0 4645 1  TCGETCAD  TC       MAKECADR          GET CALLERS FCADR

 0118    REF  61  LAST 1369       00,3763  50 070 0            INDEX    RUPTREG1
 0119    REF   5  LAST 1369       00,3764  55 323 0            TS       DELAYLOC          SAVE DELAY CADRS

 0120    REF   8  LAST 1355       00,3765  0 5133 0            TC       JOBSLEEP

 0121    REF 258  LAST 1367       00,3766  3 4755 1  WAKER     CAF      ZERO
 0122    REF  46  LAST 1353       00,3767  50 006 1            INDEX    BBANK
 0123    REF    6  LAST 1369    00,3770  57323 1            XCH    DELAYLOC          MAKE DELAYLOC AVAILABLE
 0124    REF   13  LAST 1356    00,3771  0 5137 1           TC     JOBWAKE

 0125    REF   81  LAST 1320    00,3772  0 5261 1           TC     TASKOVER

 0126    REF    1               00,3773   03760 0  TCSLEEP  GENADR TCGETCAD -2
 0127    REF    1               00,3774   03766 0  WAKECAD  GENADR WAKER
```

```
R0128    GENTRAN, A BLOCK TRANSFER ROUTINE.

R0129    WRITTEN BY D. EYLES
R0130    MOD 1 BY KERNAN                                                                      UTILITYM REV 17 11/18/67

R0132    MOD 2 BY SCHULENBERG  (REMOVE RELINT)   SKIPPER REV 4 2/28/68

R0133                THIS ROUTINE IS USEFULL FOR TRANSFERING N CONSECUTIVE ERASABLE OR FIXED QUANTITIES TO SOME OTHER N
R0135    CONSECUTIVE ERASABLE LOCATIONS.  IF BOTH BLOCKS OF DATA ARE IN SWITCHABLE EBANKS, THEY MUST BE IN THE SAME ONE.

R0137                GENTRAN IS CALLABLE IN A JOB AS WELL AS A RUPT.  THE CALLING SEQUENCE IS:

A0139                                                  I            CA      N-1                 # OF QUANTITIES MINUS ONE
A0140                                                  I +1         TC      GENTRAN             IN FIXED-FIXED.
A0141                                                  I +2         ADRES   L                   STARTING ADRES OF DATA TO BE MOVED.
A0142                                                  I +3         ADRES   M                   STARTING ADRES OF DUPLICATION BLOCK.
A0143                                                  I +4                                     RETURNS HERE.

R0144                GENTRAN TAKES 25 MCT'S (300 MICROSECONDS) PER ITEM + 5 MCT'S (60 MICS) FOR ENTERING AND EXITING.

R0146                A, L AND ITEMP1 ARE NOT PRESERVED.

 0147                          5544                      BLOCK   02
 0148    REF   2  LAST 1346    4300                      SETLOC  FFTAG4
 0149                          5544                      BANK

 0150    REF  62  LAST 1368    0061                      EBANK=  ITEMP1

 0151    REF   1                                         COUNT*  $$/TRAN

 0152                          5544  0 0004 0  GENTRAN   INHINT
 0153    REF  63  LAST 1371    5545  54 061 1            TS      ITEMP1              SAVE N-1.
 0154    REF 372  LAST 1369    5546  50 002 0            INDEX   Q                   C(Q) = ADRES L.
 0155                          5547  6 0000 1            AD      0                   ADRES (L + N - 1).
 0156    REF 456  LAST 1369    5550  50 000 1            INDEX   A
 0157                          5551  3 0000 1            CA      0                   C(ABOVE).
 0158    REF 250  LAST 1369    5552  54 001 1            TS      L                   SAVE DATA.
 0159    REF  64  LAST 1371    5553  3 0061 0            CA      ITEMP1
 0160    REF 373  LAST 1371    5554  50 002 0            INDEX   Q
 0161                          5555  6 0001 0            AD      1                   ADRES (M + N - 1).
 0162    REF 457  LAST 1371    5556  50 000 1            INDEX   A
 0163                          5557  22 000 1            LXCH    0                   STUFF IT.
 0164    REF  65  LAST 1371    5560  10 061 1            CCS     ITEMP1              LOOP UNTIL N-1 = 0.
 0165    REF   2  LAST  299    5561  1 5545 1            TCF     GENTRAN +1
 0166    REF   5  LAST 1286    5562  1 6744 1            TCF     Q+2                 RETURN TO CALLER.
```

```
P0167    B5OFF    ZERO BIT 5 OF EXTVBACT, WHICH IS SET BY TESTXACT.

R0168              MAY BE USED AS NEEDED BY ANY EXTENDED VERB WHICH HAS DONE TESTXACT

 0170    REF   1                                          COUNT* $$/EXTVB

 0171    REF  47  LAST 1359       5563  4 4747 0  B5OFF      CS      BIT5
 0172    REF  18  LAST 1346       5564  7 1043 0             MASK    EXTVBACT
 0173    REF  19  LAST 1372       5565  5 5043 0             TS      EXTVBACT
 0174    REF 155  LAST 1364       5566  0 5155 0             TC      ENDOFJOB
```

```
L        ALARM AND ABORT                                                                USER'S PAGE NO.   1        ED S3

R0001              THE FOLLOWING SUBROUTINE MAY BE CALLED TO DISPLAY A NON-ABORTIVE ALARM CONDITION. IT MAY BE CALLED
R0003    EITHER IN INTERRUPT OR UNDER EXECUTIVE CONTROL.

R0004              CALLING SEQUENCE IS AS FOLLOWS:

R0005              TC       ALARM  .
R0006              CCT      AAANN                ALARM NO. NN IN GENERAL AREA AAA.
R0007                                            (RETURNS HERE)

 0008                                5567                   BLOCK   02
 0009    REF    1                    4000                   SETLOC  FFTAG7
 0010                                5567                   BANK

 0011    REF    7  LAST   475        0375                   EBANK=  FAILREG

 0012    REF    1                                           COUNT*  $$/ALARM
R0013    ALARM TURNS ON THE PROGRAM ALARM LIGHT, BUT DOES NOT DISPLAY.

 0014                                5567  0 0004 0  ALARM     INHINT

 0015    REF 374  LAST 1371          5570  3 0002 0            CA      Q
 0016    REF   4  LAST 1278          5571  55'363 1  ALARM2    TS      ALMCADR
 0017    REF 375  LAST 1373          5572  50 002 0            INDEX   Q
 0018                                5573  3 0000 1            CA      0
 0019    REF 251  LAST 1371          5574  54 001 1  BORTENT   TS      L

 0020    REF  47  LAST 1369          5575  3 0006 1  PRIOENT   CA      BBANK
 0021                                5576  0 0006 1   +1       EXTEND
 0022    REF  27  LAST 1353          5577  04 007 1            ROR     SUPERBNK        ADD SUPER BITS.
 0023    REF   5  LAST 1373          5600  55'364 0            TS      ALMCADR +1

 0024    REF 376  LAST 1373          5601  3 0002 0  LARMENT   CA      Q               STORE RETURN FOR ALARM
 0025    REF  66  LAST 1371          5602  54 061 1            TS      ITEMP1

 0026    REF   8  LAST 1373          5603  10 375 1  CHKFAIL1  CCS     FAILREG         IS ANYTHING IN FAILREG
 0027    REF   1                     5604  1 5610 1            TCF     CHKFAIL2        YES TRY NEXT REG
 0028    REF 252  LAST 1373          5605  3 0001 0            CA      L
 00285   REF   9  LAST 1373          5606  54 375 1            TS      FAILREG
 0029    REF   1                     5607  1 5614 0            TCF     PROGLARM        TURN ALARM LIGHT ON FOR FIRST ALARM

 0030    REF  10  LAST 1373          5610  10 376 1  CHKFAIL2  CCS     FAILREG +1
 0031    REF   2  LAST 1373          5611  1 5614 0            TCF     PROGLARM
 0032    REF 253  LAST 1373          5612  3 0001 0            CA      L
 0033    REF  11  LAST 1373          5613  54 376 1            TS      FAILREG +1

 0039    REF  12  LAST 1373          5614  22 377 1  PROGLARM  LXCH    FAILREG +2      STORE AS "MOST RECENT" ALARM CODE

 0040    REF  47  LAST 1369          5615  4 1035 1            CS      DSPTAB +11D     TURN ON PROGRAM ALARM IF OFF
 0041    REF   2  LAST 1350          5616  7 5632 1            MASK    OCT40400
 0042    REF  48  LAST 1373          5617  27'035 1            ADS     DSPTAB +11D
```

```
L       ALARM ANO ABORT                                                       USER'S PAGE NO.   2      EC S3

 0043   REF  67  LAST 1373       5620  56 C61 C  MULTEXIT XCH    ITEMP1           OBTAIN RETURN AOORESS IN A
 0044                            5621  0 0003 1           RELINT
 0045   REF 458  LAST 1371       5622  5C 000 1           INDEX  A
 0046                            5623  C 000I 0           TC     1

R0051   PRIOLARM OISPLAYS V05N09 VIA PRICOSPR WITH 3 RETURNS TO THE USER FROM THE ASTRONAUT AT CALL LOC +1,+2,+3 ANO
R0053   AN IMMEDIATE RETURN TO THE USER AT CALL LOC +4. EXAMPLE FOLLOWS,
A0054                                                     CAF    OCTXX            ALARM COOE
A0055                                                     TC     BANKCALL
A0056                                                     CAOR   PRICLARM

A0057                                                     ...    ...
A0058                                                     ...    ...
A0059                                                     ...    ...              ASTRONAUT RETURN
A0060                                                     TC     PHASCHNG         IMMEOIATE RETURN TO USER. RESTART
A0061                                                     OCT    X.1              PHASE CHANGE FOR PRIO OISPLAY

 0062                         10,3563                     BANK   10
 0063   REF   3  LAST 1366    10,2000                     SETLOC OISPLAYS
 0064                         10,3563                     BANK

 0065   REF   3 LAST 1366 TO 1367:   14   669*            COUNT* $$/DSPLA
 0066                         10,3563  C 0004 0  PRICLARM INHINT                  * * * KEEP IN DISPLAY ROUTINES BANK
 0067   REF 254  LAST 1373    10,3564  54 001 1           TS     L                SAVE ALARM COOE

 0068   REF  28  LAST 1369    10,3565  3 0133 0           CA     BUF2             2 CAOR OF PRIOLARM USER
 0069   REF   6  LAST 1373    10,3566  55'363 1           TS     ALMCAOR
 0070   REF  29  LAST 1374    10,3567  3 0134 1           CA     BUF2 +1
 0071   REF   1               10,3570  C 5576 0           TC     PRICENT +1       * LEAVE L ALONE
 0072                         10,3571   77467 1  -2SEC    OEC    -200             *** OCNT MOVE
 0073   REF   6  LAST  925    10,3572  3 5006 1           CAF    V05N09
 0074   REF   2  LAST  519    10,3573  1 2505 1           TCF    PRICOSPR

 0075                            5624                     BLOCK  02
 0076   REF   2  LAST 1373       4000                     SETLOC FFTAG7
 0077                            5624                     BANK

 0078   REF   2 LAST 1373 TO 1374:   29     29*           COUNT* $$/ALARM
 0079                            5624  C 0004 0  BAILOUT  INHINT
 0080   REF 377  LAST 1373       5625  3 0002 0           CA     0
 0081   REF   7  LAST 1374       5626  55'363 1           TS     ALMCAOR

 0082   REF 378  LAST 1374       5627  50 002 0           INOEX  0
 0083                            5630  3 0000 1           CAF    0
 0084   REF   1                  5631  0 5574 1           TC     BORTENT
 0085                            5632   40400 1  OCT40400 OCT    40400

 0086                            5633  0 0004 0           INHINT
 0087   REF  88  LAST 1361       5634  3 4752 0  WHIMPER  CA     TWC
 0088   REF  24  LAST 1286       5635  6 0005 1           AO     Z
 0089   REF   2  LAST  824     5636  54 017 0            TS        BRUPT
 0090                          5637  5 0017 1            RESUME
 0091   REF  60  LAST 1346     5640  0 4635 0            TC        POSTJUMP     RESUME SENDS CONTROL HERE
 0092   REF   2  LAST  826     5641   12763 0            CADR      ENEMA
 0093                          5642  0 0004 0  P00DOO    INHINT
 0094   REF 379  LAST 1374     5643  3 0002 0            CA        Q
 0095   REF   8  LAST 1374     5644  55'363 1  ABORT2    TS        ALMCADR
 0096   REF 380  LAST 1375     5645  50 002 0            INDEX     Q
 0097                          5646  3 0000 1            CAF       0
 0098   REF   2  LAST 1374     5647  0 5574 1            TC        BORTENT
 0099                          5650   77770 1  OCT77770  OCT       77770        DON'T MOVE

 0100   REF   3  LAST 1090     5651  3 4765 1            CAF       OCT35        4.35SPOT FOR GOPOODOO
 0101   REF 255  LAST 1374     5652  54 001 1            TS        L
 0102                          5653  4 0000 0            COM
 0103   REF   9  LAST  860     5654  52 760 1            DXCH      -PHASE4
 0104                          5655  0 0004 0  GOPOODOO  INHINT
 01042  REF 304  LAST 1327     5656  0 4616 1            TC        BANKCALL     RESET STATEFLG, REINTFLG, AND NODOFLAG.
 01044  REF   1                5657   27746 1            CADR      FLAGS
 0105   REF  31  LAST 1331     5660  3 0103 0            CA        FLAGWRD7     IS SERVICER CURRENTLY IN OPERATION?
 0106   REF   3  LAST  282     5661  7 4746 1            MASK      V37FLBIT
 0107   REF 459  LAST 1374     5662  10 000 0            CCS       A
 0108   REF   1                5663  1 5671 0            TCF       STRTIDLE
 0109   REF 305  LAST 1375     5664  0 4616 1            TC        BANKCALL     TERMINATE GRPS 1, 3, 5, AND 6
 0110   REF   2  LAST  232     5665   12650 1            CADR      V37KLEAN
 01102  REF 306  LAST 1375     5666  0 4616 1            TC        BANKCALL     TERMINATE GRPS 2, 4, 1, 3, 5, AND 6
 01104  REF   2  LAST  214     5667   12641 1            CADR      MR.KLEAN           (I.E., GRP 4 LAST)
 0111   REF   2  LAST  860     5670  1 5634 1            TCF       WHIMPER
 0112   REF   1                5671  3 5733 0  STRTIDLE  CAF       BBSERVDL
 01122  REF   3  LAST 1362     5672  0 4727 1            TC        SUPERSW
 01124  REF 307  LAST 1375     5673  0 4616 1            TC        BANKCALL     PUT SERVICER INTO ITS "GROUND" STATE
 01125  REF   1                5674   57322 0            CADR      SERVIDLE     AND PROCEED TO GOTOPOOH.
 0114                          5675  0 0004 0  CCSHOLE   INHINT
 0115   REF 381  LAST 1375     5676  3 0002 0            CA        Q
 0116   REF   1                5677  0 5644 1            TC        ABORT2
 0117                          5700   21103 0  OCT21103  OCT       21103
 0118                          5701  0 0004 0  CURTAINS  INHINT
 0119   REF 382  LAST 1375     5702  3 0002 0            CA        Q
 0120   REF   2  LAST 1278     5703  0 5571 1            TC        ALARM2
 0121                          5704   00217 0  OCT217    OCT       00217
 0122   REF   9  LAST 1375     5705  0 1363 0            TC        ALMCADR      RETURN TO USER

 0123                          5706  0 0004 0  BAILOUT1  INHINT
 0124   REF  10  LAST 1375     5707  53'364 0            DXCH      ALMCADR
 0125   REF   1                5710  3 5732 1            CAF       ADR40400
 0126   REF  68  LAST 1374     5711  54 061 1  BOTHABRT  TS        ITEMP1
 0127   REF 383  LAST 1375     5712  50 002 0            INDEX     Q
 0128                          5713  3 0000 1            CAF       0
 0129   REF 256  LAST 1375     5714  54 001 1            TS        L
 0130   REF   1                5715  1 5603 0            TCF       CHKFAIL1
 0131                               5716  0 0004 0  P00DOO1  INHINT
 0132    REF  11  LAST 1375         5717  53'364 0           DXCH    ALMCADR
 0133    REF   1                    5720  3 5731 1           CAF     ADR77770
 0134    REF   1                    5721  1 5711 1           TCF     BOTHABRT

 0135                               5722  0 0004 0  ALARM1   INHINT
 0136    REF  12  LAST 1376         5723  53'364 0           DXCH    ALMCADR
 0137                               5724  0 0004 0  ALMNCADR INHINT
 0138    REF 384  LAST 1375         5725  50 002 0           INDEX   Q
 0139                               5726  3 0000 1           CA      Q
 0140    REF 257  LAST 1375         5727  54 001 1           TS      L
 0141    REF   1                    5730  1 5601 1           TCF     LARMENT

 0142    REF   5  LAST 1366         5731  1 5650 0  ADR77770 TCF     OCT77770
 0143    REF   3  LAST 1373         5732  1 5632 1  ADR40400 TCF     OCT40400
 0144    REF 156  LAST 1372         5155            DOALARM  EQUALS  ENDOFJOB
 01444   REF  53  LAST  887     E7,1515                      EBANK=  DVCNTR
 01445   REF   2  LAST 1375         5733   56067 0  BBSERVDL BBCON   SERVIDLE
R0145    CALLING SEQUENCE FOR VARALARM

A0146                                                        CAF     (ALARM)
A0147                                                        TC      VARALARM

R0148    VARALARM TURNS ON PROGRAM ALARM LIGHT BUT DOES NOT DISPLAY
 0149                               5734  0 0004 0  VARALARM INHINT

 0150    REF 258  LAST 1376         5735  54 001 1           TS      L                  SAVE USERS ALARM CODE

 0151    REF 385  LAST 1376         5736  3 0002 0           CA      Q                  SAVE USERS Q
 0152    REF  13  LAST 1376         5737  55'363 1           TS      ALMCADR

 0153    REF   2  LAST 1374         5740  0 5575 0           TC      PRIOENT
 0154                               5741   00014 1  OCT14    OCT     14                 DONT MOVE

 0155    REF  14  LAST 1376         5742  0 1363 0           TC      ALMCADR            RETURN TO USER

 0156    REF   3  LAST 1375         5634            ABORT    EQUALS  WHIMPER
 0157                           13,3746                      BANK    13
 0158    REF   1                13,2000                      SETLOC  ABTFLGS
 0159                           13,3746                      BANK
 0160    REF   1                                             COUNT*  $$/ALARM

 0161    REF   1                13,3746  4 4747 0  FLAGS     CS      STATEBIT
 0162    REF  21  LAST 1324     13,3747  7 0077 0            MASK    FLAGWRD3
 0163    REF  22  LAST 1376     13,3750  54 077 0            TS      FLAGWRD3
 0164    REF   3  LAST 1213     13,3751  4 4745 1            CS      REINTBIT
 0165    REF  20  LAST  857     13,3752  7 0106 1            MASK    FLGWRD10
 0166    REF  21  LAST 1376     13,3753  54 106 1            TS      FLGWRD10
 0167    REF   3  LAST  231     13,3754  4 4753 0            CS      NODOBIT
 0168    REF  31  LAST 1307     13,3755  7 0076 1            MASK    FLAGWRD2
 0169    REF  32  LAST 1376    13,3756  54 076 1           TS      FLAGWRD2
 0170    REF 386  LAST 1376    13,3757  0 0002 0           TC      Q
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R0001    PROGRAM NAME:    P27
R0002    WRITTEN BY:      KILROY/ DE WOLF

R0003    MOD NO:          6
R0004    MOD BY:          KILROY
R0005    DATE:            01DEC67

R0006    LOG SECTION:     UPDATE PROGRAM.

R0007    FUNCT. DESCR:    P27 (THE UPDATE PROGRAM) PROCESSES COMMANDS AND DATA
R0008                          INSERTIONS REQUESTED BY THE GROUND VIA UPLINK.
R0009                          THE P27 PROGRAM WILL ACCEPT UPDATES
R0010                          ONLY DURING P00 FOR THE LM, AND ONLY DURING P00,
R0011                     P02, AND FRESH START FOR THE CSM

R0012    CALLING SEQ:     PROGRAM IS INITIATED BY UPLINK ENTRY OF VERBS 70, 71, 72 AND 73.

R0014    SUBROUTINES:     TESTXACT, NEWMODEX, NEWMODEX +3, GOXDSPF, BANKCALL, FINDVAC, INTPRET, INTSTALL, TPAGREE,
R0016                     INTWAKEU, ENDEXT, POSTJUMP, FALTON, NEWPHASE, PHASCHNG

R0017    NORMAL EXIT:     TC ENDEXT

R0018    ALARM/ABORT:     TC FALTON FOLLOWED BY TC ENDEXT

R0019    RESTARTS:        P27 IS RESTART PROTECTED IN TWO WAYS...
R0020                     1. PRIOR TO VERIFLAG INVERSION(WHICH IS CAUSED BY THE GROUND/ASTRONAUT'S VERIFICATION OF UPDATE
R0022                        DATA BY SENDING A V33E WHEN V21N02 IS FLASHING)---
R0023                        NO PROTECTION EXCEPT PRE-P27 MODE IS RESTORED, COAST + ALIGN DOWNLIST IS SELECTED AND UPLINK
R0025                        ACTIVITY LIGHT IS TURNED OFF.(JUST AS IF A V34E WAS SENT DURING P27 DATA LOADS).
R0027                        V70,V71,V72 OR V73 WILL HAVE TO BE COMPLETELY RESENT BY USER.
R0029                     2. AFTER VERIFLAG INVERSION(WHEN UPDATE OF THE SPECIFIED ERASABLES IS BEING PERFORMED)---
R0031                        PROTECTED AGAINST RESTARTS.

R0032    DEBRIS:          UPBUFF   (20D)  TEMP STORAGE FOR ADDRESSES AND CONTENTS.
R0033                     UPVERB   (1)    VERB NUMBER MINUS 70D (E.G. FOR V72, UPVERB = 72D - 70D = 2)
R0035                     UPOLDMOD (1)    FOR MAJOR MODE INTERRUPTED BY P27.
R0036                     COMPNUMB (1)    TOTAL NUMBER OF COMPONENTS TO BE TRANSMITTED.
R0038                     UPCOUNT  (1)    ACTUAL NUMBER OF COMPONENTS RECEIVED.
R0039                     UPTEMP   (1)    SCRATCH, BUT USUALLY CONTAINS COMPONENT NUMBER TO BE CHANGED DURING VERIFY CYCLE


R0041    INPUT:

R0042     ENTRY:            DESCRIPTION

R0043     V70EXXXXXEXXXXXE (LIFTOFF TIME INCREMENT) DOUBLE PRECISION OCTAL TIME INCREMENT, XXXXX XXXXX,
R0045                       IS ADDED TO TEPHEM, SUBTRACTED FROM AGC CLOCK(TIME2,TIME1), SUBTRACTED FROM CSM STATE
R0047                       VECTOR TIME(TETCSM) AND SUBTRACTED FROM LEM STATE VECTOR TIME(TETLEM).
R0049                       THE DP OCTAL TIME INCREMENT IS SCALED AT 2(28).
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R0050    V71EIIEAAAAE      (CONTIGUOUS BLOCK UPDATE) II-2 OCTAL COMPONENTS,XXXXX,
R0051     XXXXXE           ARE LOADED INTO ERASABLE STARTING AT ECADR, AAAA.
R0052    XXXXXE            IT IS .GE. 3 .AND. .LE. 20D. ,
R0053                      AND (AAAA + II - 3) DOES NOT PRODUCE AN ADDRESS IN THE
R0054    S NEXT BANK
R0055      .               SCALING IS SAME AS INTERNAL REGISTERS.

R0056     V72EIIE          (SCATTER UPDATE) (II-1)/2 OCTAL COMPONENTS,XXXXX, ARE
R0057     AAAAEXXXXXE      LOADED INTO ERASABLE LOCATIONS, AAAA.
R0058     AAAAEXXXXXE      II IS .GE. 3 .AND. .LE. 19D, AND MUST BE ODD.
R0060      .               SCALING IS SAME AS INTERNAL REGISTERS.

R0061     V73EXXXXXEXXXXXE (OCTAL CLOCK INCREMENT) DOUBLE PRECISION OCTAL TIME
R0062                      INCREMENT XXXXX XXXXX, IS ADDED TO THE AGC CLOCK, IN
R0063                      CENTISECONDS SCALED AT (2)28.
R0064                      THIS LOAD IS THE OCTAL EQUIVALENT OF V55.


R0065    OUTPUT:         IN ADDITION TO THE ABOVE REGISTER LOADS, ALL UPDATES
R0066                    COMPLEMENT BIT3 OF FLAGWORD7.


R0067    ADDITIONAL NOTES: VERB 71, JUST DEFINED ABOVE WILL BE USED TO PERFORM BUT NOT LIMITED TO THE FOLLOWING UPDATES--

R0069                    1. CSM/LM STATE VECTOR UPDATE
R0072                    2. REFSMMAT UPDATE


R0073              THE FOLLOWING COMMENTS DELINEATE EACH SPECIAL UPDATE----

R0074    1  CSM/LM STATE VECTOR UPDATE(ALL DATA ENTRIES IN OCTAL)

R0075    ENTRIES:        DATA DEFINITION:                                          SCALE FACTORS:
R0077    V71E            CONTIGUOUS BLOCK UPDATE VERB
R0078      21E           NUMBER OF COMPONENTS FOR STATE VECTOR UPDATE
R0080     AAAAE          ECADR OF 'UPSVFLAG'
R0082    XXXXXE          STATE VECTOR IDENTIFIER: 00001 FOR CSM, 77776 FOR LEM - EARTH SPHERE OF INFLUENCE SCALING
R0083                                             00002 FOR CSM, 77775 FOR LEM - LUNAR SPHERE OF INFLUENCE SCALING
R0084    XXXXXEXXXXXE    X POSITION
R0086    XXXXXEXXXXXE    Y POSITION
R0088    XXXXXEXXXXXE    Z POSITION
R0090    XXXXXEXXXXXE    X VELOCITY
R0092    XXXXXEXXXXXE    Y VELOCITY
R0094    XXXXXEXXXXXE    Z VELOCITY
R0096    XXXXXEXXXXXE    TIME FROM AGC CLOCK ZERO
R0098    V33E            VERB 33 TO SIGNAL THAT THE STATE VECTOR IS READY TO BE STORED.


R0144    2. REFSMMAT(ALL DATA ENTRIES IN OCTAL)
R0145    ENTRIES:        DATA DEFINITIONS:                                         SCALE FACTORS:
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R0147   V71E               CONTIGUOUS BLOCK UPDATE VERB
R0148     24E              NUMBER OF COMPONENTS FOR REFSMMAT UPDATE
R0150    AAAAE             ECADR OF 'REFSMMAT'
R0152   XXXXXEXXXXXE       ROW 1 COLUMN 1                                    2(-1)
R0154   XXXXXEXXXXXE       ROW 1 COLUMN 2                                    2(-1)
R0156   XXXXXEXXXXXE       ROW 1 COLUMN 3                                    2(-1)
R0158   XXXXXEXXXXXE       ROW 2 COLUMN 1                                    2(-1)
R0160   XXXXXEXXXXXE       ROW 2 COLUMN 2                                    2(-1)
R0162   XXXXXEXXXXXE       ROW 2 COLUMN 3                                    2(-1)
R0164   XXXXXEXXXXXE       ROW 3 COLUMN 1                                    2(-1)
R0166   XXXXXEXXXXXE       ROW 3 COLUMN 2                                    2(-1)
R0168   XXXXXEXXXXXE       ROW 3 COLUMN 3                                    2(-1)
R0170   V33E               VERB 33 TO SIGNAL THAT REFSMMAT IS READY TO BE STORED.


 0171                        07,3763                        BANK    07
 0172   REF   7  LAST  299   43,2000                        SETLOC  EXTVERBS
 0173                        43,3751                        BANK

 0174   REF   4  LAST  979   E3,1706                        EBANK=  TEPHEM

 0175   REF   1                                             COUNT*  $$/P27
 0176   REF   1              43,3751  3 4755 1  V70UPDAT CAF     UP70            COMES HERE ON V70E
 0177   REF   2  LAST  263   43,3752  1 3760 1           TCF     V73UPDAT +1


 0178   REF   1              43,3753  3 4753 1  V71UPDAT CAF     UP71            COMES HERE ON V71E
 0179   REF   3  LAST 1380   43,3754  1 3760 1           TCF     V73UPDAT +1


 0180   REF   1              43,3755  3 4752 0  V72UPDAT CAF     UP72            COMES HERE ON V72E
 0181   REF   4  LAST 1380   43,3756  1 3760 1           TCF     V73UPDAT +1


 0182   REF   1              43,3757  3 6250 0  V73UPDAT CAF     UP73            COMES HERE ON V73E

 0183   REF   1              43,3760  55'165 0   +1      TS      UPVERBSV        SAVE UPVERB UNTIL IT'S OK TO ENTER P27

 0184   REF  20  LAST  301   43,3761  0 2076 1           TC      TESTXACT        GRAB DISPLAY IF AVAILABLE, OTHERWISE
A0185                                                                            TURN*OPERATOR ERROR* ON AND TERMINATEJOB

 0186   REF  22  LAST 1286   43,3762  3 1010 1           CA      MODREG          CHECK IF UPDATE ALLOWED
 0187                        43,3763  0 0006 1           EXTEND                  FIRST CHECK FOR MODREG = +0, -0
 0188                        43,3764  1 3767 0           BZF     +3              (+0 = P00, -0 = FRESHSTART)
 0189   REF  61  LAST 1375   43,3765  0 4635 0  UPERROR  TC      POSTJUMP        TURN ON 'OPERATOR ERROR' LIGHT
 0190   REF   1              43,3766   11740 1           CADR    UPERROUT +2     GO TO COMMON UPDATE PROGRAM EXIT

 01915  REF   1              43,3765            CKMDMORE =       UPERROR
 0192   REF   2  LAST  104   43,3767  55'170 1   +3      TS      UPOLDMOD        SET UPOLDMOD TO ZERO.
 0193   REF   2  LAST 1380   43,3770  31'165 1           CAE     UPVERBSV        SET UPVERB TO INDICATE TO P27
 0194    REF   2  LAST  104    43,3771   55'171 0               TS       UPVERB          WHICH EXTENDED VERB CALLED IT.

 0195    REF 145  LAST 1367    43,3772   3 4753 1               CAF      ONE
 0196    REF   2  LAST  104    43,3773   55'172 0               TS       UPCOUNT         INITIALIZE UPCOUNT TO 1

 0197    REF  62  LAST 1380    43,3774   0 4635 0               TC       POSTJUMP        LEAVE EXTENDED VERB BANK AND
 0198    REF   1               43,3775    11357 0               CADR     UPPART2         GO TO UPDATE PROGRAM(P27) BANK.


 0211    REF 259  LAST 1369       4755             UP70         EQUALS   ZERO
 0212    REF 146  LAST 1381       4753             UP71         EQUALS   ONE
 0213    REF  89  LAST 1374       4752             UP72         EQUALS   TWO
 0214    REF  43  LAST 1364       6250             UP73         EQUALS   THREE


 0215                          04,3357                          BANK     04
 0216    REF   2  LAST 1218    04,2000                          SETLOC   UPDATE2
 0217                          04,3357                          BANK

 0218    REF   1                                                COUNT*   $$/P27

 0219                          04,3357             UPPART2      EQUALS                   UPDATE PROGRAM - PART 2

 0220    REF 113  LAST 1327    04,3357   0 5353 1               TC       PHASCHNG        SET RESTART GROUP 6 TO RESTORE OLD MODE
 0221                          04,3360    07026 1               OCT      07026           AND DOWNLIST AND EXIT IF RESTART OCCURS.
 0222                          04,3361    30000 1               OCT      30000           PRIORITY SAME AS CHRPRIO
 0223    REF   4  LAST  206       1173                          EBANK=   UPBUFF
 0224    REF   1               04,3362    03670 0               2CADR    UPOUT +1
 0224    REF   1               04,3363    10102 0

 0225    REF 147  LAST 1381    04,3364   3 4753 1               CAF      ONE
 0226    REF   9  LAST  986    04,3365   54 333 0               TS       DNLSTCOD        DOWNLIST

 0227    REF   5  LAST  797    04,3366   0 5311 1               TC       NEWMODEX        SET MAJOR MODE = 27
 0228                          04,3367    00033 1               DEC      27

 0229    REF   3  LAST 1381    04,3370   51'171 1               INDEX    UPVERB          BRANCH DEPENDING ON WHETHER THE UPDATE
 0230                          04,3371   1 3372 0               TCF      +1              VERB REQUIRES A FIXED OR VARIABLE NUMBER
 0231                          04,3372   1 3375 1               TCF      +3              V70 FIXED.           (OF COMPONENTS.
 0232    REF   1               04,3373   1 3400 1               TCF      OHWELL1         V71 VARIABLE - GO GET NO. OF COMPONENTS
 0233    REF   2  LAST 1381    04,3374   1 3400 1               TCF      OHWELL1         V72 VARIABLE - GO GET NO. OF COMPONENTS
 0234    REF  90  LAST 1381    04,3375   3 4752 0               CA       TWO             V73 (AND V70) FIXED
 0235    REF   3  LAST  206    04,3376   55'167 1               TS       COMPNUMB        SET NUMBER OF COMPONENTS TO 2.
 0236    REF   1               04,3377   1 3423 0               TCF      OHWELL2         GO GET THE TWO UPDATE COMPONENTS

 0237    REF   1               04,3400   3 3473 1  OHWELL1      CAF      ADUPBUFF        * REQUEST USER TO SEND NUMBER   *
 0238    REF 836  LAST 1365    04,3401   54 156 1               TS       MPAC +2         * OF COMPONENTS PARAMETER(II)   *
 0239    REF   1               04,3402   3 3474 0   +2          CAF      UPLDADNV        (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
 0240    REF 308  LAST 1375    04,3403   0 4616 1               TC       BANKCALL        DISPLAY A FLASHING V21N01
 0241    REF  11  LAST  719    04,3404    20334 1               CADR     GOXDSPF         TO REQUEST II.
 0242   REF    1               04,3405   1 3670 1            TCF      UPOUT4        V34 TERMINATE UPDATE(P27) RETURN
 0243   REF    3  LAST 1361    04,3406   1 3402 0            TCF      OHWELL1  +2
 0244   REF    1               04,3407   0 3464 1            TC       CK4V32        DATA OR V32 RETURN
 0245   REF   50  LAST 1277    04,3410   4 4752 1            CS       BIT2
 0246   REF    5  LAST 1381    04,3411   6 1173 0            AD       UPBUFF        IS II(NUMBER OF COMPONENTS PARAMETER)
 0247                          04,3412   0 0006 1            EXTEND                 .GE. 3 AND .LE. 20D.
 0248   REF    4  LAST 1382    04,3413   6 3402 1            BZMF     OHWELL1  +2
 0249   REF    6  LAST 1382    04,3414   4 1173 1            CS       UPBUFF
 0250   REF    1               04,3415   6 4362 1            AD       UP21
 0251                          04,3416   0 0006 1            EXTEND
 0252   REF    5  LAST 1382    04,3417   6 3402 1            BZMF     OHWELL1  +2
 0253   REF    7  LAST 1382    04,3420  31'173 0             CAE      UPBUFF
 0254   REF    4  LAST 1381    04,3421  55'167 1             TS       COMPNUMB      SAVE II IN COMPNUMB


RD257                 UPBUFF LOADING SEQUENCE

 02571  REF    3  LAST 1361    04,3422  25'172 1             INCR     UPCOUNT       INCREMENT COUNT OF COMPONENTS RECEIVED.
 0258   REF    1               04,3423   3 3640 0  OHWELL2   CAF      ADUPBFM1      CALCULATE LOCATION(ECADR) IN UPBUFF
 0259   REF    4  LAST 1382    04,3424   6 1172 1            AD       UPCOUNT       WHERE NEXT COMPONENT SHOULD BE STORED.
 0260   REF  837  LAST 1381    04,3425  54 156 1     +2      TS       MPAC  +2      PLACE ECADR INTO R3.
 0261   REF    2  LAST 1381    04,3426   3 3474 0    +3      CAF      UPLOADNV      (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
 0262   REF  309  LAST 1381    04,3427   0 4616 1            TC       BANKCALL      DISPLAY A FLASHING V21N01
 0263   REF   12  LAST 1381    04,3430    20334 1            CADR     GOXDSPF       TO REQUEST DATA.
 0264   REF    2  LAST 1382    04,3431   1 3670 1            TCF      UPOUT4        V34 TERMINATE UPDATE(P27) RETURN.
 0265   REF    2  LAST 1381    04,3432   1 3426 0            TCF      OHWELL2  +3   V33 PROCEED RETURN
 0266   REF    2  LAST 1382    04,3433   0 3464 1            TC       CK4V32        DATA OR V32 RETURN
 0267   REF    5  LAST 1382    04,3434   4 1172 0            CS       UPCOUNT       HAVE WE FINISHED RECEIVING ALL
 0268   REF    5  LAST 1382    04,3435   6 1167 0            AD       COMPNUMB      THE DATA WE EXPECTED.
 0269                          04,3436   0 0006 1            EXTEND
 0270   REF    1               04,3437   6 3441 0            BZMF     UPVERIFY      YES- GO TO VERIFICATION SEQUENCE
 0272   REF    3  LAST 1382    04,3440   1 3422 1            TCF      OHWELL2  -1   NO- REQUEST ADDITIONAL DATA.


RD273                 VERIFY SEQUENCE

 0274   REF    1               04,3441   3 3472 0  UPVERIFY  CAF      ADUPTEMP      PLACE ECADR WHERE COMPONENT NO. INDEX
 0275   REF  838  LAST 1382    04,3442  54 156 1             TS       MPAC  +2      IS TO BE STORED INTO R3.
 0276   REF    1               04,3443   3 3475 1            CAF      UPVRFYNV      (CK4V32 RETURNS HERE IF V32 ENCOUNTERED)
 0277   REF  310  LAST 1382    04,3444   0 4616 1            TC       BANKCALL      DISPLAY A FLASHING V21N02 TO REQUEST
 0278   REF   13  LAST 1382    04,3445    20334 1            CADR     GOXDSPF       DATA CORRECTION OR VERIFICATION.
 0279   REF    3  LAST 1382    04,3446   1 3670 1            TCF      UPOUT4        V34 TERMINATE UPDATE(P27) RETURN
 0280   REF    1               04,3447   1 3476 0            TCF      UPSTORE       V33 DATA SENT IS GOOD. GO STORE IT.
 0281   REF    3  LAST 1382    04,3450   0 3464 1            TC       CK4V32        COMPONENT NO. INDEX OR V32 RETURN
 0282   REF    4  LAST  104    04,3451   3 1166 1            CA       UPTEMP        DOES THE COMPONENT NO. INDEX JUST SENT
 0283                          04,3452   0 0006 1            EXTEND                 SPECIFY A LEGAL COMPONENT NUMBER?
 0284   REF    2  LAST 1382    04,3453   6 3441 0            BZMF     UPVERIFY      NO, IT IS NOT POSITIVE NONZERO
 0285   REF    5  LAST 1382    04,3454   4 1166 0            CS       UPTEMP
 0288   REF    6  LAST 1382    04,3455   6 1167 0            AD       COMPNUMB
 0289   REF   55  LAST 1319    04,3456   6 4753 1            AD       BIT1
 0290                                04,3457  0 0006 1            EXTEND                         
 0291   REF   3  LAST 1382  04,3460  6 3441 0            BZMF     UPVERIFY          NO
 0292   REF   2  LAST 1382  04,3461  3 3640 0            CAF      ADUPBFM1          YES- BASED ON THE COMPONENT NO. INDEX
 0293   REF   6  LAST 1382  04,3462  6 1166 1            AD       UPTEMP            CALCULATE THE ECADR OF LOCATION IN
 0294   REF   4  LAST 1382  04,3463  1 3425 0            TCF      OHWELL2 +2        UPBUFF WHICH USER WANTS TO CHANGE.

 0295   REF   2  LAST 1381  04,3670           UPOUT4     EQUALS   UPOUT +1          COMES HERE ON V34 TO TERMINATE UPDATE


R0296                 CHECK FOR VERB 32 SEQUENCE

 0297   REF 839  LAST 1382  04,3464  4 0154 0  CK4V32    CS       MPAC              ON DATA RETURN FROM 'GOXDSPF'
 0298   REF  61  LAST 1358  04,3465  7 4746 1            MASK     BIT6              ON DATA RETURN FROM "GOXDSP"& THE CON-
 0299   REF 460  LAST 1375  04,3466  10 000 0            CCS      A                 TENTS OF MPAC = VERB.  SO TEST FOR V32.
 0300   REF 387  LAST 1377  04,3467  0 0002 0            TC       Q                 IT'S NOT A V32, IT'S DATA.  PROCEED.
 0301   REF 388  LAST 1383  04,3470  50 002 0            INDEX    Q
 0302                       04,3471  7'7771 0            TC       0 -6              V32 ENCOUNTERED - GO BACK AND GET DATA

 0305   REF   7  LAST 1383  04,3472   01166 1  ADUPTEMP  ADRES    UPTEMP            ADDRESS OF TEMP STORAGE FOR CORRECTIONS
 0306   REF   8  LAST 1382  04,3473   01173 0  ADUPBUFF  ADRES    UPBUFF            ADDRESS OF UPDATE DATA STORAGE BUFFER
 0307                       04,3474   05201 1  LPLOADNV  VN       2101              VERB 21 NOUN 01
 0308                       04,3475   05202 1  UPVRFYNV  VN       2102              VERB 21 NOUN 02
 0309   REF   4  LAST 1093     4362            UP21      =        MD1               DEC 21 = MAX NO OF COMPONENTS +1
 03121  REF  22  LAST 1348     4756            UPDTPHAS  EQUALS   FIVE

R0313                 PRE-STORE AND FAN TO APPROPRIATE BRANCH SEQUENCE

 0314                       04,3476            UPSTORE   EQUALS                     GROUND HAS VERIFIED UPDATE. STORE DATA.

 0315                       04,3476  0 0004 0            INHINT

 0316   REF  32  LAST 1375  04,3477  30 103 0            CAE      FLAGWRD7          INVERT VERIFLAG(BIT3 OF FLAGWRD7) TO
 0317   REF 259  LAST 1376  04,3500  56 001 0            XCH      L                 INDICATE TO THE GROUND(VIA DOWNLINK)
 0318   REF   1             04,3501  3 4751 0            CAF      VERIFBIT          THAT THE V33 (WHICH THE GROUND SENT TO
 0319                       04,3502  0 0006 1            EXTEND                     VERIFY THE UPDATE) HAS BEEN SUCCESSFULLY
 0320   REF  17  LAST 1367  04,3503  06 001 0            RXOR     LCHAN             RECEIVED BY THE UPDATE PROGRAM
 0321   REF  33  LAST 1383  04,3504  54 103 1            TS       FLAGWRD7

 0322   REF 114  LAST 1381  04,3505  0 5353 1            TC       PHASCHNG          SET RESTART GROUP 6 TO REDO THE UPDATE
 0323                       04,3506   04026 1            OCT      04026             DATA STORE IF A RESTART OCCURS.
 0324                       04,3507  0 0004 0            INHINT                     (BECAUSE PHASCHNG DID A RELINT)

 0325   REF  91  LAST 1381  04,3510  4 4752 1            CS       TWO               GO TO UPFNDVAC IF INSTALL IS REQUIRED,
 0326   REF   4  LAST 1381  04,3511  6 1171 1            AD       UPVERB            THAT IS, IF IT'S A V70 - V72.
 0327                       04,3512  0 0006 1            EXTEND                     GO TO UPEND73 IF IT'S A V73.
 0328   REF   1             04,3513  6 3522 1            BZMF     UPFNDVAC

R0330                 VERB 73 BRANCH

 0331                       04,3514  0 0006 1  UPEND73   EXTEND                     V73-PERFORM DP OCTAL AGC CLOCK INCREMENT
 0332   REF   9  LAST 1383   04,3515  3 1174 1             DCA      UPBUFF
 0333   REF  10  LAST 1384   04,3516  53'204 1             DXCH     UPBUFF +8D
 0334   REF   1              04,3517  0 3545 0             TC       TIMEDIDL
 0335   REF   8  LAST  829   04,3520  0 4364 1             TC       FALTON          ERROR- TURN ON *OPERATOR ERROR* LIGHT
 0336   REF   3  LAST 1383   04,3521  0 3670 0             TC       UPOUT +1        GO TO COMMON UPDATE PROGRAM EXIT

 0337   REF   7  LAST 1330   04,3522  3 4355 0  UPFNDVAC   CAF      CHRPRIO         (USE EXTENDED VERB PRIORITY)
 0338   REF  45  LAST 1359   04,3523  0 5105 0             TC       FINDVAC         GET VAC AREA FOR 'CALL INTSTALL'
 0339   REF   5  LAST 1380   E3,1706                       EBANK=   TEPHEM
 0340   REF   1              04,3524   03527 1             2CADR    UPJOB           (NOTE: THIS WILL ALSO SET EBANK FOR
 0340   REF   1              04,3525   10103 1
 0341   REF 157  LAST 1376   04,3526  0 5155 0             TC       ENDOFJOB        'TEPHEM' UPDATE BY V70)

 0342   REF 237  LAST 1257   04,3527  0 6042 1  UPJOB      TC       INTPRET         THIS COULD BE A STATE VECTOR UPDATE--SO
 0343                        04,3530   77624 1             CALL                     WAIT(PUT JOB TO SLEEP) IF ORBIT INT(OI)
 0344   REF  38  LAST 1216   04,3531   27410 1                      INTSTALL        IS IN PROGRESS--OR--GRAB OI AND RETURN
A0345                                                                               TO UPWAKE IF OI IS NOT IN PROGRESS.

 0346                        04,3532   77776 1  UPWAKE     EXIT

 0347   REF 115  LAST 1383   04,3533  0 5353 1             TC       PHASCHNG        RESTART PROTECT(GROUP 6)
 0348                        04,3534   04026 1             OCT      04026

 0350   REF  74  LAST 1357   04,3535  0 5504 0             TC       UPFLAG          SET INTEGRATION RESTART BIT
 0351   REF   5  LAST 1235   04,3536   00236 0             ADRES    REINTFLG
 0352                        04,3537  0 0004 0             INHINT
 0355                        04,3540            UPPART3    EQUALS

 0356   REF   5  LAST 1383   04,3540  51'171 1             INDEX    UPVERB          BRANCH TO THE APPROPRIATE UPDATE VERB
 0357                        04,3541  1 3542 0             TCF      +1              ROUTINE TO ACTUALLY PERFORM THE UPDATE
 0358   REF   1              04,3542  1 3701 0             TCF      UPEND70         V70
 0359   REF   1              04,3543  1 3610 1             TCF      UPEND71         V71
 0360   REF   1              04,3544  1 3642 0             TCF      UPEND72         V72


R0361              ROUTINE TO INCREMENT CLOCK(TIME2,TIME1) WITH CONTENTS OF DP WORD AT UPBUFF.

 0363                        04,3545  0 0006 1  TIMEDIDL   EXTEND
 0364   REF   8  LAST 1383   04,3546  23'166 1             QXCH     UPTEMP          SAVE Q FOR RETURN
 0365   REF 260  LAST 1381   04,3547  3 4755 1             CAF      ZERO            ZERO AND SAVE TIME2,TIME1
 0366                        04,3550  22 007 0             ZL
 0367   REF  36  LAST 1329   04,3551  52 025 1             DXCH     TIME2
 0368   REF  11  LAST 1384   04,3552  53'216 1             DXCH     UPBUFF +18D     STORE IN CASE OF OVERFLOW

 0369   REF   1              04,3553  3 4756 1             CAF      UPDTPHAS        DO
 0370   REF 260  LAST 1383   04,3554  54 001 1             TS       L               A
 0371                        04,3555  4 0000 0             COM                      QUICK
 03711  REF   4  LAST  860   04,3556  52 764 0             DXCH     -PHASE6         PHASCHNG

 0372                        04,3557  0 0004 0  TIMEDIDR   INHINT
 0373   REF 261   LAST 1384    04,3560   3 4755 1             CAF      ZERO
 0374                          04,3561   22 007 0             ZL                         PICK UP INCREMENTER(AND ZERO
 0375   REF 840   LAST 1383    04,3562   54 156 1             TS       MPAC +2           IT IN CASE OF RESTARTS) AND
 0376   REF  12   LAST 1384    04,3563   53'204 1             DXCH     UPBUFF +8D        STORE IT
 0377   REF 841   LAST 1385    04,3564   52 155 1             DXCH     MPAC              INTO MPAC FOR TPAGREE.

 0378                          04,3565   0 0006 1             EXTEND
 0379   REF  13   LAST 1385    04,3566   3 1216 0             DCA      UPBUFF +18D
 0380   REF 842   LAST 1385    04,3567   20 155 1             DAS      MPAC              FORM SUM IN MPAC
 0381                          04,3570   0 0006 1             EXTEND
 0382   REF   1                04,3571   1 3600 0             BZF      DELTATOK          TEST FOR OVERFLOW
 0383   REF 262   LAST 1385    04,3572   3 4755 1             CAF      ZERO
 0384   REF  14   LAST 1385    04,3573   53'216 1             DXCH     UPBUFF +18D       OVERFLOW, RESTORE OLD VALUE OF CLOCK
 0385   REF  37   LAST 1384    04,3574   20 025 1             DAS      TIME2             AND TURN ON OPERATOR ERROR

 0386   REF 116   LAST 1384    04,3575   0 5353 1             TC       PHASCHNG          RESTART PROTECT(GROUP 6)
 0387                          04,3576    04026 1             OCT      04026

 0388   REF   9   LAST 1384    04,3577   0 1166 1             TC       UPTEMP            GO TO ERROR EXIT

 0389   REF  18   LAST 1329    04,3600   0 7262 0   DELTATOK  TC       TPAGREE           FORCE SIGN AGREEMENT
 0390   REF 843   LAST 1385    04,3601   52 155 1             DXCH     MPAC
 0391   REF  38   LAST 1385    04,3602   20 025 1             DAS      TIME2             INCREMENT TIME2,TIME1

 0392   REF 117   LAST 1385    04,3603   0 5353 1             TC       PHASCHNG          RESTART PROTECT(GROUP 6)
 0393                          04,3604    04026 1             OCT      04026

 0394                          04,3605   0 0004 0             INHINT
 0395   REF  10   LAST 1385    04,3606   51'166 1             INDEX    UPTEMP            (CODED THIS WAY FOR RESTART PROTECTION)
 0396                          04,3607   0 0001 0             TC       1                 NORMAL RETURN
R0397             VERB 71 BRANCH

 0402   REF  15   LAST 1385    04,3610   31'174 1   UPEND71   CAE      UPBUFF +1         SET EBANK
 0403   REF  82   LAST 1356    04,3611   54 003 0             TS       EBANK               AND
 0404   REF  20   LAST 1316    04,3612   7 4357 0             MASK     LOW8              CALCULATE
 0405   REF  11   LAST 1385    04,3613   55'166 0             TS       UPTEMP            S-REG VALUE OF RECEIVING AREA

 0406   REF   5   LAST 1316    04,3614   6 7750 1             AD       NEG3              IN THE PROCESS OF
 0407   REF   7   LAST 1382    04,3615   6 1167 0             AD       COMPNUMB          PERFORMING
 0408                          04,3616   0 0006 1             EXTEND                     THIS UPDATE
 0409   REF   1                04,3617   1 3625 1             BZF      STORLP71          WILL WE
 0410   REF  31   LAST 1324    04,3620   7 4743 1             MASK     BIT9              OVERFLOW
 0411   REF 461   LAST 1383    04,3621   10 000 0             CCS      A                 INTO THE NEXT EBANK....
 0412   REF   2   LAST 1380    04,3622   1 3736 1             TCF      UPERROUT          YES

 0413   REF   6   LAST 1385    04,3623   3 7750 1             CA       NEG3              NO- CALCULATE NUMBER OF
 0414   REF   8   LAST 1385    04,3624   6 1167 0             AD       COMPNUMB          WORDS TO BE STORED MINUS ONE
 0415   REF 844   LAST 1385    04,3625   54 154 0   STORLP71  TS       MPAC              SAVE NO. OF WORDS REMAINING MINUS ONE
 0416   REF 462   LAST 1385    04,3626   50 000 1             INDEX    A                 TAKE NEXT UPDATE WORD FROM
 0417   REF  16   LAST 1385    04,3627   3 1175 0             CA       UPBUFF +2         UPBUFF AND
 0418   REF 261  LAST 1384   04,3630  54 001 1             TS       L                 SAVE IT IN L
 0419   REF 845  LAST 1385   04,3631  3 0154 1             CA       MPAC              CALCULATE NEXT
 0420   REF  12  LAST 1385   04,3632  6 1166 1             AD       UPTEMP            RECEIVING ADDRESS
 0421   REF 463  LAST 1385   04,3633  50 000 1             INDEX    A
 0422                        E3,1400                       EBANK=   1400
 0423                        04,3634  23'400 1             LXCH     1400              UPDATE THE REGISTER  BY CONTENTS OF L
 0424   REF   6  LAST 1384   E3,1706                       EBANK=   TEPHEM
 0425   REF 846  LAST 1386   04,3635  10 154 0             CCS      MPAC              ARE THERE ANY WORDS LEFT TO BE STORED
 0426   REF   2  LAST 1385   04,3636  1 3625 1             TCF      STORLP71          YES
 0427   REF   4  LAST 1384   04,3637  1 3667 1             TCF      UPOUT             NO- THEN EXIT UPDATE PROGRAM
 0428   REF  17  LAST 1385   04,3640   01172 1  ADUPBFM1   ADRES    UPBUFF -1         SAME AS ADUPBUFF BUT LESS 1 (DON'T MOVE)
 0429   REF   5  LAST 1386   04,3641  1 3667 1             TCF      UPOUT             NO- EXIT UPDATE(HERE WHEN COMPNUMB = 3)


R0430                 VERB 72 BRANCH

 0431   REF  56  LAST 1382   04,3642  3 4753 1  UPEND72    CAF      BIT1              HAVE AN ODD NO. OF COMPONENTS
 0432   REF   9  LAST 1385   04,3643  7 1167 1             MASK     COMPNUMB          BEEN SENT FOR A V72 UPDATE...
 0433   REF 464  LAST 1386   04,3644  10 000 0             CCS      A
 0434                        04,3645  1 3647 0             TCF      +2                YES
 0435   REF   3  LAST 1385   04,3646  1 3736 1             TCF      UPERROUT          ERROR- SHOULD BE ODD NO. OF COMPONENTS
 0451   REF  51  LAST 1382   04,3647  4 4752 1             CS       BIT2
 0452   REF  10  LAST 1386   04,3650  6 1167 0             AD       COMPNUMB
 0453   REF 847  LAST 1386   04,3651  54 154 0  LOLOOP72   TS       MPAC              NOW PERFORM THE UPDATE
 0454   REF 465  LAST 1386   04,3652  50 000 1             INDEX    A
 0455   REF  18  LAST 1386   04,3653  31'174 1             CAE      UPBUFF +1         PICK UP NEXT UPDATE WORD
 0456   REF 466  LAST 1386   04,3654  22 000 1             LXCH     A
 0457   REF 848  LAST 1386   04,3655  10 154 0             CCS      MPAC              SET POINTER TO ECADR(MUST BE CCS)
 0458   REF 849  LAST 1386   04,3656  54 154 0             TS       MPAC
 0459   REF 467  LAST 1386   04,3657  50 000 1             INDEX    A
 0460   REF  19  LAST 1386   04,3660  31'174 1             CAE      UPBUFF +1         PICK UP NEXT ECADR OF REG TO BE UPDATED
 0461   REF  83  LAST 1385   04,3661  54 003 0             TS       EBANK             SET EBANK
 0462   REF  21  LAST 1385   04,3662  7 4357 0             MASK     LOW8              ISOLATE RELATIVE ADDRESS
 0463   REF 468  LAST 1386   04,3663  50 000 1             INDEX    A
 0464                        E3,1400                       EBANK=   1400
 0465                        04,3664  23'400 1             LXCH     1400              UPDATE THE REGISTER BY CONTENTS OF L
 0466   REF   7  LAST 1386   E3,1706                       EBANK=   TEPHEM
 0467   REF 850  LAST 1386   04,3665  10 154 0             CCS      MPAC              ARE WE THROUGH THE V72 UPDATE...
 0468   REF   1              04,3666  1 3651 1             TCF      LOLOOP72          NO


R0469                 NORMAL FINISH OF P27

 0470                        04,3667            UPOUT      EQUALS
 0471   REF   1              04,3667  0 3131 1             TC       INTWAKEU          RELEASE  GRAB  OF ORBITAL INTEGRATION
 0472   REF   3  LAST 1380   04,3670  31'170 0   +1        CAE      UPOLDMOD          RESTORE PRIOR P27 MODE
 0473   REF   6  LAST 1381   04,3671  0 5314 1             TC       NEWMODEX +3
 0474   REF 263  LAST 1385   04,3672  3 4755 1             CAF      ZERO
 0475   REF  10  LAST 1381   04,3673  54 333 0             TS       DNLSTCOD
 0476   REF   1              04,3674  0 3743 1             TC       UPACTOFF          TURN OFF 'UPLINK ACTIVITY' LIGHT
 0477                            04,3675  0 0006 1          EXTEND                    KILL GROUP 6.
 0478   REF  26  LAST 1305       04,3676  3 4755 1          DCA      NEG0
 0479   REF   5  LAST 1384       04,3677  52 764 0          DXCH     -PHASE6

 0480   REF  43  LAST  720       04,3700  0 5472 0          TC       ENDEXT           EXTENDED VERB EXIT


R0481                VERB 70 BRANCH

 0482                            04,3701  0 0006 1  UPEND70 EXTEND                    V70 DOES THE FOLLOWING WITH DP DELTA
 0483   REF  20  LAST 1386       04,3702  4 1174 0          DCS      UPBUFF           TIME IN UPBUFF
 0484   REF  21  LAST 1387       04,3703  53'204 1          DXCH     UPBUFF +8D
 0485   REF   2  LAST 1384       04,3704  0 3545 0          TC       TIMEDIDL         DECREMENT AGC CLOCK

 0486   REF   4  LAST 1386       04,3705  0 3736 0          TC       UPERROUT         ERROR WHILE DECREMENTING CLOCK -- EXIT

 0487   REF   8  LAST 1386       E3,1706                    EBANK=   TEPHEM
 0488                            04,3706  0 0006 1          EXTEND
 0489   REF  22  LAST 1387       04,3707  4 1174 0          DCS      UPBUFF           COPY DECREMENTERS FOR
 0490   REF  23  LAST 1387       04,3710  53'206 0          DXCH     UPBUFF +10D      RESTART PROTECTION
 0491                            04,3711  0 0006 1          EXTEND
 0492   REF  24  LAST 1387       04,3712  4 1174 0          DCS      UPBUFF
 0493   REF  25  LAST 1387       04,3713  53'210 1          DXCH     UPBUFF +12D

 0494   REF 118  LAST 1385       04,3714  0 5353 1          TC       PHASCHNG         RESTART PROTECT(GROUP 6)
 0495                            04,3715   04026 1          OCT      04026

 0496   REF 264  LAST 1386       04,3716  3 4755 1          CAF      ZERO
 0497                            04,3717  22 007 0          ZL
 0498   REF  26  LAST 1387       04,3720  53'206 0          DXCH     UPBUFF +10D      DECREMENT CSM STATE VECTOR TIME
 0499   REF   5  LAST  504       04,3721  21'571 1          DAS      TETCSM

 0500   REF 265  LAST 1387       04,3722  3 4755 1          CAF      ZERO
 0501                            04,3723  22 007 0          ZL
 0502   REF  27  LAST 1387       04,3724  53'210 1          DXCH     UPBUFF +12D      DECREMENT LEM STATE VECTOR TIME
 0503   REF   4  LAST  627       04,3725  21'643 0          DAS      TETLEM

 0504   REF 266  LAST 1387       04,3726  3 4755 1          CAF      ZERO
 0505                            04,3727  22 007 0          ZL
 0506   REF  28  LAST 1387       04,3730  53'174 0          DXCH     UPBUFF
 0507   REF   9  LAST 1387       04,3731  21'710 1          DAS      TEPHEM +1        INCREMENT TP TEPHEM
 0508   REF  10  LAST 1387       04,3732  27'706 0          ADS      TEPHEM

 0509   REF 119  LAST 1387       04,3733  0 5353 1          TC       PHASCHNG         RESTART PROTECT(GROUP 6)
 0510                            04,3734   04026 1          OCT      04026

 0511   REF  29  LAST 1387          1173                    EBANK=   UPBUFF

 0512   REF   6  LAST 1386       04,3735  0 3667 0          TC       UPOUT            GO TO STANDARD UPDATE PROGRAM EXIT
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R0513              ERROR SEQUENCE

 0514   REF   9  LAST 1384   04,3736  0 4364 1  UPERROUT TC       FALTON             TURN ON *OPERATOR ERROR* LIGHT
 0515   REF   7  LAST 1387   04,3737  1 3667 1           TCF      UPOUT              GO TO COMMON UPDATE PROGRAM EXIT

 0516   REF  10  LAST 1388   04,3740  0 4364 1   +2      TC       FALTON             TURN ON 'OPERATOR ERROR' LIGHT
 0517   REF   2  LAST 1386   04,3741  0 3743 1           TC       UPACTOFF           TURN OFF'UPLINK ACTIVITY'LIGHT
 0518   REF  44  LAST 1387   04,3742  0 5472 0           TC       ENDEXT             EXTENDED VERB EXIT
A0519                                                                                (THE PURPOSE OF UPERROUT +2 EXIT IS
A0520                                                                                TO PROVIDE AN ERROR EXIT WHICH DOES NOT
A0521                                                                                RESET ANY RESTART GROUPS)
A0522

P0523              :UPACTOFF: IS A ROUTINE TO TURN OFF UPLINK ACTIVITY LIGHT ON ALL EXITS FROM UPDATE PROGRAM(P27).

 0525   REF  38  LAST 1361   04,3743  4 4751 1  UPACTOFF CS       BIT3
 0527                        04,3744  0 0006 1           EXTEND                      TURN OFF UPLINK ACTIVITY LIGHT
 0528   REF  36  LAST 1359   04,3745  03 011 1           WAND     DSALMOUT           (BIT 3 OF CHANNEL 11)
 0530   REF 389  LAST 1363   04,3746  0 0002 0           TC       Q
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L        RTB OP CODES                                                                          USER'S PAGE NO.  1      EO S4

 0001                             22,3773                       BANK    22
 0002    REF   1                  10,2000                       SETLOC  RTBCODES
 0003                             10,3574                       BANK

 0004    REF  12   LAST 1257      E5,1664                       EBANK=  XNB
 0005    REF   1                                                COUNT*  $$/RTB

R0006              LOAD TIME2, TIME1 INTO MPAC:

 0007                             10,3574   0 0006 1  LOADTIME  EXTEND
 0008    REF  39   LAST 1385      10,3575   3 0025 0            DCA     TIME2
 0009    REF   2   LAST 1013      10,3576   1 6060 0            TCF     SLOAD2

R0010              CONVERT THE SINGLE PRECISION 2'S COMPLEMENT NUMBER ARRIVING IN MPAC (SCALED IN HALF-REVOLUTIONS) TO A
R0012    DP 1'S COMPLEMENT NUMBER SCALED IN REVOLUTIONS.

 0016    REF 851   LAST 1386      10,3577  10 154 0   CDULOGIC  CCS     MPAC
 0017    REF 267   LAST 1387      10,3600   3 4755 1            CAF     ZERO
 0018                             10,3601   1 3604 1            TCF     +3
 0019                             10,3602   1 3603 0            NOOP
 0020    REF  28   LAST 1096      10,3603   4 4736 0            CS      HALF

 0021    REF 852   LAST 1389      10,3604  54 155 1             TS      MPAC +1
 0022    REF 268   LAST 1389      10,3605   3 4755 1            CAF     ZERO
 0023    REF 853   LAST 1389      10,3606  56 154 1             XCH     MPAC
 0024                             10,3607   0 0006 1            EXTEND
 0025    REF  29   LAST 1389      10,3610   7 4736 0            MP      HALF
 0026    REF 854   LAST 1389      10,3611  20 155 1             DAS     MPAC
 0027    REF  61   LAST 1274      10,3612   1 6064 1            TCF     DANZIG          MODE IS ALREADY AT DOUBLE-PRECISION

R0054              FORCE TP SIGN AGREEMENT IN MPAC:

 0055    REF  19   LAST 1385      10,3613   0 7262 0  SGNAGREE  TC      TPAGREE
 0056    REF  62   LAST 1389      10,3614   1 6064 1            TCF     DANZIG

R0057              CONVERT THE DP 1'S COMPLEMENT ANGLE SCALED IN REVOLUTIONS TO A SINGLE PRECISION 2'S COMPLEMENT ANGLE
R0059    SCALED IN HALF-REVOLUTIONS.

 0060    REF   1                  10,3615   0 3645 0  1STO2S    TC      1TO2SUB
 0061    REF 269   LAST 1389      10,3616   3 4755 1            CAF     ZERO
 0062    REF 855   LAST 1389      10,3617  54 155 1             TS      MPAC +1
 0063    REF   5   LAST 1041      10,3620   1 6063 0            TCF     NEWMODE

R0064              DO 1STO2S ON A VECTOR OF ANGLES:

 0065    REF   2   LAST 1389      10,3621   0 3645 0  V1STO2S   TC      1TO2SUB         ANSWER ARRIVES IN A AND MPAC.

 0066    REF 856   LAST 1389      10,3622  52 162 0             DXCH    MPAC +5
 0067    REF 857   LAST 1389      10,3623  52 155 1             DXCH    MPAC
 0068    REF   3   LAST 1389      10,3624   0 3645 0            TC      1TO2SUB
 0069    REF 858   LAST 1389    10,3625   54 156 1              TS       MPAC +2

 0070    REF 859   LAST 1390    10,3626   52 160 1              DXCH     MPAC +3
 0071    REF 860   LAST 1390    10,3627   52 155 1              DXCH     MPAC
 0072    REF   4   LAST 1389    10,3630   0 3645 0              TC       1TO2SUB
 0073    REF 861   LAST 1390    10,3631   54 155 1              TS       MPAC +1

 0074    REF 862   LAST 1390    10,3632   3 0161 1              CA       MPAC +5
 0075    REF 863   LAST 1390    10,3633   54 154 0              TS       MPAC

 0076    REF 148   LAST 1381    10,3634   3 4753 1   TPMODE     CAF      ONE              MODE IS TP.
 0077    REF   6   LAST 1389    10,3635   1 6063 0              TCF      NEWMODE

R0078                 V1STO2S FOR 2 COMPONENT VECTOR. USED BY RR.

 0079    REF   5   LAST 1390    10,3636   0 3645 0   2V1STO2S   TC       1TO2SUB
 0080    REF 864   LAST 1390    10,3637   52 160 1              DXCH     MPAC +3
 0081    REF 865   LAST 1390    10,3640   52 155 1              DXCH     MPAC
 0082    REF   6   LAST 1390    10,3641   0 3645 0              TC       1TO2SUB
 0083    REF 262   LAST 1386    10,3642   54 001 1              TS       L
 0084    REF 866   LAST 1390    10,3643   3 0157 1              CA       MPAC +3
 0085    REF   3   LAST 1389    10,3644   1 6060 0              TCF      SLOAD2

R0086                 SUBROUTINE TO DO DOUBLING AND 1'S TO 2'S CONVERSION:

 0087    REF 867   LAST 1390    10,3645   52 155 1   1TO2SUB    DXCH     MPAC             FINAL MPAC +1 UNSPECIFIED.
 0088                           10,3646   20 001 1              DDOUBL
 0089    REF 469   LAST 1386    10,3647   10 000 0              CCS      A
 0090    REF 149   LAST 1390    10,3650   6 4753 1              AD       ONE
 0091                           10,3651   1 3653 0              TCF      +2
 0092                           10,3652   4 0000 0              COM                       THIS WAS REVERSE OF MSU.

 0093    REF 868   LAST 1390    10,3653   54 154 0              TS       MPAC             AND SKIP ON OVERFLOW.
 0094    REF 390   LAST 1388    10,3654   0 0002 0              TC       Q

 0095    REF 470   LAST 1390    10,3655   50 000 1              INDEX    A                OVERFLOW UNCORRECT AND IN MSU.
 0096    REF   5   LAST 1096    10,3656   3 4734 0              CAF      LIMITS
 0097    REF 869   LAST 1390    10,3657   26 154 0              ADS      MPAC
 0098    REF 391   LAST 1390    10,3660   0 0002 0              TC       Q

R0114                 THE FOLLOWING ROUTINE INCREMENTS IN 2S COMPLEMENT THE REGISTER WHOSE ADDRESS IS IN BUF BY THE 1S COMPL.
R0116          QUANTITY FOUND IN TEM2. THIS MAY BE USED TO INCREMENT DESIRED IMU AND OPTICS CDU ANGLES OR ANY OTHER 2S COMPL.
R0118          (+0 UNEQUAL TO -0) QUANTITY. MAY BE CALLED BY BANKCALL/SWCALL.

 0119    REF  31   LAST 1259    10,3661   54 142 1   CDUINC     TS       TEM2             1S COMPL.QUANT. ARRIVES IN ACC. STORE IT
 0120    REF 168   LAST 1259    10,3662   50 130 0              INDEX    BUF
 0121                           10,3663   10 000 0              CCS      0                CHANGE 2S COMPL. ANGLE(IN BUF)INTO 1S
 0122    REF 150   LAST 1390    10,3664   6 4753 1              AD       ONE
 0123                           10,3665   1 3671 0              TCF      +4
 0124    REF 151   LAST 1390    10,3666   6 4753 1              AD       ONE
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L        RTB CP CODES                                                                         USER'S PAGE NO.   3      E5 S4

 0125    REF 152  LAST 1390    10,3667  6 4753 1          AD      ONE             OVERFLOW HERE IF 2S COMPL. IS 180 DEG.
 0126                          10,3670  4 0000 0          COM

 0127    REF  32  LAST 1390    10,3671  6 0142 0          AD      TEM2            SULT MOVES FROM 2ND TO 3D QUAD.(OR BACK)
 0129    REF 471  LAST 1390    10,3672  10 000 0          CCS     A               BACK TO 2S COMPL.
 0130    REF 153  LAST 1391    10,3673  6 4753 1          AD      ONE
 0131                          10,3674  1 3676 1          TCF     +2
 0132                          10,3675  4 0000 0          COM
 0133    REF  33  LAST 1391    10,3676  54 142 1          TS      TEM2            STORE 14BIT QUANTITY WITH PRESENT SIGN
 0134                          10,3677  1 3703 1          TCF     +4
 0135    REF 472  LAST 1391    10,3700  50 000 1          INDEX   A                SIGN.
 0137    REF   6  LAST 1390    10,3701  3 4734 0          CAF     LIMITS          FIX IT,BY ADDING IN 37777 OR 40000
 0138    REF  34  LAST 1391    10,3702  6 0142 0          AD      TEM2

 0139    REF 169  LAST 1390    10,3703  50 130 0          INDEX   BUF
 0140                          10,3704  54 000 0          TS      0               STORE NEW ANGLE IN 2S COMPLEMENT.
 0141    REF 392  LAST 1390    10,3705  0 0002 0          TC      Q
```

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L        RTB OP CODES                                                                        USER'S PAGE NO.  4       E5 S4

P0142               RTB TO TORQUE GYROS, EXCEPT FOR THE CALL TO IMUSTALL. ECADR OF COMMANDS ARRIVES IN X1.

 0144    REF   61  LAST 1213    10,3706  50 120 1  PULSEIMU INDEX   FIXLOC           ADDRESS OF GYRO COMMANDS SHOULD BE IN X1
 0145    REF   69  LAST 1263    10,3707  3 0046 0           CA      X1
 0146    REF  311  LAST 1382    10,3710  0 4616 1           TC      BANKCALL
 0147    REF    7  LAST  962    10,3711   17314 1           CADR    IMUPULSE
 0148    REF   63  LAST 1389    10,3712  1 6064 1           TCF     DANZIG
```

```
R0192             THE SUBROUTINE  SIGNMPAC  SETS C(MPAC, MPAC +1) TO SIGN(MPAC).
R0193       FOR THIS, ONLY THE CONTENTS OF MPAC ARE EXAMINED.     ALSO +0 YIELDS POSMAX AND -0 YIELDS NEGMAX.

R0195       ENTRY MAY BE BY EITHER OF THE FOLLOWING:

R0196       1.        LIMIT THE SIZE OF MPAC ON INTERPRETIVE OVERFLOW:
R0197       ENTRY:            BOVB
R0198                                   SIGNMPAC

R0199       2.        GENERATE IN MPAC THE SIGNUM FUNCTION OF MPAC:
R0200       ENTRY:            RTB
R0201                                   SIGNMPAC

R0202       IN EITHER CASE, RETURN IS TO  THE NEXT INTERPRETIVE INSTRUCTION IN THE CALLING SEQUENCE.

 0204                               10,3713  0 0006 1  SIGNMPAC EXTEND
 0205       REF   2  LAST  445      10,3714  3 4733 1           DCA     DPOSMAX
 0206       REF 870  LAST 1390      10,3715  52 155 1           DXCH    MPAC
 0207       REF 473  LAST 1391      10,3716  10 000 0           CCS     A
 0208       REF 270  LAST 1389      10,3717  3 4755 1  DPMODE   CAF     ZERO            SETS MPAC +2 TO ZERO IN THE PROCESS
 0209       REF   4  LAST 1390      10,3720  1 6062 1           TCF     SLOAD2 +2
 0210                               10,3721  1 3722 1           TCF     +1
 0211                               10,3722  0 0006 1           EXTEND
 0212       REF   3  LAST 1393      10,3723  4 4733 0           DCS     DPOSMAX
 0213       REF   5  LAST 1393      10,3724  1 6060 0           TCF     SLOAD2

R0214           RTB OP CODE NORMUNIT IS LIKE INTERPRETIVE INSTRUCTION UNIT, EXCEPT THAT IT CAN BE DEPENDED ON NOT TO BLOW
R0216       UP WHEN THE VECTOR BEING UNITIZED IS VERY SMALL -- IT WILL BLOW UP WHEN ALL COMPONENTS ARE ZERO.   IF NORMUNIT
R0218       IS USED AND THE UPPER ORDER HALVES OF ALL COMPONENTS ARE ZERO, THE MAGNITUDE RETURNED IN 36D WILL BE TOO LARGE
R0220       BY A FACTOR OF 2(13) AND THE SQUARED MAGNITUDE RETURNED AT 34D WILL BE TOO BIG BY A FACTOR OF 2(26).

 0222      .REF 154  LAST 1391      10,3725  3 4753 1  NORMUNX1 CAF     ONE
 02221      REF  11  LAST  906      10,3726  1 3730 1           TCF     NORMUNIT +1
 02222      REF 271  LAST 1393      10,3727  3 4755 1  NORMUNIT CAF     ZERO
 02223      REF  62  LAST 1392      10,3730  6 0120 1           AD      FIXLOC
 02224      REF 871  LAST 1393      10,3731  54 156 1           TS      MPAC  +2
 02225      REF 312  LAST 1392      10,3732  0 4616 1           TC      BANKCALL        GET SIGN AGREEMENT IN ALL COMPONENTS
 0223       REF   3  LAST 1064      10,3733   01010 1           CADR    VECAGREE
 0224       REF 872  LAST 1393      10,3734  10 154 0           CCS     MPAC
 0225       REF   1                 10,3735  1 3771 1           TCF     NOSHIFT
 0226                               10,3736  1 3740 0           TCF     +2
 0227       REF   2  LAST 1393      10,3737  1 3771 1           TCF     NOSHIFT
 0228       REF 873  LAST 1393      10,3740  10 157 0           CCS     MPAC  +3
 0229       REF   3  LAST 1393      10,3741  1 3771 1           TCF     NOSHIFT
 0230                               10,3742  1 3744 1           TCF     +2
 0231       REF   4  LAST 1393      10,3743  1 3771 1           TCF     NOSHIFT
 0232       REF 874  LAST 1393      10,3744  10 161 0           CCS     MPAC  +5
 0233       REF   5  LAST 1393      10,3745  1 3771 1           TCF     NOSHIFT
 0234                               10,3746  1 3750 1           TCF     +2
 0235       REF   6  LAST 1393      10,3747  1 3771 1           TCF     NOSHIFT
```

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L        RTB OP CODES                                                                                          USER'S PAGE NO.   6      F5 S4

 0236     REF 875  LAST 1393    10,3750  3 0155 0               CA      MPAC   +1         SHIFT ALL COMPONENTS LEFT 13
 0237                           10,3751  0 0006 1               EXTEND
 0238     REF  80  LAST 1362    10,3752  7 4736 0               MP      BIT14
 0239     REF 876  LAST 1394    10,3753  20 155 1               DAS     MPAC              DAS GAINS A LITTLE ACCURACY
 0240     REF 877  LAST 1394    10,3754  3 0160 0               CA      MPAC   +4
 0241                           10,3755  0 0006 1               EXTEND
 02411    REF  81  LAST 1394    10,3756  7 4736 0               MP      BIT14
 02412    REF 878  LAST 1394    10,3757  20 160 1               DAS     MPAC   +3
 02413    REF 879  LAST 1394    10,3760  3 0162 1               CA      MPAC   +6
 02414                          10,3761  0 0006 1               EXTEND
 02415    REF  82  LAST 1394    10,3762  7 4736 0               MP      BIT14
 02416    REF 880  LAST 1394    10,3763  20 162 0               DAS     MPAC   +5
 02417    REF   2  LAST 1064    10,3764  3 4761 0               CAF     THIRTEEN
 02418    REF 881  LAST 1394    10,3765  50 156 0               INDEX   MPAC   +2
 02419                          10,3766  54 045 1               TS      370
 0242     REF  63  LAST 1381    10,3767  0 4635 0  OFFTUNIT     TC      POSTJUMP
 0243     REF   3  LAST 1007    10,3770   01024 0               CADR    UNIT   +1         SKIP THE "TC VECAGREE" DONE AT UNIT


 02431    REF 272  LAST 1393    10,3771  3 4755 1  NOSHIFT      CAF     ZERO
 02432    REF   1               10,3772  1 3765 1               TCF     OFFTUNIT -2


R0300      RTB  VECSGNAG   ...FORCES SIGN AGREEMENT OF VECTOR IN MPAC.

 0301     REF 313  LAST 1393    10,3773  0 4616 1  VECSGNAG     TC      BANKCALL
 0302     REF   4  LAST 1393    10,3774   01010 1               CADR    VECAGREE
 0303     REF  64  LAST 1392    10,3775  0 6064 0               TC      DANZIG




*** END OF SKIPPER .101 ***
```

```
R0001    PROGRAM NAMES:  (1) T6JOBCHK        MOD. NO. 5    OCTOBER 2, 1967
R0002                    (2) DOT6RUPT

R0003    MODIFICATION BY: LOWELL G HULL (A.C.ELECTRONICS)
R0004    THESE PROGRAMS ENABLE THE LM DAP TO CONTROL THE THRUST TIMES OF THE REACTION CONTROL SYSTEM JETS BY USING TIME6.
R0006    SINCE THE LM DAP MAINTAINS EXCLUSIVE CONTROL OVER TIME6 AND ITS INTERRUPTS, THE FOLLOWING CONVENTIONS HAVE BEEN
R0008    ESTABLISHED AND MUST NOT BE TAMPERED WITH:
R0009            1. NO NUMBER IS EVER PLACED INTO TIME6 EXCEPT BY LM DAP.
R0010            2. NO PROGRAM OTHER THAN LM DAP ENABLES THE TIME6 COUNTER.
R0011            3. TO USE TIME6, THE FOLLOWING SEQUENCE IS ALWAYS EMPLOYED:
R0012                    A. A POSITIVE (NON-ZERO) NUMBER IS STORED IN TIME6.
R0013                    B. THE TIME6 CLOCK IS ENABLED.
R0014                    C. TIME6 IS INTERROGATED AND IS:
R0015                            I. NEVER FOUND NEGATIVE(NON-ZERO) OR +0.
R0016                           II. SOMETIMES FOUND POSITIVE(BETWEEN 1 AND 240D) INDICATING THAT IT IS ACTIVE.
R0018                          III. SOMETIMES FOUND POSMAX INDICATING THAT IT IS INACTIVE AND NOT ENABLED.
R0020                           IV. SOMETIMES FOUND NEGATIVE ZERO INDICATING THAT:
R0021                                   A. A T6RUPT IS ABOUT TO OCCUR AT THE NEXT DINC, OR
R0023                                   B. A T6RUPT IS WAITING IN THE PRIORITY CHAIN, OR
R0025                                   C. A T6RUPT IS IN PROCESS NOW.
R0026            4) ALL PROGRAMS WHICH OPERATE IN EITHER INTERRUPT MODE OR WITH INTERRUPT INHIBITED MUST CALL T6JOBCHK
R0028               EVERY 5 MILLISECONDS TO PROCESS A POSSIBLE WAITING T6RUPT BEFORE IT CAN BE HONORED BY THE HARDWARE.

R0030            (5. PROGRAM JTLST, IN Q,R-AXES, HANDLES THE INPUT LIST.)
R0031    T6JOBCHK CALLING SEQUENCE:

A0032                                      L          TC       T6JOBCHK
A0033                                      L +1       (RETURN)

R0034    DOT6RUPT CALLING SEQUENCE:

A0035                                                 DXCH     ARUPT            T6RUPT LEAD IN AT LOCATION 4004.
A0036                                                 EXTEND
A0037                                                 DCA      T6ADR
A0038                                                 DTCB

R0039    SUBROUTINES CALLED: DOT6RUPT CALLS T6JOBCHK.

R0040    NORMAL EXIT MODES: T6JOBCHK RETURNS TO L +1.
R0041                       DOT6RUPT TRANSFERS CONTROL TO RESUME.

R0042    ALARM/ABORT MODES: NONE.

R0043    INPUT: TIME6    NXT6ADR      OUTPUT: TIME6    NXT6ADR     CHANNEL 5
R0044           T6NEXT   T6NEXT +1            T6NEXT   T6NEXT +1   CHANNEL 6
R0045           T6FURTHA T6FURTHA +1          T6FURTHA T6FURTHA +1 BIT15/CH13
R0046    DEBRIS: T6JOBCHK CLOBBERS A.  DOT6RUPT CLOBBERS NOTHING.
```

```
 0055                          17,2055                          BANK    17
 0056    REF   1               17,2200                          SETLOC  DAPS2
 0057                          17,2055                          BANK
 0058    REF   2  LAST  221    E6,1466                          EBANK=  T6NEXT
 0059    REF   1                                                COUNT*  $$/DAPT6

 0060    REF   1               17,2055  10 031 1  T6JOBCHK CCS     TIME6            CHECK TIME6 FOR WAITING T6RUPT:
 0061    REF 393  LAST 1391    17,2056  0 0002 0           TC      Q                NONE: CLOCK COUTING DOWN.
 0062    REF  20  LAST 1109    17,2057  0 5675 0           TC      CCSHOLE
 0063    REF  21  LAST 1396    17,2060  0 5675 0           TC      CCSHOLE
R0064    CONTROL PASSES TO T6JOB ONLY WHEN C(TIME6) = -0 (I.E., WHEN A T6RUPT MUST BE PROCESSED).

 0069    REF  34  LAST 1122    17,2061  3 4733 1  T6JOB    CA      POSMAX
 0070                          17,2062  22 007 0           ZL
 0071    REF   1               17,2063  53'471 0           DXCH    T6FURTHA
 0072    REF   3  LAST 1396    17,2064  53'467 1           DXCH    T6NEXT
 0073    REF   2  LAST  221    17,2065  23'465 1           LXCH    NXT6ADR
 0074    REF   2  LAST 1396    17,2066  54 031 1           TS      TIME6

 0075    REF   7  LAST 1361    17,2067  6 7730 1           AD      PRIO37
 0076    REF 474  LAST 1393    17,2070  54 000 0           TS      A
 0077    REF   1               17,2071  1 2075 0           TCF     ENABLET6
 0078    REF  35  LAST 1396    17,2072  3 4733 1           CA      POSMAX
 0079    REF   3  LAST 1396    17,2073  54 031 1           TS      TIME6
 0080    REF   1               17,2074  1 2115 1           TCF     GOCH56
 0081                          17,2075  0 0006 1  ENABLET6 EXTEND
 00812   REF   3  LAST  987    17,2076  23'265 1           QXCH    C13QSAV
 008125  REF  62  LAST 1369    17,2077  22 070 0           LXCH    RUPTREG1
 00813   REF   8  LAST  987    17,2100  0 6022 1           TC      C13STALL
 00814                         17,2101  0 0006 1           EXTEND
 00815   REF   4  LAST 1396    17,2102  23'265 1           QXCH    C13QSAV
 008155  REF  63  LAST 1396    17,2103  22 070 0           LXCH    RUPTREG1
 00816   REF  48  LAST 1368    17,2104  3 4735 1           CAF     BIT15
 0082                          17,2105  0 0006 1           EXTEND
 0083    REF  22  LAST 1328    17,2106  05 013 0           WOR     CHAN13
 0084    REF   4  LAST 1396    17,2107  3 1466 1           CA      T6NEXT
 0085    REF   8  LAST 1396    17,2110  6 7730 1           AD      PRIO37
 0086    REF 475  LAST 1396    17,2111  54 000 0           TS      A
 0087    REF   2  LAST 1396    17,2112  1 2115 1           TCF     GOCH56
 0088    REF  36  LAST 1396    17,2113  3 4733 1           CA      POSMAX
 0089    REF   5  LAST 1396    17,2114  55'466 0           TS      T6NEXT
 0090    REF 263  LAST 1390    17,2115  50 001 0  GOCH56   INDEX   L
 0091    REF   1               17,2116  1 5743 0           TCF     WRITEP -1

 0092                             5743                          BLOCK   02
 0093    REF   1                  4000                          SETLOC  FFTAG9
 0094                             5743                          BANK
 0095    REF  15  LAST  908    E6,1634                          EBANK=  CDUXD
 0096    REF   1                                                COUNT*  $$/DAPT6
 0097   REF   4  LAST  221        5743  3 1472 1             CA      NEXTP
 0098                             5744  0 0006 1  WRITEP     EXTEND
 0099   REF   2  LAST  214        5745  01 006 0             WRITE   CHAN6
 0100   REF 394  LAST 1396        5746  0 0002 0             TC      Q

 0101   REF   1                   5747  3 1473 0             CA      NEXTU
 0102   REF 264  LAST 1396        5750  54 001 1  WRITEU     TS      L
 0103   REF   1                   5751  4 5764 0             CS      00314OCT
 0104                             5752  0 0006 1             EXTEND
 0105   REF   3  LAST 1020        5753  02 005 0             RAND    CHAN5
 0106   REF 265  LAST 1397        5754  6 0001 0             AD      L
 0107                             5755  0 0006 1             EXTEND
 0108   REF   4  LAST 1397        5756  01 005 0             WRITE   CHAN5
 0109   REF 395  LAST 1397        5757  0 0002 0             TC      Q

 0110   REF   1                   5760  3 1474 1             CA      NEXTV
 0111   REF 266  LAST 1397        5761  54 001 1  WRITEV     TS      L
 0112   REF   2  LAST 1397        5762  3 5764 1             CA      00314OCT
 0113                             5763  1 5752 0             TCF     -9D
 0114                             5764   00314 1  00314OCT   OCT     00314

 0115                          17,2117                       BANK    17
 0116   REF   2  LAST 1396     17,2000                       SETLOC  DAPS2
 0117                          17,2117                       BANK

 0118   REF   6  LAST 1396     E6,1466                       EBANK=  T6NEXT
 0119   REF   2 LAST 1396 TO 1396:     34     34*            COUNT*  $$/DAPT6

 0120   REF  11  LAST 1331     17,2117  22 016 0  DOT6RUPT   LXCH    BANKRUPT         (INTERRUPT LEAD INS CONTINUED)
 0121                          17,2120  0 0006 1             EXTEND
 0122   REF  10  LAST 1331     17,2121  22 012 1             QXCH    QRUPT

 0123   REF   1                17,2122  0 2055 0             TC      T6JOBCHK         CALL T6JOBCHK.

 0124   REF  25  LAST 1331     17,2123  1 5270 0             TCF     RESUME           END TIME6 INTERRUPT PROCESSOR.
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L        DAP INTERFACE SUBROUTINES                                                           USER'S PAGE NO.  1       EO S4

 0001                             20,2115                      BANK    20
 0002    REF    3  LAST    43     20,2000                      SETLOC  DAPS3
 0003                             20,2115                      BANK

 0004    REF   16  LAST 1396      E6,1634                      EBANK=  CDUXD
 0005    REF    1                                              COUNT*  $$/DAPIF

R0006    MOD 0                 DATE   11/15/66           BY   GEORGE W. CHERRY

R0007    MOD 1                        1/23/67            MODIFICATION BY PETER ADLER

R0008    FUNCTIONAL DESCRIPTION

R0009             HEREIN ARE A COLLECTION OF SUBROUTINES WHICH ALLOW MISSION CONTROL PROGRAMS TO CONTROL THE MODE
R0011             AND INTERFACE WITH THE DAP.

R0012    CALLING SEQUENCES

R0013    IN INTERRUPT OR WITH INTERRUPT INHIBITED
R0014             TC      IBNKCALL
R0015             FCADR   ROUTINE

R0016    IN A JOB WITHOUT INTERRUPT INHIBITED
R0017             INHINT
R0018             TC      IBNKCALL
R0019             FCADR   ROUTINE
R0020             RELINT

R0021    OUTPUT

R0022             SEE INDIVIDUAL ROUTINES BELOW

R0023    DEBRIS

R0024             A,L, AND SOMETIMES MDUETEMP                                     ODE       NOT IN PULSES MODE
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L        DAP INTERFACE SUBRCLTINES                                                               USER'S PAGE NO.   2       E? S4

R0087    SUBROUTINE NAMES:
R0088              SETMAXDB, SETMINCB, RESTCRCB, PFLITECB

R0089    MODIFIED: 30 JANUARY 1968 BY P S WEISSMAN TC CREATE RESTORCB.

R0090    MODIFIED: 1 MARCH 1968 BY P S WEISSMAN TO SAVE EBANK AND CREATE PFLITEDB

R0091    FUNCTIONAL DESCRIPTION:
R0092              SETMAXDB - SET DEADBAND TO 5.0 DEGREES
R0093              SETMINDB - SET DEADBAND TO 0.3 DEGREE
R0094              RESTORDB - SET DEADBAND TO .3,1, CR 5 ACCORDING TC BITS 4 AND 5 OF DAPBOOLS
R0096              PFLITECB - SET DEADBAND TO 1.0 DEGREE AND ZERO THE COMMANDED ATTITUDE CHANGE AND COMMANDED RATE
R0098              ALL ENTRIES SET UP A NOVAC JOB TC DO 1/ACCS SO THAT THE TJETLAW SWITCH CURVES ARE POSITIONED TO
R0100    REFLECT THE NEW DEADBAND.  IT SHOULD BE NOTED THAT THE DEADBAND REFERS TC THE ATTITUDE IN THE P-,U-,AND V-AXES.

R0102    SUBROUTINE CALLED:  NOVAC

R0103    CALLING SEQUENCE: SAME AS ABOVE
A0104                                                      DR         TC      RESTORDB +1       FROM ALLCCAST
R0105    DEBRIS:  A, L, Q, RUPTREG1, (ITEMPS  IN NDVAC)

 0106    REF  31  LAST  904    20,2115  3C 111 0  RESTCRCB CAE     DAPBCCLS          DETERMINE CREW-SELECTED DEADBAND.
 01061   REF   1               20,2116  7 4747 0           MASK    DBSLECT2          CHECK FOR MAX CB (5 DEG)
 01062                         20,2117  C 0006 1           EXTEND
 01063                         20,2120  1 2122 0           BZF     +2
 01064   REF   1               20,2121  1 2130 0           TCF     SETMAXDB          BIT5 DAPBOOLS IS SET - CREW WANTS 5 DEG
 01065   PEF  32  LAST 1399    20,2122  30 111 0           CAE     DAPBODLS
 0107    REF   1               20,2123  7 4750 0           MASK    DBSELECT          CHECK FOR 1 DEG DEADBAND SELECTION
 0108                          20,2124  C 0006 1           EXTEND
 0109    REF   6  LAST  347    20,2125  1 2141 0           BZF     SETMINCB

 01091   REF   1               20,2126  3 2153 1           CAF     POWERDB           BIT4 DAPBOOLS IS SET - CREW WANTS 1 DEG
 01092   REF   2  LAST 1399    20,2127  1 2131 1           TCF     SETMAXDB +1
 0110    REF   1               20,2130  3 2152 0  SETMAXDB CAF     WIDEDB            SET 5 DEGREE DEADBAND.
 0111    REF   4  LAST  825    20,2131  55'343 0   +1      TS      DB

 0112                          20,2132  0 0006 1           EXTEND                    SET UP JOB TO RE-POSITION SWITCH CURVES.
 0113    REF  64  LAST 1396    20,2133  22 070 0           QXCH    RUPTREG1
 0114    REF   4  LAST  738    20,2134  3 7720 0  CALLACCS CAF     PRIO27
 0115    REF  31  LAST 1363    20,2135  C 5072 1           TC      NOVAC
 0116    REF   9  LAST  734    E6,1536                     EBANK=  AOSQ
 0117    REF   2  LAST  194    20,2136   03652 0           2CADR   1/ACCJCB
 0117                          20,2137   42106 0

 0118    REF  65  LAST 1399    20,2140  0 0070 0           TC      RUPTREG1          RETURN TO CALLER.

 0119    REF   1               20,2141  3 2151 0  SETMINCB CAF     NARRCWCB          SET 0.3 DEGREE DEADBAND.
 0120    REF   3  LAST 1399    20,2142  1 2131 1           TCF     SETMAXDB +1
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L          DAP INTERFACE SUBROUTINES                                                              USER'S PAGE NO.   3       E6 S4

 0121                                 20,2143   0 0006 1  PFLITEDB EXTEND                         THE RETURN FROM CALLACCS IS TO RUPTREG1.
 0122      REF  66  LAST 1399         20,2144  22 070 0            QXCH     RUPTREG1
 0123      REF   9  LAST  847         20,2145   0 2154 0            TC       ZATTEROR              ZERO THE ERRORS AND COMMANDED RATES.
 0124      REF   2  LAST 1399         20,2146   3 2153 1            CAF      POWERDB               SET DB TO 1.0 DEG.
 0125      REF   5  LAST 1399         20,2147  55'343 0            TS       DB
 0126      REF   1                    20,2150   1 2134 1            TCF      CALLACCS              SET UP 1/ACCS AND RETURN TO CALLER.
 01261                                20,2151    00155 0  NARROWDB OCTAL    00155                 0.3 DEGREE SCALED AT 45.
 01262                                20,2152    03434 1  WIDEDB   OCTAL    03434                 5.0 DEGREES SCALED AT 45.
 0127                                 20,2153    00554 0  POWERDB  DEC      .02222                1.0 DEGREE SCALED AT 45.


 0128      REF   8  LAST  896         20,2154   3 5015 0  ZATTEROR CAF      EBANK6
 0129      REF  84  LAST 1386         20,2155  56 003 1            XCH      EBANK
 0130      REF 267  LAST 1397         20,2156  54 001 1            TS       L                     SAVE CALLERS EBANK IN L.
 0131      REF  21  LAST 1305         20,2157  30 032 0            CAE      CDUX
 0132      REF  17  LAST 1398         20,2160  55'634 0            TS       CDUXD
 0133      REF  10  LAST 1301         20,2161  30 033 1            CAE      CDUY
 0134      REF   4  LAST  905         20,2162  55'635 1            TS       CDUYD
 0135      REF  13  LAST 1301         20,2163  30 034 0            CAE      CDUZ
 0136      REF   4  LAST  905         20,2164  55'636 1            TS       CDUZD
 0137      REF   9  LAST  919         20,2165   1 2171 0            TCF      STOPRATE +3


 0138      REF   9  LAST 1400         20,2166   3 5015 0  STOPRATE CAF      EBANK6
 0139      REF  85  LAST 1400         20,2167  56 003 1            XCH      EBANK
 0140      REF 268  LAST 1400         20,2170  54 001 1            TS       L                     SAVE CALLERS EBANK IN L.
 0141      REF 273  LAST 1394         20,2171   3 4755 1   +3       CAF      ZERO
 0142      REF  11  LAST  913         20,2172  55'642 1            TS       OMEGAPD
 0143      REF   6  LAST  912         20,2173  55'643 0            TS       OMEGAQD
 0144      REF   6  LAST  912         20,2174  55'644 1            TS       OMEGARD
 0145      REF   5  LAST  913         20,2175  55'637 0            TS       DELCDUX
 0146      REF   2  LAST  137         20,2176  55'640 0            TS       DELCDUY
 0147      REF   2  LAST  137         20,2177  55'641 1            TS       DELCDUZ
 0148      REF   4  LAST  913         20,2200  55'274 0            TS       DELPEROR
 0149      REF   2  LAST  371         20,2201  55'275 1            TS       DELQEROR
 0150      REF   2  LAST  371         20,2202  55'276 1            TS       DELREROR
 0151      REF  86  LAST 1400         20,2203  22 003 1            LXCH     EBANK                 RESTORE CALLERS EBANK.
 0152      REF 396  LAST 1397         20,2204   0 0002 0            TC       Q

R0153      SUBROUTINE NAME:  ALLCOAST

R0154      WILL BE CALLED BY FRESH STARTS AND ENGINE OFF ROUTINES.

R0156      CALLING SEQUENCE: (SAME AS ABOVE)

R0157      EXIT:  RETURN TO Q.

R0158      SUBROUTINES CALLED:  STOPRATE, RESTORDB, NOVAC

R0159      ZERO:  (FOR ALL AXES) AOS, ALPHA, AOSTERM, OMEGAD, DELCDU, DELEROR
```

```
RO160    OUTPUT:  DRIFTBIT/DAPBOOLS, OE, JOB TO DO 1/ACCS

RO161    DEBRIS:  A, L, Q, RUPTREG1, RUPTREG2, (ITEMPS IN NOVAC)

 0162                        20,2205  0 0006 1  ALLCOAST EXTEND                    SAVE Q FOR RETURN
 0163    REF  23  LAST 1322  20,2206  22 071 1           QXCH     RUPTREG2
 0164    REF  10  LAST 1400  20,2207  0 2166 1           TC       STOPRATE         CLEAR RATE INTERFACE.  RETURN WITH A=0
 0165    REF  87  LAST 1400  20,2210  22 003 1           LXCH     EBANK              AND L=EBANK6.  SAVE CALLERS EBANK.
 0166    REF  10  LAST 1399  20,2211  55'536 1           TS       AOSQ
 0167    REF  11  LAST 1401  20,2212  55'537 0           TS       AOSQ +1
 0168    REF   2  LAST  734  20,2213  55'540 0           TS       AOSR
 0169    REF   3  LAST 1401  20,2214  55'541 1           TS       AOSR +1
 0170    REF   2  LAST  197  20,2215  55'424 0           TS       ALPHAQ           FOR DOWNLIST.
 0171    REF   1             20,2216  55'425 1           TS       ALPHAR
 0172    REF   2  LAST  134  20,2217  55'544 1           TS       AOSQTERM
 0173    REF   1             20,2220  55'545 0           TS       AOSRTERM
 0174    REF  88  LAST 1401  20,2221  22 003 1           LXCH     EBANK            RESTORE EBANK  (EBANK6 NO LONGER NEEDED)

 0175    REF  33  LAST 1399  20,2222  4 0111 1           CS       DAPBOOLS         SET UP DRIFTBIT
 0176    REF   2  LAST  734  20,2223  7 4744 0           MASK     DRIFTBIT
 0177    REF  34  LAST 1401  20,2224  26 111 1           ADS      DAPBOOLS
 0178    REF   8  LAST  847  20,2225  0 2116 0           TC       RESTORDB +1      RESTORE DEADBANK TO CREW-SELECTED VALUE.

 0179    REF  24  LAST 1401  20,2226  0 0071 1           TC       RUPTREG2         RETURN.
```

```
L         DAPIDLER PROGRAM                                                                     USER'S PAGE NO.   1       EO S4

R0001     THE DAPIDLER PROGRAM IS STARTED BY FRESH START AND RESTART.          THE DAPIDLER PROGRAM IS DONE 10 TIMES
R0003     PER SECOND UNTIL THE ASTRONAUT DESIRES THE DAP TO WAKE UP, AND THE IMU AND CDUS ARE READY FOR USE BY THE DAP.
R0005     THE NECESSARY INITIALIZATION OF THE DAP IS DONE BY THE DAPIDLER PROGRAM.
 0006                          16,2000                      BANK    16
 0007     REF   1              16,2000                      SETLOC  DAPS1
 0008                          16,2000                      BANK

 0009     REF  12  LAST 1401   E6,1536                      EBANK=  AOSQ

 0010     REF   1                                           COUNT*  $$/DAPID

 0011                          16,2000  0 0006 1  CHEKBITS  EXTEND
 0012     REF   8  LAST  905   16,2001  00 031 0            READ    CHAN31            IF BOTH BIT13 AND BIT14 ARE ONE, THEN
 0013                          16,2002  4 0000 0            COM                       THE MODE SELECT SWITCH IS IN THE OFF
 0014     REF   6  LAST  501   16,2003  7 4355 1            MASK    BIT13-14          POSITION, AND SO THE DAP SHOULD BE OFF,
 0015                          16,2004  0 0006 1            EXTEND                    WITH NO ATTITUDE ERROR DISPLAY.
 0016     REF   1              16,2005  1 2157 1            BZF     MOREIDLE

 0017     REF  48  LAST 1309   16,2006  4 1300 1            CS      IMODES33
 0018     REF  62  LAST 1383   16,2007  7 4746 1            MASK    BIT6
 0019     REF 476  LAST 1396   16,2010  10 000 0            CCS     A
 0020     REF   1              16,2011  1 2206 0            TCF     JUMPDSP
 0021     REF   4  LAST  221   16,2012  4 1262 1            CS      RCSFLAGS          IMU NOT USABLE.  SET UP INITIALIZATION
 0022     REF  39  LAST 1388   16,2013  7 4751 1            MASK    BIT3              FLAG FOR ATT ERROR DISPLAY ROUTINE.
 0023     REF   5  LAST 1402   16,2014  27'262 1            ADS     RCSFLAGS
 0024     REF   1              16,2015  1 2163 0            TCF     SHUTDOWN

 0025     REF  50  LAST 1331   16,2016  3 4742 1  CHEKMORE  CAF     BIT10             BIT 10 OF 30 IS PGNCS CONTROL OF S/C
 0026                          16,2017  0 0006 1            EXTEND
 0027     REF   8  LAST  905   16,2020  02 030 0            RAND    CHAN30            BITS IN 30 ARE INVERTED
 0028     REF 477  LAST 1402   16,2021  10 000 0            CCS     A
 0029     REF   2  LAST 1402   16,2022  1 2157 1            TCF     MOREIDLE

 0030                          16,2023  0 0002 0            RETURN
```

```
P0031    DAPIDLER ENTRY.

 0032    REF   12  LAST 1397   16,2024   22 016 0  DAPIDLER LXCH    BANKRUPT        INTERRUPT LEAD INS (CONTINUED)
 0033                          16,2025   0 0006 1           EXTEND
 0034    REF   11  LAST 1397   16,2026   22 012 1           QXCH    QRUPT

 0035    REF    6  LAST 1402   16,2027   3 1262 0           CA      RCSFLAGS
 0036    REF   50  LAST 1358   16,2030   7 4737 1           MASK    BIT13
 0037    REF  47B  LAST 1402   16,2031   10 000 0           CCS     A               CHECK IF 1/ACCJOB HAS BEEN SET UP SINCE
 0038    REF    1              16,2032   1 2041 1           TCF     CHECKUP         THE LAST FRESH START OR RESTART.
 003B1   REF   51  LAST 1403   16,2033   3 4737 0           CA      BIT13
 003B2   REF    7  LAST 1403   16,2034   27'262 1           ADS     RCSFLAGS        BIT 13 IS 1.
 003B3   REF    5  LAST 1399   16,2035   3 7720 0           CAF     PRIO27
 0039    REF   32  LAST 1399   16,2036   0 5072 1           TC      NOVAC           SET UP JOB TO DO A LITTLE INITIALIZATION
 0040    REF   13  LAST 1402   E6,1536                      EBANK=  AOSQ              AND EXECUTE 1/ACCS.
 0041    REF    1              16,2037    03645 0           2CADR   1/ACCSET        (WILL BRANCH TO MOREIDLE ON ACCSOKAY)
 0041    REF    1              16,2040    42106 0

 0042    REF    1              16,2041   0 2000 0  CHECKUP  TC      CHEKBITS        CHECK TO SEE IF LM DAP IS TO GO ON AND
A0043                                                                                 DO ERROR DISPLAY.

 0044    REF   35  LAST 1401   16,2042   30 111 0           CAE     DAPBOOLS        IF 1/ACCS HAS NOT BEEN COMPLETED, IDLE.
 0045    REF    2  LAST  221   16,2043   7 4751 1           MASK    ACCSOKAY          NOTE: ONLY FRESH START AND RESTART
 0046                          16,2044   0 0006 1           EXTEND                          KNOCK THIS BIT DOWN.
 0047    REF    3  LAST 1402   16,2045   1 2157 1           BZF     MOREIDLE

 004B    REF   51  LAST 1310   16,2046   0 4674 0  STARTDAP TC      IBNKCALL        ZERO ATTITUDE ERROR AND DESIRED RATES.
 0049    REF   10  LAST 1400   16,2047    40154 0           FCADR   ZATTEROR
 0050    REF  274  LAST 1400   16,2050   3 4755 1           CAF     ZERO            ********** INITIALIZE: **********
 0051    REF    3  LAST  134   16,2051   55'524 1           TS      TJP
 0052    REF    2  LAST  135   16,2052   55'525 0           TS      TJU
 0053    REF    1              16,2053   55'526 0           TS      TJV
 0054    REF    7  LAST  197   16,2054   55'421 0           TS      OMEGAP          RATES IN BODY (PILOT) COORDINATES.
 0055    REF    6  LAST  756   16,2055   55'422 0           TS      OMEGAQ
 0056    REF    1              16,2056   55'423 1           TS      OMEGAR
 0057    REF    6  LAST  131   16,2057   55'430 0           TS      TRAPEDP
 005B    REF    1              16,2060   55'431 1           TS      TRAPEDQ
 0059    REF    1              16,2061   55'432 1           TS      TRAPEDR
 0060    REF   14  LAST 1403   16,2062   55'536 1           TS      AOSQ            OFFSET ACCELERATION ESTIMATES.
 0061    REF   15  LAST 1403   16,2063   55'537 0           TS      AOSQ +1
 0062    REF    4  LAST 1401   16,2064   55'540 0           TS      AOSR
 0063    REF    5  LAST 1403   16,2065   55'541 1           TS      AOSR +1
 0064    REF    3  LAST 1401   16,2066   55'424 0           TS      ALPHAQ          COPIES OF OFFSET ESTIMATES FOR DOWNLIST.
 0065    REF    2  LAST 1401   16,2067   55'425 1           TS      ALPHAR
 0066    REF    3  LAST  135   16,2070   55'501 0           TS      NEGUQ
 0067    REF    1              16,2071   55'503 1           TS      NEGUR
 006B    REF    3  LAST 1401   16,2072   55'544 1           TS      AOSQTERM        QRAXIS RATE DERIVATION TERMS AND KALMAN
 0069    REF    2  LAST 1401   16,2073   55'545 0           TS      AOSRTERM        FILTER INITIALIZATION TERMS.
 0070    REF    1              16,2074   55'510 0           TS      QACCDOT         DESCENT ACCELERATION DERIVATIVE EST.
 0071    REF    1              16,2075   55'512 1           TS      RACCDOT
 0072  REF    1             16,2076  55'502 0              TS      ALLOWGTS         AOSTASK FLAG FOR QRAXIS RCS CONTROL USE.
 0073  REF    1             16,2077  55'630 1              TS      COTROLER         DO TRYGTS ON FIRST PASS (WILL GO TO RCS)
 0074  REF    1             16,2100  55'632 0              TS      INGTS            RECOGNIZE FIRST GTS PASS AS SUCH.
 0075  REF    3  LAST  135  16,2101  55'631 0              TS      QGIMTIMR         STOP GIMBAL DRIVES.  (PROBABLY WOULD BE
 0076  REF    1             16,2102  55'633 1              TS      RGIMTIMR           GOOD ENOUGH JUST TO INACTIVATE TIMERS)
 0077  REF    1             16,2103  55'460 0              TS      OLDPMIN          MINIMUM IMPULSE MODE ERASABLES
 0078  REF    1             16,2104  55'461 1              TS      OLDQRMIN
 00781 REF    3  LAST  138  16,2105  55'766 0              TS      PJETCTR          INITIALIZE COCKED JET INHIBITION
 00782 REF    1             16,2106  55'767 1              TS      UJETCTR          COUNTERS
 00783 REF    1             16,2107  55'770 1              TS      VJETCTR
 0079  REF   48  LAST 1372     4747           CALLGMBL EQUALS BIT5             RCSFLAGS INITIALIZATION.
 0080  REF    1             16,2110   4 2202 1             CS      MANFLAG
 0081  REF    8  LAST 1403  16,2111   7 1262 1             MASK    RCSFLAGS         NEGUQ(R) HAVE BEEN GENERATED.
 0082  REF    9  LAST 1404  16,2112  55'262 1              TS      RCSFLAGS

R0083    SET UP "OLD" MEASURED CDU ANGLES:

 0084                       16,2113   0 0006 1             EXTEND
 0085  REF   22  LAST 1400  16,2114   3 0033 1             DCA     CDUX             OLDXFORP AND OLDYFORP
 0086  REF    3  LAST  131  16,2115  53'441 0              DXCH    OLDXFORP
 0087  REF   14  LAST 1400  16,2116   3 0034 0             CA      CDUZ
 0088  REF    1             16,2117  55'442 0              TS      OLDZFORQ
 0089  REF   10  LAST 1404  16,2120   4 1262 1             CS      RCSFLAGS
 0090  REF   36  LAST 1359  16,2121   7 4740 1             MASK    BIT12
 00901 REF   11  LAST 1404  16,2122  27'262 1              ADS     RCSFLAGS         BIT 12 SET TO 1.
 0091  REF   31  LAST 1356  16,2123   3 4751 0             CA      FOUR
 0092  REF    2  LAST  134  16,2124  55'534 0              TS      SKIPU
 0093  REF    1             16,2125  55'535 1              TS      SKIPV
 0094  REF   37  LAST 1396  16,2126   3 4733 1             CA      POSMAX
 0095  REF    4  LAST 1396  16,2127  54 031 1              TS      TIME6
 0096  REF    7  LAST 1397  16,2130  55'466 0              TS      T6NEXT
 0097  REF    2  LAST 1396  16,2131  55'470 1              TS      T6FURTHA
 0098  REF  275  LAST 1403  16,2132   3 4755 1             CA      ZERO
 0099  REF    8  LAST 1404  16,2133  55'467 1              TS      T6NEXT +1
 0100  REF    3  LAST 1404  16,2134  55'471 0              TS      T6FURTHA +1
 0101  REF    3  LAST 1396  16,2135  55'465 0              TS      NXT6ADR
 0102  REF    5  LAST 1397  16,2136  55'472 0              TS      NEXTP
 0103  REF    2  LAST 1397  16,2137  55'473 1              TS      NEXTU
 0104  REF    2  LAST 1397  16,2140  55'474 0              TS      NEXTV
 0105  REF    7  LAST 1032  16,2141   4 4363 1             CS      TEN
 0106  REF    1             16,2142  55'756 0              TS      DAPZRUPT         JASK NOT IN PROGRESS, INITIALIZE NEG.
 0107  REF   92  LAST 1383  16,2143   3 4752 0             CA      TWO
 0108  REF    1             16,2144  55'433 0              TS      NPTRAPS
 0109  REF    1             16,2145  55'434 1              TS      NQTRAPS
 0110  REF    1             16,2146  55'435 0              TS      NRTRAPS
 0111                       16,2147   0 0006 1             EXTEND
 0112  REF    1             16,2150   3 2205 1             DCA     PAXADIDL
 0113  REF    3  LAST  221  16,2151  53'264 1              DXCH    T5ADR
 0114  REF    1             16,2152   3 7732 0    SETTIME5 CAF     MS100
 0115  REF    4  LAST  653  16,2153  54 030 0              TS      TIME5
 0116    REF  26  LAST 1397   16,2154  1 5270 0           TCF      RESUME
 0117    REF  16  LAST 1403   E6,1536                     EBANK=   AOSQ
 0118    REF   2  LAST  225   16,2155   02024 0  IDLERADR 2CADR    DAPIDLER
 0118                         16,2156   34106 1
 0119    REF  52  LAST 1403   16,2157  0 4674 0  MOREIDLE TC       IBNKCALL        CALCULATE Q,R-AXES ATTITUDE ERRORS.
 0120    REF   1              16,2160   36655 1           CADR     QERRCALC

 0121    REF  53  LAST 1405   16,2161  0 4674 0           TC       IBNKCALL
 0122    REF   1              16,2162   35452 1           CADR     CALCPERR        CALCULATE P AXIS ATTITUDE ERRORS.

 0123                         16,2163  0 0006 1  SHUTDOWN EXTEND
 0124    REF   1              16,2164  3 2156 1           DCA      IDLERADR
 0125    REF   4  LAST 1404   16,2165  53'264 1           DXCH     T5ADR

 0126    REF 276  LAST 1404   16,2166  3 4755 1           CAF      ZERO            KILL ANY POSSIBLE JET REQUESTS
 0127    REF   6  LAST 1404   16,2167  55'472 0           TS       NEXTP
 0128    REF   3  LAST 1404   16,2170  55'473 1           TS       NEXTU
 0129    REF   3  LAST 1404   16,2171  55'474 0           TS       NEXTV
 0130                         16,2172  0 0006 1           EXTEND                   COMMAND JETS OFF.
 0131    REF   5  LAST 1397   16,2173  01 005 0           WRITE    CHAN5
 0132                         16,2174  0 0006 1           EXTEND
 0133    REF   3  LAST 1397   16,2175  01 006 0           WRITE    CHAN6
 0134    REF   1              16,2176  4 2203 0           CS       BGIM23          TURN TRIM GIMBAL OFF
 0135                         16,2177  0 0006 1           EXTEND
 0136    REF  66  LAST 1316   16,2200  03 012 1           WAND     CHAN12
 0137    REF   1              16,2201  1 2152 1           TCF      SETTIME5        RETURN IN 100 MSEC.

 01371                        16,2202   03021 1  MANFLAG  OCT      03021
 0138                         16,2203   07400 1  BGIM23   OCTAL    07400
 0139    REF   8  LAST 1403   E6,1421                     EBANK=   OMEGAP
 0140    REF   1              16,2204   02213 0  PAXADIDL 2CADR    PAXIS
 0140    REF   1              16,2205   34106 1
 0141    REF   2  LAST  157     7732             MS100    =        OCT37766
 0142    REF  69  LAST 1375     0061             CCSMG    =        ITEMP1
 01431                        16,2206  0 0006 1  JUMPDSP  EXTEND                   TRANSFER TO BANK 20
 01432   REF   1              16,2207  3 2212 1           DCA      DSPCADR         FOR ATTITUDE ERROR DISPLAYS
 01433                        16,2210  52 006 0           DTCB

 01434   REF   3  LAST  138   E6,1760                     EBANK=   AK
 01435   REF   1              16,2211   02227 1  DSPCADR  2CADR    ALTDSPLY
 01435   REF   1              16,2212   40106 1
 01436                         20,2227                      BANK    20
 01437  REF    4  LAST 1398    20,2000                      SETLOC  DAPS3
 01438                         20,2227                      BANK
 01439  REF    1                                            COUNT*  $$/NEEDL

R0144   PROGRAM: ALTDSPLY

R0145   MOD 0.  6 DEC 1967

R0146   AUTHOR:  CRAIG WORK, DON KEENE, MIT IL

R0147   MOD 3 BY DON KEENE AUG 1, 1968 MOVED PROGRAM TO BANK 20

R0148   PROGRAM DESCRIPTION:

R0149   ALTDSPLY REVERSES THE DSPLYALT BIT OF RCSFLAGS EACH TIME IT IS CALLED, WHICH IS PRESUMABLY EVERY 100 MS.
R0151   IF THE REVERSED BIT IS ONE, NEEDLER IS CALLED TO DISPLAY ATTITUDE ERRORS.  IF THE BIT IS ZERO, THE ATTITUDE ERR-
R0153   ORS ARE CALCULATED AS 1) ESTIMATED RATES (FOLLOWING) IF NEED2FLG = 1, OTHERWISE AS 2) DAP FOLLOWING ERRORS FOR
R01541  NEEDLFLG = 0 AND 3) TOTAL ATTITUDE ERRORS FOR NEEDLFLG = 1.

R0155   WARNING:  ALTDSPLY MAY ONLY BE CALLED WITH INTERRUPT INHIBITED.

R0156   WARNING:  EBANK MUST BE SET TO 6 WHEN USING THIS ROUTINE.

R0157   INPUT:  RCSFLAGS AND 1) IF NEEDLFLG=0, INPUT PERROR,QERROR,RERROR.
R0158                        2) IF NEEDLFLG=1, INPUT CPHI,CTHETA,CPSI,CDUX,CDUY,CDUZ,M11,M21,M31,M22,M32. (GPMATRIX)

R01591                 3) IF NEED2FLG = 1, INPUT OMEGAP, OMEGAQ, AND OMEGAR.

R0160   OUTPUTS:  RCSFLAGS WITH DSPLYALT REVERSED,AK,AK1,AK2,+ NEEDLER OUTPUTS.

R0161   ENTRY:   TCF    ALTDSPLY

R0162   EXIT:    TCF    CHEKMORE

R0163   ALARM OR ABORT EXITS:  NONE

R0164   SUBPROGRAMS CALLED: NEEDLER, OVERSUB2

R0165   DEBRIS:  A,L,AND NEEDLER DEBRIS.

 0166   REF  12  LAST 1404   20,2227   3 1262 0  ALTDSPLY CA      RCSFLAGS        INVERT THE DISPLAY ALTERNATION BIT.
 0167   REF 269  LAST 1400   20,2230  54 001 1            TS      L
 0168   REF   1              20,2231   3 4750 1           CA      DSPLYALT
 0169                        20,2232   0 0006 1           EXTEND
 0170   REF  18  LAST 1383   20,2233  06 001 0            RXOR    LCHAN
 0171   REF  13  LAST 1406   20,2234  55 1262 1           TS      RCSFLAGS

 0172   REF   2  LAST 1406   20,2235   7 4750 0           MASK    DSPLYALT
 0173   REF 479  LAST 1403   20,2236  10 000 0            CCS     A               IS ALTERNATION FLAG ZERO?
 0174   REF   1                20,2237  1 2336 1            TCF     NEEDLER

 01741  REF  31  LAST 1368     20,2240  4 0074 0            CS      FLAGWRD0       CHECK FOR RATE DISPLAY TO ERROR NEEDLES
 01742  REF   1                20,2241  7 4735 0            MASK    NEED2BIT       VIA EXTENDED VERB 60
 01743                         20,2242  0 0006 1            EXTEND
 01744  REF   1                20,2243  1 2257 1            BZF     DISPRATE

 0175   REF  32  LAST 1407     20,2244  30 074 1            CAE     FLAGWRD0       NEEDLFLG WILL INDICATE TOTAL OR DAP AT-
 0176   REF   1                20,2245  7 4750 0            MASK    NEEDLBIT       TITUDE ERROR DISPLAY REQUEST.
 0177   REF 480  LAST 1406     20,2246  10 000 0            CCS     A
 0178   REF   1                20,2247  1 2266 0            TCF     DSPLYTOT       TOTAL ERROR IS NEEDED IN AK,AK +1,AK +2

 0179   REF   2  LAST  133     20,2250  4 1450 0            CS      QERROR         YES. DISPLAY ATT ERRORS ON THE 8-BALL.
 0180   REF   4  LAST 1405     20,2251  55'761 1            TS      AK +1          ERROR COMPLEMENTS ARE INPUT TO NEEDLER.
 0181   REF   2  LAST  133     20,2252  4 1452 1            CS      RERROR
 01815  REF   5  LAST 1407     20,2253  55'762 1            TS      AK +2
 0182   REF   2  LAST  156     20,2254  4 1464 1            CS      PERROR
 0183   REF   6  LAST 1407     20,2255  57'760 1            XCH     AK

 0184   REF   1                20,2256  1 2456 0            TCF     RETNMORE       DISPLAY THESE THE NEXT TIME THROUGH

 01841  REF   7  LAST 1403     20,2257  4 1422 0  DISPRATE  CS      OMEGAQ         LOAD ESTIMATED RATES (FOLLOWING)
 01842  REF   7  LAST 1407     20,2260  55'761 1            TS      AK +1
 01843  REF   2  LAST 1403     20,2261  4 1423 1            CS      OMEGAR
 01844  REF   8  LAST 1407     20,2262  55'762 1            TS      AK +2
 01845  REF   9  LAST 1405     20,2263  4 1421 0            CS      OMEGAP
 01846  REF   9  LAST 1407     20,2264  57'760 1            XCH     AK
 01847  REF   2  LAST 1407     20,2265  1 2456 0            TCF     RETNMORE

R0185   CALCULATE GIMBAL ANGLE TOTAL ERRORS, RESOLVE INTO PILOT AXES, STORE TOTAL ERRORS FOR NEEDLER.  Q-AXIS FIRST.

 0187                          20,2266  0 0006 1  DSPLYTOT  EXTEND
 0188   REF  70  LAST 1405     20,2267  22 061 0            QXCH    ITEMP1         SAVE Q FOR CHEKBITS RETURN.

 0189   REF   3  LAST  482     20,2270  3 0322 1            CA      CTHETA         DESIRED ATTITUDE, Y-AXIS, 2'S COMP.
 0190                          20,2271  0 0006 1            EXTEND                 SUBTRACT CURRENT ATTITUDE.
 0191   REF  11  LAST 1400     20,2272  20 033 0            MSU     CDUY           DIFFERENCE SCALED AT PI, 1'S COMP.
 0192   REF  10  LAST 1407     20,2273  55'760 0            TS      AK             SAVE FOR R-ERROR CALCULATION.
 0193                          20,2274  0 0006 1            EXTEND
 0194   REF   2  LAST  191     20,2275  7 1415 1            MP      M21            (CTHETA-CDUY)*M21 SCALED AT PI RADIANS.
 0195   REF  11  LAST 1407     20,2276  57'761 0            XCH     AK +1          STORE FIRST TERM OF Q ERROR.
 0196   REF   5  LAST  523     20,2277  3 0323 0            CA      CPSI           DESIRED ATTITUDE,Z-AXIS, 2'S COMP.
 0197                          20,2300  0 0006 1            EXTEND                 SUBTRACT CURRENT ATTITUDE.
 0198   REF  15  LAST 1404     20,2301  20 034 1            MSU     CDUZ           DIFFERENCE SCALED AT PI, 1'S COMP.
 0199   REF  12  LAST 1407     20,2302  55'762 1            TS      AK +2          SAVE Z-AXIS TERM FOR R ERROR CALCULATION
 0200                          20,2303  0 0006 1            EXTEND
 0201   REF   5  LAST  896     20,2304  7 1417 0            MP      M22            (CPSI-CDUZ)*M22, SCALED AT PI RADIANS.
 0202   REF  13  LAST 1407     20,2305  6 1761 0            AD      AK +1          Q ERROR COMPLETE         , AT PI RAD.
 0203   REF   1                20,2306  0 2451 0            TC      OVERSUB2       PIN NEEDLES IN CASE OF OVERFLOW.
 0204   REF  14  LAST 1407     20,2307  55'761 1            TS      AK +1
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RD205    R ERROR CALCULATION NEXT.

 0206    REF  15  LAST 1407    20,2310  3 1760 1            CA      AK                    Y-AXIS DIFFERENCE STORED BY Q-AXIS CALC.
 0207                          20,2311  0 0006 1            EXTEND
 0208    REF   2  LAST  191    20,2312  7 1416 1            MP      M31                   (CTHETA-CDUY)*M31, SCALED AT PI RADIANS.
 0209    REF  16  LAST 1408    20,2313  57'762 0            XCH     AK +2                 FIRST TERM OF R ERROR.
A0210                                                                                     Z-AXIS DIFFERENCE, STORED BY A CALC. IS
 0211                          20,2314  0 0006 1            EXTEND                        RECOVERED BY THE EXCHANGE.
 0212    REF   3  LAST  896    20,2315  7 1420 1            MP      M32                   (CPSI-CDUZ)*M32, SCALED AT PI RADIANS.
 0213    REF  17  LAST 1408    20,2316  6 1762 0            AD      AK +2                 R ERROR COMPLETE          , AT PI RAD.
 0214    REF   2  LAST 1407    20,2317  0 2451 0            TC      OVERSU82              PIN NEEDLES IN CASE OF OVERFLOW.
 0215    REF  18  LAST 1408    20,2320  55'762 1            TS      AK +2

RD216    NOW CALCULATE P ERROR.  (NOTE THAT M13 = 1, SCALED AT 1, SO THE MULTIPLICATION IS BY-PASSED.)

 0218    REF  19  LAST 1408    20,2321  3 1760 1            CA      AK                    Y-AXIS DIFFERENCE STORED BY Q AXIS CALC.
 0219                          20,2322  0 0006 1            EXTEND
 0220    REF   7  LAST  190    20,2323  7 1414 0            MP      M11                   (CTHETA-CDUY)*M11 SCALED AT PI RADIANS.
 0221    REF  20  LAST 1408    20,2324  57'760 1            XCH     AK                    FIRST TERM OF P ERROR IN AK, AT PI RAD.
 0222    REF  11  LAST  908    20,2325  30 321 1            CAE     CPHI                  DESIRED ATTITUDE, X-AXIS, 2'S COMP.
 0223                          20,2326  0 0006 1            EXTEND                        SUBTRACT CURRENT X ATTITUDE.
 0224    REF  23  LAST 1404    20,2327  20 032 1            MSU     CDUX                  X-AXIS DIFFERENCE, 1'S COMP, AT PI RAD.

RD225    M13 = 1, SO BYPASS THE MULTIPLICATION.
RD226             EXTEND
R0227             MP      M13                (CPHI-CDUX)*M13 SCALED AT PI RADIANS.

 0228    REF  21  LAST 1408    20,2330  6 1760 1            AD      AK                    P ERROR COMPLETE        , SCALED AT PI RAD
 0229    REF   3  LAST 1408    20,2331  0 2451 0            TC      OVERSU82              PIN NEEDLES IN CASE OF OVERFLOW.
 0230    REF  22  LAST 1408    20,2332  55'760 0            TS      AK

 0231                          20,2333  0 0006 1            EXTEND
 0232    REF  71  LAST 1407    20,2334  22 061 0            QXCH    ITEMP1                RESTORE Q FOR CHEKBITS RETURN.

 0233    REF   3  LAST 1407    20,2335  1 2456 0            TCF     RETNMORE              DISPLAY THESE THE NEXT TIME THROUGH
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P0234    FDAI ATTITUDE ERROR DISPLAY SUBROUTINE

R0235    PROGRAM DESCRIPTION:    D. KEENE   5/24/67

R0236    MOD 1 BY CRAIG WORK, 12 DEC 67

R0237    MOD 2 BY CRAIG WORK, 6 APRIL 68 CONVERTS ATTITUDE ERROR DISPLAY SCALING FROM 16 7/8 DEG. TO 42 3/16 DEGREES.

R0239        THIS SUBROUTINE IS USED TO DISPLAY ATTITUDE ERRORS ON THE FDAI VIA THE DIGITAL TO ANALOG CONVERTERS (DACS)
R0241    IN THE CDUS.  CARE IS TAKEN TO METER OUT THE APPROPRIATE NUMBER OF PULSES TO THE IMU ERROR COUNTERS AND PREVENT
R0243    OVERFLOW, TO CONTROL THE RELAY SEQUENCING, AND TO AVOID INTERFERENCE WITH THE COARSE ALIGN LOOP WHICH ALSO USES
R0245    THE DACS.


R0246    CALLING SEQUENCE:

R0247        DURING THE INITIALIZATION SECTION OF THE USER'S PROGRAM, BIT3 OF RCSFLAGS SHOULD BE SET TO INITIATE THE
R0249    TURN-ON SEQUENCE WITHIN THE NEEDLES PROGRAM:

R0250              CS      RCSFLAGS          IN EBANK6
R0251              MASK    BIT3
R0252              ADS     RCSFLAGS

R0253    THEREAFTER, THE ATTITUDE ERRORS GENERATED BY THE USER SHOULD BE TRANSFERED TO THE FOLLOWING LOCATIONS IN EBANK6:

R0255              AK      SCALED 180 DEGREES  NOTE: THESE LOCATIONS ARE SUBJECT
R0256              AK1     SCALED 180 DEGREES         TO CHANGE
R0257              AK2     SCALED 180 DEGREES

R0258    FULL SCALED DEFLECTION OF THE NEEDLES CORRESPONDS TO 5 1/16 DEGREES, WHILE 384 BITS IN THE IMU ERROR COUNTER
R0260    CORRESPONDS TO 42 3/16 DEGREES.  (DAC MAXIMUM CAPACITY IS 384 BITS.) 46 BITS EFFECTIVELY PIN THE NEEDLES.

R02611   FOR RATE DISPLAY, FULL SCALE NEEDLE DEFLECTION IS 1 17/64 DEG/SEC, AND A FULL COUNTER IS ABOUT 10.5 DEG/SEC.
R0262    A CALL TO NEEDLER WILL THEN UPDATE THE DISPLAY:

R0263              INHINT
R0264              TC      IBNKCALL          NOTE: EBANK SHOULD BE SET TO E6
R0265              CADR    NEEDLER
R0266              RELINT

R0267        THIS PROCESS SHOULD BE REPEATED EACH TIME THE ERRORS ARE UPDATED.  AT LEAST 3 PASSES THRU THE PROGRAM ARE
R0269    REQUIRED BEFORE ANYTHING IS ACTUALLY DISPLAYED ON THE ERROR METERS.
R0270    NOTE: EACH CALL TO NEEDLER MUST BE SEPARATED BY AT LEAST 50MS TO ASSURE PROPER RELAY SEQUENCING.

R0272    ERASABLE USED:
R0273                          AK          CDUXCMD
R0274                          AK1         CDUYCMD
R0275                          AK2         CDUZCMD
R0276                          EDRIVEX     A,L,Q
R0277                          EDRIVEY     T5TEMP
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L        DAPIDLER PROGRAM                                                                   USER'S PAGE NO.  9      E6 S4

R0278                             EDRIVEZ    CINCX

R0279    SWITCHES:                RCSFLAGS   BITS 3,2

R0280    I/C CHANNELS:            CHAN12     BIT 4 (COARSE ALIGN - READ ONLY)
R0281                             CHAN12     BIT 6 (IMU ERROR COUNTER ENABLE)
R0282                             CHAN14     BIT 13,14,15 (DAC ACTIVITY)


R0283    SIGN CONVENTIONS      AK = THETAD - THETA
R0284              WHERE       THETAD = COMMAND ANGLE
R0285                          THETA  = PRESENT ANGLE


 0286    REF  14  LAST 1406   20,2336  3 1262 0  NEEDLER  CA      RCSFLAGS
 0287    REF  24  LAST 1362   20,2337  7 6245 0           MASK    SIX
 0288                         20,2340  0 0006 1           EXTEND
 0289    REF   1              20,2341  1 2376 0           BZF     NEEDLES3
 0290    REF  40  LAST 1402   20,2342  7 4751 1           MASK    BIT3
 0291                         20,2343  0 0006 1           EXTEND
 0292    REF   1              20,2344  1 2367 0           BZF     NEEDLER2          BIT3 = 0, BIT2 = 1

 0293    REF  63  LAST 1402   20,2345  4 4746 1           CS      BIT6              FIRST PASS BIT3 = 1
 0294                         20,2346  0 0006 1           EXTEND                    DISABLE IMU ERROR COUNTER TO ZERO DACS
 0295    REF  67  LAST 1405   20,2347  03 012 1           WAND    CHAN12            MUST WAIT AT LEAST 60 MS BEFORE
 0296    REF 277  LAST 1405   20,2350  4 4755 0  NEEDLE11 CS      ZERO              ENABLING COUNTERS.
 0297    REF  23  LAST 1408   20,2351  55'760 0           TS      AK                ZERO THE INPUTS ON FIRST PASS
 0298    REF   1              20,2352  55'761 1           TS      AK1
 0299    REF   1              20,2353  55'762 1           TS      AK2
 0300    REF   3  LAST  138   20,2354  55'763 0           TS      EDRIVEX           ZERO THE DISPLAY REGISTERS
 0301    REF   1              20,2355  55'764 1           TS      EDRIVEY
 0302    REF   1              20,2356  55'765 0           TS      EDRIVEZ
 0303    REF   4  LAST 1305   20,2357  54 050 0           TS      CDUXCMD           ZERO THE OUT COUNTERS
 0304    REF   2  LAST  176   20,2360  54 051 1           TS      CDUYCMD
 0305    REF   2  LAST  177   20,2361  54 052 1           TS      CDUZCMD
 0306    REF  25  LAST 1410   20,2362  4 6245 0           CS      SIX               RESET RCSFLAGS FOR PASS2
 0307    REF  15  LAST 1410   20,2363  7 1262 1           MASK    RCSFLAGS
 0308    REF  52  LAST 1386   20,2364  6 4752 0           AD      BIT2
 0309    REF  16  LAST 1410   20,2365  55'262 1           TS      RCSFLAGS
 0310    REF   4  LAST 1408   20,2366  1 2456 0           TCF     RETNMORE

 0311    REF  64  LAST 1410   20,2367  3 4746 0  NEEDLER2 CAF     BIT6              ENABLE IMU ERROR COUNTERS
 0312                         20,2370  0 0006 1           EXTEND
 0313    REF  68  LAST 1410   20,2371  05 012 1           WOR     CHAN12
 0314    REF  26  LAST 1410   20,2372  4 6245 0           CS      SIX               RESET RCSFLAGS TO DISPLAY ATTITUDE
 0315    REF  17  LAST 1410   20,2373  7 1262 1           MASK    RCSFLAGS          ERRORS    WAIT ATLEAST 4 MS FOR
 0316    REF  18  LAST 1410   20,2374  55'262 1           TS      RCSFLAGS          RELAY CLOSURE
 0317    REF   5  LAST 1410   20,2375  1 2456 0           TCF     RETNMORE

 0318    REF  65  LAST 1410   20,2376  3 4746 0  NEEDLES3 CAF     BIT6              CHECK TO SEE IF IMU ERROR COUNTER
 0319                           20,2377   0 0006 1           EXTEND                IS ENABLED
 0320   REF  69  LAST 1410      20,2400  02 012 0           RAND     CHAN12
 0321   REF 481  LAST 1407      20,2401  10 000 0           CCS      A             IF NOT, RE-INITIALIZE NEEDLER.
 0322   REF   1                 20,2402   1 2407 1           TCF      NEEDLER

 0323   REF  19  LAST 1410      20,2403   4 1262 1           CS       RCSFLAGS      SET UP INITIALIZATION FLAG IN RCSFLAGS.
 0324   REF  41  LAST 1410      20,2404   7 4751 1           MASK     BIT3
 0325   REF  20  LAST 1411      20,2405  27 262 1           ADS      RCSFLAGS
 0326   REF   6  LAST 1410      20,2406   1 2456 0           TCF      RETNMORE

 0327   REF  93  LAST 1404      20,2407   3 4752 0  NEEDLER  CAF      TWO
 0328   REF   1                 20,2410  54 063 0  DACLOOP  TS       DINDX
 0329   REF   1                 20,2411   4 2450 0           CS       ONETENTH      RESCALE INPUTS TO + OR - 1800 DEGREES.
 0330                           20,2412   0 0006 1           EXTEND
 0331   REF   2  LAST 1411      20,2413   5 0063 1           INDEX    DINDX
 0332   REF  24  LAST 1410      20,2414   7 1760 0           MP       AK
 0333   REF 270  LAST 1406      20,2415  54 001 1           TS       L
 0334   REF 482  LAST 1411      20,2416  10 000 0           CCS      A
 0335   REF   1                 20,2417   3 2446 0           CA       DACLIMIT
 0336                           20,2420   1 2422 0           TCF      +2
 0337   REF   2  LAST 1411      20,2421   4 2446 1           CS       DACLIMIT
 0338   REF 271  LAST 1411      20,2422   6 0001 0           AD       L
 0339   REF   1                 20,2423  54 061 1           TS       T5TEMP        OVFLO CHK
 0340                           20,2424   1 2430 0           TCF      +4
 0341   REF 483  LAST 1411      20,2425  50 000 1           INDEX    A             ON OVERFLOW LIMIT OUTPUT TO +-384
 0342   REF   3  LAST 1411      20,2426   3 2446 0           CAF      DACLIMIT
 0343   REF 272  LAST 1411      20,2427  54 001 1           TS       L
 0344   REF   3  LAST 1411      20,2430  50 063 1           INDEX    DINDX
 0345   REF   4  LAST 1410      20,2431   4 1763 0           CS       EDRIVEX       CURRENT VALUE OF DAC
 0346   REF 273  LAST 1411      20,2432   6 0001 0           AD       L
 0347   REF   4  LAST 1411      20,2433  50 063 1           INDEX    DINDX
 0348   REF   5  LAST 1410      20,2434  26 050 0           ADS      CDUXCMD
 0349   REF   5  LAST 1411      20,2435  50 063 1           INDEX    DINDX
 0350   REF   5  LAST 1411      20,2436  23 763 1           LXCH     EDRIVEX
 0351   REF   6  LAST 1411      20,2437  10 063 0           CCS      DINDX
 0352   REF   1                 20,2440   1 2410 1           TCF      DACLOOP
 0353   REF   5  LAST 1364      20,2441   3 7743 0           CAF      13,14,15
 0354                           20,2442   0 0006 1           EXTEND
 0355   REF  23  LAST 1318      20,2443  05 014 1           WOR      CHAN14        SET DAC ACTIVITY BITS
 0356   REF   7  LAST 1411      20,2444   1 2456 0           TCF      RETNMORE

 0357                           20,2445   77177 0           DEC      -384
 0358                           20,2446   37200 1  DACLIMIT DEC      16000
 0359                           20,2447   00600 1           DEC      384

 0360                           20,2450   03146 1  ONETENTH OCT      03146         DECIMAL  +0.1, SCALED AT 1.
 0361   REF  56  LAST 1358         4750            DSPLYALT EQUALS   BIT4          100 MS ALTERNATION BIT IN RCSFLAGS


 0362                           20,2451  54 007 1  OVERSUB2 TS       7             RETURNS  A  UNCHANGED  OR LIMITED TO
 0363    REF 397  LAST 1400    20,2452  0 0002 0             TC       Q                 POSMAX OR NEGMAX IF A HAS OVERFLOW
 0364    REF 484  LAST 1411    20,2453  50 000 1             INDEX    A
 0365    REF   7  LAST 1391    20,2454  4 4734 1             CS       LIMITS            DUPLICATE CODING IN  BANK 16
 0366    REF 398  LAST 1412    20,2455  0 0002 0             TC       Q


 0367                          20,2456  0 0006 1  RETNMORE EXTEND                       RETURN TO CHEKMORE
 0368    REF   1               20,2457  3 2462 0             DCA      MORECADR
 0369                          20,2460  52 006 0             DTCB

 0370    REF  17  LAST 1405    E6,1536                       EBANK=   AOSQ
 0371    REF   1               20,2461   02016 1  MORECADR 2CADR    CHEKMORE
 0371    REF   1               20,2462   34106 1
 0001                            16,2213                                  BANK     16
 0002   REF    2  LAST 1402      16,2000                                  SETLOC  DAPS1
 0003                            16,2213                                  BANK

 0004   REF    3  LAST 1407      E6,1464                                  EBANK=  PERROR
 0005   REF    1                                                          COUNT*  $$/DAPP

R0006   THE FOLLOWING T5RUPT ENTRY BEGINS THE PROGRAM WHICH CONTROLS THE P-AXIS ACTION OF THE LEM USING THE RCS JETS.
R0008   THE NOMINAL TIME BETWEEN THE P-AXIS RUPTS IS 100 MS IN ALL NON-IDLING MODES OF THE DAP.

 0010   REF    2  LAST 1404      16,2213  3 7732 0  PAXIS       CA      MS100
 0011   REF    5  LAST 1404      16,2214  26 030 0              ADS     TIME5              *** NECESSARY IN ORDER TO ALLOW SYN-
A00115                                                                                     CHRONIZATION WITH OTHER INTERRUPTS ***

 0012   REF   13  LAST 1403      16,2215  22 016 0              LXCH    BANKRUPT           INTERRUPT LEAD IN (CONTINUED)
 0013                            16,2216  0 0006 1              EXTEND
 0014   REF   12  LAST 1403      16,2217  22 012 1              QXCH    QRUPT

R0015   CHECK IF DAP PASS IS PERMISSIBLE

 0016   REF    2  LAST 1404      16,2220  11'756 0              CCS     DAPZRUPT           IF DAPZRUPT POSITIVE, DAP (JASK) IS
 0017   REF    3  LAST 1352      16,2221  0 5624 1              TC      BAILOUT               STILL IN PROGRESS AND A RESTART IS
 0018                            16,2222   32000 0              OCT     32000               CALLED FOR.  IT IS NEVER ZERO

 0019   REF    2  LAST 1403      16,2223  0 2000 0              TC      CHEKBITS           RETURN IS TC I+1 IF DAP SHOULD STAY ON.

 00191  REF   24  LAST 1408      16,2224  3 0032 0              CA      CDUX               READ AND STORE CDU'S
 00192  REF    2  LAST  132      16,2225  55'747 0              TS      DAPTREG4
 00193  REF   12  LAST 1407      16,2226  3 0033 1              CA      CDUY
 00194  REF    2  LAST  132      16,2227  55'750 0              TS      DAPTREG5
 00195  REF   16  LAST 1407      16,2230  3 0034 0              CA      CDUZ
 00196  REF    2  LAST  134      16,2231  55'751 1              TS      DAPTREG6
R0020   ***** KALCMANU-DAP AND "RATE-HOLD"-DAP INTERFACE *****

R0021   THE FOLLOWING SECTION IS EXECUTED EVERY 100 MS (10 TIMES A SECOND) WITHIN THE P-AXIS REACTION CONTROL SYSTEM
R0023   AUTOPILOT (WHENEVER THE DAP IS IN OPERATION).

 0024   REF   18  LAST 1400      16,2232  3 1634 1              CA      CDUXD
 0025                            16,2233  0 0006 1              EXTEND
 0026   REF    6  LAST 1400      16,2234  21'637 0              MSU     DELCDUX
 0027   REF    1                 16,2235  0 2256 1              TC      1STOTWOS
 0028   REF   19  LAST 1413      16,2236  55'634 0              TS      CDUXD
 0029   REF    5  LAST 1400      16,2237  3 1635 0              CA      CDUYD
 0030                            16,2240  0 0006 1              EXTEND
 0031   REF    3  LAST 1400      16,2241  21'640 0              MSU     DELCDUY
 0032   REF    2  LAST 1413      16,2242  0 2256 1              TC      1STOTWOS
 0033   REF    6  LAST 1413      16,2243  55'635 1              TS      CDUYD
 0034   REF    5  LAST 1400      16,2244  3 1636 0              CA      CDUZD
 0035                            16,2245  0 0006 1              EXTEND
 0036   REF    3  LAST 1400      16,2246  21'641 1              MSU     DELCDUZ
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L        P-AXIS RCS AUTOPILOT                                                          USER'S PAGE NO.   2      E6 S4

 0037    REF   3  LAST 1413    16,2247  0 2256 1           TC      1STOTWCS
 0038    REF   6  LAST 1413    16,2250  55'636 1           TS      COUZO
 00381                         16,2251  0 0006 1           EXTEND                 DIMINISH MANUAL CONTROL DIRECT RATE
 00382   REF   1               16,2252  27'445 1           DIM     TCP            TIME COUNTERS.
 00383                         16,2253  0 0006 1           EXTEND
 00384   REF   1               16,2254  27'457 1           DIM     TCQR
A0039                                                 RATELOOP COMPUTES JETRATEQ, JETRATER, AND 1JACC*NO. PJETS IN ITEMP1.
A0040                                                   RETURNS TO BACKP.

A0041                                                   JETRATE = 1JACC*NO.PJETS*TJP  (NOTE TJ IS THE TIME FIRED DURING CSP)

A0042                                                   JETRATEQ= 1JACCQ(TJU*NO.UJETS - TJV*NO.VJETS)

A0043                                                   JETRATER= 1JACCR(TJU*NO.UJETS + TJV*NO.VJETS)

 0044    REF   1               16,2255  1 2647 1           TCF     PAXFILT        PROCEEDS TO RATELOOP AFTER SUPERJOB
 0045    REF 485  LAST 1412    16,2256  10 000 0  1STOTWCS CCS     A
 0046    REF 155  LAST 1393    16,2257  6 4753 1           AD      ONE
 0047    REF 399  LAST 1412    16,2260  0 0002 0           TC      Q
 0048    REF 486  LAST 1414    16,2261  4 0000 0           CS      A
 0049    REF 400  LAST 1414    16,2262  0 0002 0           TC      Q
 0050                          16,2263  0 0006 1  SUBDIVDE EXTEND                 OVERFLOW PROTECTION ROUTINE TO GIVE
 0051    REF   3  LAST  134    16,2264  7 1740 1           MP      DAPTEMP3         POSMAX OR NEGMAX IF THE DIVIDE WOULD
 0052    REF   3  LAST  131    16,2265  21'427 0           DAS     OMEGAU           OVERFLOW

 0053                          16,2266  0 0006 1  +3       EXTEND
 00531   REF   4  LAST 1414    16,2267  3 1427 1           DCA     OMEGAU
 00532   REF   2  LAST  132    16,2270  53'743 1           DXCH    DAPTEMP5
 00533   REF   5  LAST 1414    16,2271  11'426 1           CCS     OMEGAU
 0054                          16,2272  1 2274 0           TCF     +2
 0055    REF   1               16,2273  1 2304 0           TCF     DIVIDER
 0056    REF   1               16,2274  6 2315 1           AD      -OCT630
 0057                          16,2275  0 0006 1           EXTEND
 0058    REF   2  LAST 1414    16,2276  6 2304 1           BZMF    DIVIDER

 0059    REF   6  LAST 1414    16,2277  11'426 1           CCS     OMEGAU
 0060    REF  38  LAST 1404    16,2300  3 4733 1           CA      POSMAX           45 DEG/SEC
 0061    REF 401  LAST 1414    16,2301  0 0002 0           TC      Q
 0062    REF  39  LAST 1414    16,2302  4 4733 0           CS      POSMAX
 0063    REF 402  LAST 1414    16,2303  0 0002 0           TC      Q

 0064    REF   7  LAST 1414    16,2304  53'427 0  DIVIDER  DXCH    OMEGAU
 0065                          16,2305  0 0006 1           EXTEND
 0066    REF   3  LAST 1413    16,2306  11'747 0           DV      DAPTREG4
 0067    REF 403  LAST 1414    16,2307  0 0002 0           TC      Q

 0068                          16,2310  54 007 1  OVERSUB  TS      7              RETURNS A UNCHANGED OR LIMITED TO
 0069    REF 404  LAST 1414    16,2311  0 0002 0           TC      Q                POSMAX OR NEGMAX IF A HAS OVERFLOW
 0070    REF 487  LAST 1414    16,2312  50 000 1           INDEX   A
 0071    REF  49  LAST 1396    16,2313  4 4734 1           CS      BIT15 -1
 0072   REF 405  LAST 1414   16,2314  0 0002 0            TC      Q

 0073                        16,2315   77147 0  -OCT630   OCT     77147

 0074   REF  19  LAST  138   16,2316  3 1736 1  BACKP     CA      DAPTEMP1
 0075                        16,2317  0 0006 1            EXTEND
 0076   REF   6  LAST  913   16,2320  7 1530 1            MP      1JACC
 0077   REF   3  LAST  133   16,2321  55'744 0            TS      JETRATE
A0078                                           BEGINNING OF THE RATE DERIVATION
A0079                                           OMEGAP,Q,R        BODY RATES SCALED AT PI/4
A0080                                           TRAPEP,Q,R        BODY ANGLE ERRORS FROM PREDICTED ANGLE (PI/40)
A0081                                           NP(QR)TRAPS       NUMBER OF TIMES ANGLE ERROR HAS BEEN ACCUMULATED
A0082                                           AOSQ(R)TERM       CHANGE IN RATE DUE TO OFFSET ACCELLERATION. (PI/4)
A0083                                           JETRATE,Q,R       CHANGE IN RATE DUE TO  JET   ACCELLERATION. (PI/4)
A0084                                           TRAPSIZE          NEGATIVE LIMIT OF MAGNITUDE OF TRAPEDP,ECT.
A0086                                           OMEGAU            DP-TEMPORARY STORAGE

A0087                                                   OMEGA = OMEGA + JETRATE + AOSTERM (+TRAPED/NTRAPS IF TRAPED BIG)

 0088   REF   4  LAST 1414   16,2322  31'747 1            CAE     DAPTREG4        CDUX IS STORED HERE
 0089   REF 274  LAST 1411   16,2323  54 0001 1           TS      L
 0090                        16,2324  0 0006 1            EXTEND
 0091   REF   4  LAST 1404   16,2325  21'440 1            MSU     OLDXFORP        SCALED AT PI
 0092   REF   5  LAST 1415   16,2326  23'440 0            LXCH    OLDXFORP
 0093   REF  20  LAST 1415   16,2327  55'736 0            TS      DAPTEMP1
 0094   REF   1              16,2330  3 3624 1            CA      1/40
 0095   REF   5  LAST 1415   16,2331  55'747 0            TS      DAPTREG4
 0096   REF   4  LAST 1415   16,2332  4 1744 0            CS      JETRATE
 0097                        16,2333  0 0006 1            EXTEND
 0098   REF  83  LAST 1394   16,2334  7 4736 0            MP      BIT14
 0099   REF   7  LAST 1403   16,2335  27'430 0            ADS     TRAPEDP
 0100   REF   1              16,2336  3 1745 0            CA      JETRATEQ
 0101   REF   4  LAST 1403   16,2337  6 1544 0            AD      AOSQTERM
 0102                        16,2340  0 0006 1            EXTEND
 0103   REF   1              16,2341  7 7741 0            MP      -BIT14
 0104   REF   2  LAST 1403   16,2342  27'431 1            ADS     TRAPEDQ
 0105   REF   1              16,2343  3 1746 0            CA      JETRATER
 0106   REF   3  LAST 1403   16,2344  6 1545 1            AD      AOSRTERM
 0107                        16,2345  0 0006 1            EXTEND
 0108   REF   2  LAST 1415   16,2346  7 7741 0            MP      -BIT14
 0109   REF   2  LAST 1403   16,2347  27'432 1            ADS     TRAPEDR

 0110   REF   3  LAST 1413   16,2350  3 1750 1            CA      DAPTREG5        CDUY IS STORED HERE
 0111   REF 275  LAST 1415   16,2351  54 0001 1           TS      L
 0112                        16,2352  0 0006 1            EXTEND
 0113   REF   1              16,2353  21'441 0            MSU     OLDYFORP        SCALED AT PI
 0114   REF   2  LAST 1415   16,2354  23'441 1            LXCH    OLDYFORP
 0115   REF   3  LAST  134   16,2355  55'737 1            TS      DAPTEMP2
 0116                        16,2356  0 0006 1            EXTEND
 0117   REF   8  LAST 1408   16,2357  7 1414 0            MP      M11             M11 SCALED AT 1
 0118    REF  21  LAST 1415   16,2360   6 1736 1          AD      DAPTEMP1
 0119    REF   8  LAST 1414   16,2361  53'427 0          DXCH    OMEGAU

 0120    REF   1              16,2362   0 2266 1          TC      SUBDIVDE +3      RETURNS WITH CDU-RATE AT PI/4

 0121                         16,2363   0 0006 1          EXTEND
 0122    REF  10  LAST 1407   16,2364  61'421 1          SU      OMEGAP
 0123    REF   8  LAST 1415   16,2365  27'430 0          ADS     TRAPEDP
 0124    REF   1              16,2366   0 2310 1          TC      OVERSUB
 0125    REF   9  LAST 1416   16,2367  55'430 0          TS      TRAPEDP
 012501                       16,2370   0 0006 1          EXTEND
 012502 REF    3  LAST 1414   16,2371   3 1743 0          DCA     DAPTEMP5
 012503 REF    3  LAST  131   16,2372  21'447 0          DAS     DXERROR
 012504 REF    1              16,2373   4 1454 1          CS      PLAST
 012505                       16,2374   0 0006 1          EXTEND
 012506 REF    2  LAST 1415   16,2375   7 3624 0          MP      1/40
 012507 REF    4  LAST 1416   16,2376  21'447 0          DAS     DXERROR          MANUAL MODE X-ATTITUDE ERROR (OP)
 0126    REF   3  LAST 1413   16,2377   3 1751 0          CA      DAPTEMP6         CDUZ IS STORED HERE
 0127    REF 276  LAST 1415   16,2400  54 001 1           TS      L
 0128                         16,2401   0 0006 1          EXTEND
 0129    REF   2  LAST 1404   16,2402  21'442 0          MSU     OLDZFORQ
 0130    REF   4  LAST 1414   16,2403  55'740 1          TS      DAPTEMP3
 0131    REF   3  LAST 1416   16,2404  23'442 1          LXCH    OLDZFORQ
 0132    REF   3  LAST 1407   16,2405   3 1415 0          CA      M21
 0133                         16,2406   0 0006 1          EXTEND
 0134    REF   4  LAST 1415   16,2407   7 1737 1          MP      DAPTEMP2
 0135    REF   9  LAST 1416   16,2410  53'427 0          DXCH    OMEGAU
 0136    REF   6  LAST 1407   16,2411   3 1417 1          CA      M22
 0137    REF   2  LAST 1416   16,2412   0 2263 1          TC      SUBDIVDE

 0138                         16,2413   0 0006 1          EXTEND
 0139    REF   8  LAST 1407   16,2414  61'422 1          SU      OMEGAQ
 0140    REF   3  LAST 1415   16,2415  27'431 1          ADS     TRAPEDQ
 0141    REF   2  LAST 1416   16,2416   0 2310 1          TC      OVERSUB
 0142    REF   4  LAST 1416   16,2417  55'431 1          TS      TRAPEDQ
 014201                       16,2420   0 0006 1          EXTEND
 014202 REF    4  LAST 1416   16,2421   3 1743 0          DCA     DAPTEMP5
 014203 REF    2  LAST  131   16,2422  21'451 1          DAS     DYERROR
 014204 REF    1              16,2423   4 1455 0          CS      QLAST
 014205                       16,2424   0 0006 1          EXTEND
 014206 REF    3  LAST 1416   16,2425   7 3624 0          MP      1/40
 014207 REF    3  LAST 1416   16,2426  21'451 1          DAS     DYERROR          MANUAL MODE Y-ATTITUDE ERROR (OP)
 0143    REF   3  LAST 1408   16,2427   3 1416 0          CA      M31
 0144                         16,2430   0 0006 1          EXTEND
 0145    REF   5  LAST 1416   16,2431   7 1737 1          MP      DAPTEMP2
 0146    REF  10  LAST 1416   16,2432  53'427 0          DXCH    OMEGAU
 0147    REF   4  LAST 1408   16,2433   3 1420 0          CA      M32

 0148    REF   3  LAST 1416   16,2434   0 2263 1          TC      SUBDIVDE
 0149                            16,2435  0 0006 1                EXTEND
 0150     REF    3  LAST 1407    16,2436 61'423 0                 SU       OMEGAR
 0151     REF    3  LAST 1415    16,2437 27'432 1                 ADS      TRAPEDR
 0152     REF    3  LAST 1416    16,2440  0 2310 1                TC       OVERSUB
 0153     REF    4  LAST 1417    16,2441 55'432 1                 TS       TRAPEDR        TRAPEDS HAVE ALL BEEN COMPUTED

 015301                          16,2442  0 0006 1                EXTEND
 015302   REF    5  LAST 1416    16,2443  3 1743 0                DCA      DAPTEMP5
 015303   REF    2  LAST  131    16,2444 21'453 0                 DAS      DZERROR
 015304   REF    1               16,2445  4 1456 0                CS       RLAST
 015305                          16,2446  0 0006 1                EXTEND
 015306   REF    4  LAST 1416    16,2447  7 3624 0                MP       1/40
 015307   REF    3  LAST 1417    16,2450 21'453 0                 DAS      DZERROR        MANUAL MODE Z-ATTITUDE ERROR (DP)
 01531    REF   36  LAST 1403    16,2451  3 0111 0                CA       DAPBOOLS       PICK UP PAD LOADED STATE ESTIMATOR GAINS
 01532    REF    7  LAST  904    16,2452  7 4737 1                MASK     CSMDOCKD
 01533                           16,2453  0 0006 1                EXTEND
 01534    REF    1               16,2454  1 2462 1                BZF      LMONLY
 01535                           16,2455  0 0006 1                EXTEND                     DOCKED
 01536    REF    2  LAST  215    16,2456  3 1405 1                DCA      DKOMEGAN
 01537    REF    6  LAST 1415    16,2457 53'750 0                 DXCH     DAPTREG4
 01538    REF    2  LAST  214    16,2460  3 1403 1                CA       DKTRAP
 015382                          16,2461  1 2466 0                TCF      +5
 015384                          16,2462  0 0006 1   LMONLY       EXTEND                     UNDOCKED
 015386   REF    2  LAST  215    16,2463  3 1410 0                DCA      LMOMEGAN
 015388   REF    7  LAST 1417    16,2464 53'750 0                 DXCH     DAPTREG4
 01539    REF    2  LAST  214    16,2465  3 1406 1                CA       LMTRAP
 015392   REF    4  LAST 1416    16,2466 55'751 1    +5           TS       DAPTREG6
 0154     REF   10  LAST 1416    16,2467 11'430 0                 CCS      TRAPEDP
 0155                            16,2470  1 2472 0                TCF      +2
 0156     REF    1               16,2471  1 2507 0                TCF      SMALPDIF
 0157     REF    5  LAST 1417    16,2472  6 1751 0                AD       DAPTREG6       TRAPSIZE > ABOUT 77(01 %-1.4DEG/SEC"
 0158                            16,2473  0 0006 1                EXTEND
 0159     REF    2  LAST 1417    16,2474  6 2507 1                BZMF     SMALPDIF
 0160                            16,2475 22 007 0                 ZL
 0161     REF   11  LAST 1417    16,2476 23'430 1                 LXCH     TRAPEDP
 0162     REF  278  LAST 1410    16,2477  3 4755 1                CA       ZERO
 0163                            16,2500  0 0006 1                EXTEND
 0164     REF    2  LAST 1404    16,2501 11'433 0                 DV       NPTRAPS
 0165     REF   11  LAST 1416    16,2502 27'421 0                 ADS      OMEGAP
 0166     REF    4  LAST 1417    16,2503  0 2310 1                TC       OVERSUB
 0167     REF   12  LAST 1417    16,2504 55'421 0                 TS       OMEGAP
 0168     REF    8  LAST 1417    16,2505  3 1747 1                CA       DAPTREG4       ABOUT 10 OR 0 FOR DOCKED OR UNDOCKED
 0169     REF    3  LAST 1417    16,2506 55'433 0                 TS       NPTRAPS
 0170     REF    4  LAST 1417    16,2507 25'433 1    SMALPDIF     INCR     NPTRAPS
 0171     REF    5  LAST 1415    16,2510  3 1744 1    P-RATE       CA       JETRATE
 0172     REF   13  LAST 1417    16,2511 27'421 0                 ADS      OMEGAP
 0173     REF    5  LAST 1417    16,2512  0 2310 1                TC       OVERSUB
 0174     REF   14  LAST 1417    16,2513 55'421 0                 TS       OMEGAP

 0175     REF    5  LAST 1416    16,2514 11'431 1                 CCS      TRAPEDQ
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L         P-AXIS RCS AUTOPILOT                                                                  USER'S PAGE NO.  6       E6 S4

 0176                             16,2515  1 2517 1             TCF     +2
 0177    REF    1                 16,2516  1 2544 1             TCF     Q-RATE
 0178    REF    6  LAST 1417      16,2517  6 1751 0             AD      DAPTREG6        TRAPSIZE > ABOUT 77001 %-1.4DEG/SEC"
 0179                             16,2520  0 0006 1             EXTEND
 0180    REF    2  LAST 1418      16,2521  6 2544 0             BZMF    Q-RATE
 0181                             16,2522  22 007 0             ZL
 0182    REF    6  LAST 1417      16,2523  23'431 0             LXCH    TRAPEDQ
 0183    REF  279  LAST 1417      16,2524  3 4755 1             CA      ZERO
 0184                             16,2525  0 0006 1             EXTEND
 0185    REF    2  LAST 1404      16,2526  11'434 1             DV      NQTRAPS
 0186    REF   22  LAST 1416      16,2527  55'736 0             TS      DAPTEMP1        SAVE FOR OFFSET ESTIMATE
 0189    REF    9  LAST 1416      16,2530  27'422 0             ADS     OMEGAQ
 0190    REF    6  LAST 1417      16,2531  0 2310 1             TC      OVERSUB
 0191    REF   10  LAST 1418      16,2532  55'422 0             TS      OMEGAQ
 0192    REF    9  LAST 1417      16,2533  3 1747 1             CA      DAPTREG4        ABOUT 10 OR 0 FOR DOCKED OR UNDOCKED
 0193    REF    3  LAST 1418      16,2534  57'434 0             XCH     NQTRAPS
 0194    REF    4  LAST 1415      16,2535  6 1750 1             AD      DAPTREG5        KAOS > ABOUT 600 %N/N_60"
 0195    REF   23  LAST 1418      16,2536  57'736 1             XCH     DAPTEMP1
 0196                             16,2537  0 0006 1             EXTEND
 0197    REF   23  LAST 1383      16,2540  7 4756 0             MP      FIVE
 0198                             16,2541  0 0006 1             EXTEND
 0199    REF   24  LAST 1418      16,2542  11'736 0             DV      DAPTEMP1
 0200    REF   18  LAST 1412      16,2543  27'536 1             ADS     AOSQ
 0201    REF    4  LAST 1418      16,2544  25'434 0  Q-RATE     INCR    NQTRAPS
 0202    REF    2  LAST 1415      16,2545  3 1745 0             CA      JETRATEQ
 0203    REF    5  LAST 1415      16,2546  6 1544 0             AD      AOSQTERM
 0204    REF   11  LAST 1418      16,2547  27'422 0             ADS     OMEGAQ
 0205    REF    7  LAST 1418      16,2550  0 2310 1             TC      OVERSUB
 0206    REF   12  LAST 1418      16,2551  55'422 0             TS      OMEGAQ

 0207    REF    5  LAST 1417      16,2552  11'432 1             CCS     TRAPEDR
 0208                             16,2553  1 2555 1             TCF     +2
 0209    REF    1                 16,2554  1 2602 0             TCF     P-RATE
 0210    REF    7  LAST 1418      16,2555  6 1751 0             AD      DAPTREG6        TRAPSIZE > ABOUT 77001 %-1.4DEG/SEC"
 0211                             16,2556  0 0006 1             EXTEND
 0212    REF    2  LAST 1418      16,2557  6 2602 1             BZMF    P-RATE
 0213                             16,2560  22 007 0             ZL
 0214    REF    6  LAST 1418      16,2561  23'432 0             LXCH    TRAPEDR
 0215    REF  280  LAST 1418      16,2562  3 4755 1             CA      ZERO
 0216                             16,2563  0 0006 1             EXTEND
 0217    REF    2  LAST 1404      16,2564  11'435 0             DV      NRTRAPS
 0218    REF    6  LAST 1416      16,2565  55'737 1             TS      DAPTEMP2        SAVE FOR OFFSET ESTIMATE
 0221    REF    4  LAST 1417      16,2566  27'423 1             ADS     OMEGAR
 0222    REF    8  LAST 1418      16,2567  0 2310 1             TC      OVERSUB
 0223    REF    5  LAST 1418      16,2570  55'423 1             TS      OMEGAR
 0224    REF   10  LAST 1418      16,2571  3 1747 1             CA      DAPTREG4        ABOUT 10 OR 0 FOR DOCKED OR UNDOCKED
 0225    REF    3  LAST 1418      16,2572  57'435 1             XCH     NRTRAPS
 0226    REF    5  LAST 1418      16,2573  6 1750 1             AD      DAPTREG5        KAOS > ABOUT 600 %N/N_60"
 0227    REF    7  LAST 1418      16,2574  57'737 0             XCH     DAPTEMP2
 0228                             16,2575  0 0006 1             EXTEND
 0229   REF  24  LAST 1418   16,2576  7 4756 0           MP       FIVE
 0230                        16,2577  0 0006 1           EXTEND
 0231   REF   8  LAST 1418   16,2600  11'737 1           DV       DAPTEMP2
 0232   REF   6  LAST 1403   16,2601  27'540 0           ADS      AOSR
 0233   REF   4  LAST 1418   16,2602  25'435 1  R-RATE   INCR     NRTRAPS
 0234   REF   2  LAST 1415   16,2603  3 1746 0           CA       JETRATER
 0235   REF   4  LAST 1415   16,2604  6 1545 1           AD       AOSRTERM
 0236   REF   6  LAST 1418   16,2605  27'423 1           ADS      OMEGAR
 0237   REF   9  LAST 1418   16,2606  0 2310 1           TC       OVERSUB
 0238   REF   7  LAST 1419   16,2607  55'423 1           TS       OMEGAR

A0239                                         END OF RATE DERIVATION

A0240                                          BEGIN OFFSET ESTIMATER

A0241                                            IN POWERED FLIGHT, AOSTASK WILL BE CALLED EVERY 2 SECONDS.

A0242                                            AOS = AOS + K*SUMRATE

 0243   REF  37  LAST 1417   16,2610  4 0111 1           CS       DAPBOOLS
 0244   REF   3  LAST 1401   16,2611  7 4744 0           MASK     DRIFTBIT
 0245   REF 488  LAST 1414   16,2612  10 000 0           CCS      A
 0246   REF   1              16,2613  1 2624 1           TCF      WORKTIME
 0247   REF   4  LAST 1403   16,2614  55'424 0           TS       ALPHAQ        ZERO THE OFFSET ACCELERATION VALUES.
 0248   REF   3  LAST 1403   16,2615  55'425 1           TS       ALPHAR
 0249   REF   6  LAST 1418   16,2616  55'544 1           TS       AOSQTERM
 0250   REF   5  LAST 1419   16,2617  55'545 0           TS       AOSRTERM
 0251   REF  19  LAST 1418   16,2620  55'536 1           TS       AOSQ
 0252   REF   7  LAST 1419   16,2621  55'540 0           TS       AOSR
 0253   REF   1              16,2622  1 2667 0           TCF      PRETIMCK
 0254                        16,2623   00074 1  KAOS     DEC      60
 0255   REF   2  LAST 1403   16,2624  3 1510 1  WORKTIME CA       QACCDOT
 0256                        16,2625  0 0006 1           EXTEND
 0257   REF   3  LAST 1009   16,2626  7 4766 0           MP       CALLCODE      OCTAL 00032 IS DECIMAL .1 AT 2(6).
 0258   REF  20  LAST 1419   16,2627  21'537 0           DAS      AOSQ
 0259   REF  21  LAST 1419   16,2630  3 1536 0           CA       AOSQ
 0260   REF   5  LAST 1419   16,2631  55'424 0           TS       ALPHAQ
 0261                        16,2632  0 0006 1           EXTEND
 0262   REF   1              16,2633  7 3622 0           MP       200MS          .2 AT 1
 0263   REF   7  LAST 1419   16,2634  55'544 1           TS       AOSQTERM
 0264   REF   2  LAST 1403   16,2635  3 1512 0           CA       RACCDOT
 0265                        16,2636  0 0006 1           EXTEND
 0266   REF   4  LAST 1419   16,2637  7 4766 0           MP       CALLCODE      OCTAL 00032 IS DECIMAL .1 AT 2(6).
 0267   REF   8  LAST 1419   16,2640  21'541 1           DAS      AOSR
 0268   REF   9  LAST 1419   16,2641  3 1540 1           CA       AOSR
 0269   REF   4  LAST 1419   16,2642  55'425 1           TS       ALPHAR
 0270                        16,2643  0 0006 1           EXTEND
 0271   REF   2  LAST 1419   16,2644  7 3622 0           MP       200MS          .2 AT 1
 0272   REF   6  LAST 1419   16,2645  55'545 0           TS       AOSRTERM
 02721  REF   2  LAST 1419   16,2646  1 2667 0           TCF      PRETIMCK
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R0273

 0274   REF   1              16,2647  3 4747 1  PAXFILT  CA      CALLGMBL         EXECUTE ACDT+C12, IF NEEDED.
 02742  REF  21  LAST 1411   16,2650  7 1262 1           MASK    RCSFLAGS
 02744  REF 489  LAST 1419   16,2651  10 000 0           CCS     A                CALLGMBL IS NOT BIT15, SO THIS TEST IS
 02746  REF   1              16,2652  0 3742 0           TC      ACDT+C12         VALID.

 0275   REF  12  LAST 1123   16,2653  52 011 0           DXCH    ARUPT
 0276   REF   4  LAST  138   16,2654  53'753 0           DXCH    DAPARUPT
 0277   REF   1              16,2655  3 2666 0           CA      SUPERJOB         SETTING UP THE SUPERJOB
 0278   REF   3  LAST 1375   16,2656  56 017 1           XCH     BRUPT
 0279   REF  13  LAST 1413   16,2657  22 012 1           LXCH    QRUPT
 0280   REF   1              16,2660  53'755 0           DXCH    DAPBQRPT
 0281   REF   1              16,2661  3 2665 0           CA      SUPERADR
 0282   REF   1              16,2662  52 016 1           DXCH    ZRUPT
 0283   REF   3  LAST 1413   16,2663  53'757 1           DXCH    DAPZRUPT
 0284   REF   1              16,2664  1 5275 0           TCF     NOQBRSM +1       RELINT (JUST IN CASE) AND RESUME, IN THE
A0285                                                                             FORM OF A JASK, AT SUPERJOB.

 0286   REF   2  LAST 1420   16,2665   02667 1  SUPERADR GENADR  SUPERJOB +1
R0287   COUNT DOWN GIMBAL DRIVE TIMERS AND TURN OFF DRIVES IF REQUIRED.

 0288   REF   1              16,2666  1 3645 1  SUPERJOB TCF     FATELOOR
 02881  REF   4  LAST 1404   16,2667  11'631 0  PRETIMCK CCS     QGIMTIMR
 0289   REF   1              16,2670  1 2710 1           TCF     DECQTIMR           POSITIVE- COUNTING DOWN
 0290   REF   1              16,2671  1 2714 0           TCF     TURNOFFQ           NEGATIVE- DRIVE SHOULD BE ENDED
 0291   REF   2  LAST 1404   16,2672  11'633 1  CHKRTIMR CCS     RGIMTIMR           NEGATIVE- INACTIVE
 0292   REF   1              16,2673  1 2712 0           TCF     DECRTIMR          (NEG ZERO- IMPOSSIBLE)
 0293   REF   1              16,2674  1 2724 0           TCF     TURNOFFR         REPEATED (ABOVE) FOR R AXIS.

 0294                        16,2675  0 0006 1           EXTEND                   DECREMENT DOCKED JET INHIBITION COUNTERS
 0295   REF   4  LAST 1404   16,2676  27'766 0           DIM     PJETCTR
 0296                        16,2677  0 0006 1           EXTEND
 0297   REF   2  LAST 1404   16,2700  27'767 1           DIM     UJETCTR
 0298                        16,2701  0 0006 1           EXTEND
 0299   REF   2  LAST 1404   16,2702  27'770 1           DIM     VJETCTR
 0300   REF  37  LAST 1404   16,2703  3 4740 0           CA      BIT12
 0301   REF  22  LAST 1420   16,2704  7 1262 1           MASK    RCSFLAGS
 0302                        16,2705  0 0006 1           EXTEND
 0303   REF   1              16,2706  1 2734 1           BZF     SKIPPAXS
 0304   REF   1              16,2707  0 2740 0           TC      CHKVISFZ
 0305   REF   5  LAST 1420   16,2710  55'631 0  DECQTIMR TS      QGIMTIMR         COUNT TIMERS DOWN TO POS ZERO.
 0306   REF   1              16,2711  1 2672 1           TCF     CHKRTIMR
 0307   REF   3  LAST 1420   16,2712  55'633 1  DECRTIMR TS      RGIMTIMR
 0308   REF   2  LAST 1420   16,2713  1 2675 0           TCF     CHKRTIMR +3

 0309   REF   4  LAST 1403   16,2714  55'501 0  TURNOFFQ TS      NEGUQ            HALT DRIVES.
 0310   REF   3  LAST 1419   16,2715  55'510 0           TS      QACCDOT
 0311   REF   1              16,2716  4 5007 1           CS      QGIMBITS
 0312                        16,2717  0 0006 1           EXTEND
 0313  REF  70  LAST 1411  16,2720  03 012 1            WAND    CHAN12 -
 0314  REF   8  LAST 1116  16,2721  3 4735 1            CAF     NEGMAX
 0315  REF   6  LAST 1420  16,2722  55'631 0            TS      QGIMTIMR
 0316  REF   3  LAST 1420  16,2723  1 2672 1            TCF     CHKRTIMR
 0317  REF   2  LAST 1403  16,2724  55'503 1  TURNOFFR  TS      NEGUR
 0318  REF   3  LAST 1419  16,2725  55'512 1            TS      RACCDOT
 0319  REF   1             16,2726  4 5020 1            CS      RGIMBITS
 0320                      16,2727  0 0006 1            EXTEND
 0321  REF  71  LAST 1421  16,2730  03 012 1            WAND    CHAN12 -
 0322  REF   9  LAST 1421  16,2731  3 4735 1            CAF     NEGMAX
 0323  REF   4  LAST 1420  16,2732  55'633 1            TS      RGIMTIMR
 0324  REF   4  LAST 1421  16,2733  1 2675 0            TCF     CHKRTIMR +3
 0325  REF  12  LAST 1295     5007            QGIMBITS  EQUALS  OCT1400          BITS 9 AND 10 (OF CHANNEL 12).
 0326  REF   4  LAST 1278     5020            RGIMBITS  EQUALS  PRIO6            BITS 11 AND 12 (OF CHANNEL 12).

 0327  REF  23  LAST 1420  16,2734  4 1262 1  SKIPPAXS  CS      RCSFLAGS
 0328  REF  38  LAST 1420  16,2735  7 4740 1            MASK    BIT12
 0329  REF  24  LAST 1421  16,2736  27'262 1            ADS     RCSFLAGS         BIT 12 SET TO 1.
 0330  REF   1             16,2737  1 3630 0            TCF     QRAXIS           GO TO QRAXIS OR TC GTS.

A0331                                         Y-Z TRANSLATION

A0332                                         INPUT:  BITS 9-12 OF CH31 (FROM TRANSLATION CONTROLER)

A0333                                         OUTPUT: NEXTP

A0334                                           NEXTP IS THE CHANNEL 6 CODE OF JETS FOR THE DESIRED TRANSLATION.
A0335                                           IF THERE ARE FAILURES IN THE DESIRED POLICY, THEN

A0336                                              (1) FOR DIAGONAL TRANS:  UNFAILED PAIR
A0337                                                                       ALARM (IF NO PAIR)

A0338                                              (2) FOR PRINCIPAL TRANS: TRY TO TACK WITH DIAGONAL PAIRS
A0339                                                                       ALARM (IF DIAGONAL PAIRS ARE FAILED)
 0340                      16,2740  0 0006 1  CHKVISFZ  EXTEND
 0341  REF   9  LAST 1402  16,2741  00 031 0            READ    CHAN31
 0342  REF 490  LAST 1420  16,2742  4 0000 0            CS      A
 0343  REF   1             16,2743  7 3617 0            MASK    07400OCT
 0344                      16,2744  0 0006 1            EXTEND
 0345  REF   1             16,2745  1 3014 0            BZF     TSNEXTP
 0346                      16,2746  0 0006 1            EXTEND
 0347  REF  43  LAST 1291  16,2747  7 4745 1            MP      BIT7
 0348  REF 491  LAST 1421  16,2750  50 000 1            INDEX   A
 0349  REF   1             16,2751  3 3576 0            CA      INDXYZ
 0350  REF   1             16,2752  55'743 1            TS      ROTINDEX
 0351  REF  27  LAST 1410  16,2753  3 6245 1  TRYLORV   CA      SIX
 0352  REF   1             16,2754  0 3555 1            TC      SELECTYZ
 0353  REF  28  LAST 1421  16,2755  4 6245 0            CS      SIX
 0354  REF   1             16,2756  6 1742 1            AD      NUMBERT
 0355                      16,2757  0 0006 1            EXTEND
 0356   REF   2  LAST 1421    16,2760  1 3013 1             BZF     TSNEXTP -1
 0357   REF  25  LAST 1419    16,2761  4 4756 0             CS      FIVE
 0358   REF   2  LAST 1421    16,2762  6 1743 0             AD      ROTINDEX
 0359                         16,2763  0 0006 1             EXTEND
 0360   REF   1               16,2764  6 3002 0             BZMF    ALTERYZ
 0361   REF   2  LAST 1421    16,2765  4 1742 0             CS      NUMBERT
 0362   REF  32  LAST 1404    16,2766  6 4751 0             AD      FOUR
 0363                         16,2767  0 0006 1             EXTEND
 0364   REF   3  LAST 1422    16,2770  6 3013 0             BZMF    TSNEXTP -1
 0365   REF  48  LAST 1310    16,2771  0 5567 0   ABORTYZ   TC      ALARM
 0366                         16,2772   02001 1             OCT     02001
 0367   REF  57  LAST 1386    16,2773  3 4753 1             CA      BIT1           INVERT BIT 1 OF RCSFLAGS.
 0368   REF  25  LAST 1421    16,2774  23'262 0             LXCH    RCSFLAGS
 0369                         16,2775  0 0006 1             EXTEND
 0370                         16,2776  06 001 0             RXOR    1
 0371   REF  26  LAST 1422    16,2777  55'262 1             TS      RCSFLAGS
 0372   REF 281  LAST 1418    16,3000  3 4755 1             CA      ZERO
 0373   REF   4  LAST 1422    16,3001  1 3014 0             TCF     TSNEXTP
 0374   REF  58  LAST 1422    16,3002  3 4753 1   ALTERYZ   CA      BIT1           INVERT BIT 1 OF RCSFLAGS.
 0375   REF  27  LAST 1422    16,3003  23'262 0             LXCH    RCSFLAGS
 0376                         16,3004  0 0006 1             EXTEND
 0377                         16,3005  06 001 0             RXOR    1
 0378   REF  28  LAST 1422    16,3006  55'262 1             TS      RCSFLAGS
 0379   REF  59  LAST 1422    16,3007  7 4753 0             MASK    BIT1
 0380   REF  33  LAST 1422    16,3010  6 4751 0             AD      FOUR
 0381   REF   3  LAST 1422    16,3011  27'743 1             ADS     ROTINDEX
 0382   REF   1               16,3012  1 2753 0             TCF     TRYUORV
 0383   REF   1               16,3013  3 1740 0             CA      POLYTEMP
 0384   REF   7  LAST 1405    16,3014  55'472 0   TSNEXTP   TS      NEXTP
A0385                                             STATE LOGIC

A0386                                                CHECK IN ORDER:              IF ON
A0387                                                  LPDPHASE                   GO TO PURGENCY
A0388                                                  PULSES                     MINIMUM PULSE LOGIC
A0389                                                  DETENT(BIT15 CH31)         RATE COMMAND
A0390                                                  GO TO PURGENCY
 0391   REF  52  LAST 1403    16,3015  3 4737 0             CA      BIT13            CHECK STICK IF IN ATT. HOLD.
 0392                         16,3016  0 0006 1             EXTEND
 0393   REF  10  LAST 1421    16,3017  02 031 1             RAND    CHAN31
 0394                         16,3020  0 0006 1             EXTEND
 0395   REF   1               16,3021  1 3027 0             BZF     MANMODE

 0396   REF  38  LAST 1419    16,3022  3 0111 0             CA      DAPBOOLS
 0397   REF   2  LAST  904    16,3023  7 4743 1             MASK    XOVINHIB
 0398   REF 492  LAST 1421    16,3024  10 000 0             CCS     A
 0399   REF   1               16,3025  1 3467 0             TCF     PURGENCY         ATTITUDE STEER DURING VISIBILITY PHASE

 0400   REF   1               16,3026  1 3071 0             TCF     DETENTCK
 0401   REF   2  LAST  732    16,3027  3 4735 1   MANMODE   CA      PULSES           PULSES IS ONE FOR PULSE MODE
 0402   REF  39  LAST 1422    16,3030  7 0111 1             MASK    DAPBOOLS
 0403                                16,3031  0 0006 1            EXTEND
 0404    REF    2  LAST 1422         16,3032  1 3071 0            BZF     DETENTCK          BRANCH FOR RATE COMMAND

 0405    REF 282  LAST 1422          16,3033  3 4755 1            CA      ZERO
 0406    REF    4  LAST 1413         16,3034  55'464 1            TS      PERROR
R0407    MINIMUM IMPULSE MODE

 0408    REF   25  LAST 1413         16,3035  3 0032 0            CA      CDUX
 0409    REF   20  LAST 1413         16,3036  55'634 0            TS      CDUXD

 0410    REF    2  LAST 1404         16,3037  11'460 0            CCS     OLDPMIN
 0411    REF    1                    16,3040  1 3054 1            TCF     CHECKP

 0412    REF   42  LAST 1411         16,3041  3 4751 0  FIREP     CA      BIT3
 0413                                16,3042  0 0006 1            EXTEND
 0414    REF   11  LAST 1422         16,3043  02 031 1            RAND    CHAN31
 0415                                16,3044  0 0006 1            EXTEND
 0416    REF    1                    16,3045  1 3064 1            BZF     +XMIN

 0417    REF   57  LAST 1411         16,3046  3 4750 1            CA      BIT4
 0418                                16,3047  0 0006 1            EXTEND
 0419    REF   12  LAST 1423         16,3050  02 031 1            RAND    CHAN31
 0420                                16,3051  0 0006 1            EXTEND
 0421    REF    1                    16,3052  1 3062 1            BZF     -XMIN

 0422    REF    1                    16,3053  1 3446 0            TCF     JETSOFF

 0423                                16,3054  0 0006 1  CHECKP    EXTEND
 0424    REF   13  LAST 1423         16,3055  00 031 0            READ    CHAN31
 0425    REF 493  LAST 1422          16,3056  4 0000 0            CS      A
 0426    REF    5  LAST 1323         16,3057  7 5741 1            MASK    OCT14
 0427    REF    3  LAST 1423         16,3060  55'460 0            TS      OLDPMIN
 0428    REF    2  LAST 1423         16,3061  1 3446 0            TCF     JETSOFF

 0429    REF    8  LAST 1404         16,3062  4 4363 1  -XMIN     CS      TEN               ANYTHING LESS THAN 14MS. CORRECTED
 0430                                16,3063  1 3065 0            TCF     +2                  IN JET SELECTION ROUTINE
 0431    REF    9  LAST 1423         16,3064  3 4363 0  +XMIN     CA      TEN
 0432    REF    4  LAST 1403         16,3065  55'524 1            TS      TJP
 0433    REF 156  LAST 1414          16,3066  3 4753 1            CA      ONE
 0434    REF    4  LAST 1423         16,3067  55'460 0            TS      OLDPMIN
 0435    REF    1                    16,3070  1 3354 1            TCF     PJETSLEC -6

R0436                     MANUAL RATE COMMAND MODE
R0437                     ========================
R0438                       BY ROBERT F. STENGEL
R0439
R0440    THIS MODE PROVIDES RCAH MANUAL CONTROL THRU 2 CONTROL LAWS:                     1) DIRECT RATE AND 2) PSEUDO-AUTO.
R0442    THE DIRECT RATE MODE AFFORDS IMMEDIATE CONTROL WITHOUT OVERSHOOT. THE PSEUDO-AUTO MODE PROVIDES PRECISE
R0444    RATE CONTROL AND ATTITUDE HOLD.
R0445
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R0446     IN DIRECT RATE, JETS ARE FIRED WHEN STICK POSITION CHANGES BY A FIXED NUMBER OF INCREMENTS IN ONE DAP CYCLE.
R0448     THE 'BREAKOUT LEVEL' IS .6 D/S FOR LM-ONLY AND .3 D/S FOR CSM-DOCKED. THIS LAW NULLS THE RATE ERROR TO WITHIN
R0450     THE 'TARGET DEADBAND', WHICH EQUALS THE BREAKOUT LEVEL.
R0451     IN PSEUDO-AUTO, BODY-FIXED RATE AND ATTITUDE ERRORS ARE SUPPLIED TO TJETLAW, WHICH EXERCISES CONTROL.
R0453     CONTROL SWITCHES FROM DIRECT RATE TO PSEUDO-AUTO IF THE TARGET DB IS ACHIEVED OR IF TIME IN (1) EXCEEDS 4 SEC.
R0455     IF THE INITIAL COMMAND DOES NOT EXCEED THE BREAKOUT LEVEL, CONTROL GOES TO PSEUDO-AUTO IMMEDIATELY.
R0457
R0458     SINCE P-AXIS CONTROL IS SEPARATE FROM Q,R AXES CONTROL, IT IS POSSIBLE TO USE (1) IN P-AXIS AND (2) IN Q,R AXES,
R0460     OR VICE VERSA.  THIS ALLOWS A DEGREE OF ATTITUDE HOLD IN UNCONTROLLED AXES.  DUE TO U,V CONTROL, HOWEVER, Q AND
R0462     R AXES ARE COUPLED AND MUST USE THE SAME CONTROL LAW.
R0463
R0464     HAND CONTROLLER COMMANDS ARE SCALED BY A LINEAR/QUADRATIC LAW. FOR THE LM-ALONE, MAXIMUM COMMANDED RATES ARE 20
R0466     AND 4 D/S IN NORMAL AND FINE SCALING; HOWEVER, STICK SENSITIVITY AT ZERO COUNTS (OBTAINED AT A STICK DEFLECTION
R0468     OF 2 DEGREES FROM THE CENTERED POSITION) IS .5 OR .1 D/S PER DEGREE. NORMAL AND FINE SCALINGS FOR THE CSM-DOCKED
R0470     CASE IS AUTOMATICALLY SET TO 1/10 THE ABOVE VALUES. SCALING IS DETERMINED IN ROUTINE 3.
A0472                                                  ZEROENBL       ENABLES COUNTERS SO THEY CAN BE READ NEXT TIME
A0473                                                  JUSTOUT        FIRST DETECTION OF OUT OF DETENT (BY DURRCBIT)
A0474
A0475
 0476                            16,3071  0 0006 1  DETENTCK EXTEND
 0477     REF  14  LAST 1423     16,3072  00 031 0           READ    CHAN31
 0478     REF   1                16,3073  54'443 1           TS      CH31TEMP
 0479     REF  50  LAST 1414     16,3074  7 4735 0           MASK    BIT15               CHECK OUT-OF-DETENT BIT.
 0480                            16,3075  0 0006 1           EXTEND
 0481     REF   1                16,3076  1 3223 0           BZF     RHCMOVED            BRANCH IF OUT OF DETENT.
 0482     REF   1                16,3077  3 4740 0           CAF     DURRCBIT            IN DETENT. CHECK THE RATE COMMAND BIT.
 0483     REF  40  LAST 1422     16,3100  7 0111 1           MASK    DAPBOOLS
 0484                            16,3101  0 0006 1           EXTEND
 0485     REF   2  LAST 1422     16,3102  1 3467 0           BZF     PURGENCY            BRANCH IF NOT IN RATE COMMAND LAST PASS.
R0486     ◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦◦
 0487     REF  32  LAST 1385     16,3103  3 4743 0           CA      BIT9                JUST IN DETENT??
 0488     REF  29  LAST 1422     16,3104  7 1262 1           MASK    RCSFLAGS
 0489                            16,3105  0 0006 1           EXTEND
 0490     REF   1                16,3106  1 3120 0           BZF     RUTH
 0491     REF  53  LAST 1422     16,3107  3 4737 0           CAF     BIT13               CHECK FOR ATTITUDE HOLD.
 0492                            16,3110  0 0006 1           EXTEND
 0493     REF  15  LAST 1424     16,3111  02 031 1           RAND    CHAN31
 0494                            16,3112  0 0006 1           EXTEND
 0495     REF   1                16,3113  1 3220 0           BZF     RATEDAMP            BRANCH IF IN ATTITUDE HOLD.

 0496     REF   1                16,3114  4 5014 0           CS      BITS9,11            IN AUTO.
 0497     REF  30  LAST 1424     16,3115  7 1262 1           MASK    RCSFLAGS            (X-AXIS OVERRIDE)
 0498     REF  31  LAST 1424     16,3116  55'262 1           TS      RCSFLAGS            ZERO ORBIT (BIT 11) AND JUST-IN BIT (9).
 0499     REF   2  LAST 1424     16,3117  1 3220 0           TCF     RATEDAMP

 0500     REF  32  LAST 1424     16,3120  3 1262 0  RUTH     CA      RCSFLAGS
 0501     REF   1                16,3121  7 4742 0           MASK    PBIT                IN ATTITUDE HOLD.
 0502                            16,3122  0 0006 1           EXTEND
 0503                            16,3123  1 3125 0           BZF     +2                  BRANCH IF P-RATE DAMPING IS FINISHED.
 0504     REF   3  LAST 1424     16,3124  1 3220 0           TCF     RATEDAMP
 0505   REF  33  LAST 1424   16,3125  3 1262 0              CA      RCSFLAGS
 0506   REF   1              16,3126  7 4741 0              MASK    QRBIT
 0507                        16,3127  0 0006 1              EXTEND
 0508   REF   1              16,3130  1 3134 0              BZF     RATEDONE         BRANCH IF Q,R RATE DAMPING IS FINISHED.
 0509   REF   4  LAST 1424   16,3131  1 3220 0              TCF     RATEDAMR
R0510   ================================
 0511   REF  60  LAST 1422       4753            1/10SEC    =       BIT1
 0512   REF   5  LAST 1363       4771            40CYC      =       OCT50
 0513                        16,3132   74777 0   PQRBIT     OCT     74777
 0514   REF  14  LAST  953       5014            BITS9,11   EQUALS  EBANK5
 0515                        16,3133   00056 1   LINRATR    DEC     46
R0516   ================================
 0517   REF   2  LAST 1424   16,3134  4 4740 1   RATEDONE   CS      OURRCBIT         MANUAL COMMAND AND DAMPING COMPLETED IN
 0518                        16,3135  0 0004 0              INHINT                   ALL AXES.
 0519   REF  41  LAST 1424   16,3136  7 0111 1              MASK    DAPBOOLS
 0520   REF  42  LAST 1425   16,3137  54 111 1              TS      DAPBOOLS

R0521   READ CDUS INTO CDU DESIRED REGISTERS

 0522   REF  54  LAST 1424   16,3140  3 4737 0              CAF     BIT13
 0523                        16,3141  0 0006 1              EXTEND
 0524   REF  16  LAST 1424   16,3142  02 031 1              RAND    CHAN31
 0525                        16,3143  0 0006 1              EXTEND
 0526                        16,3144  1 3150 1              BZF     +4
 0527   REF  26  LAST 1423   16,3145  3 0032 0              CA      CDUX             (X-AXIS OVERRIDE)
 0528   REF  21  LAST 1423   16,3146  55'634 0              TS      CDUXD
 0529                        16,3147  0 3152 1              TC      +3
 0530   REF  54  LAST 1405   16,3150  0 4674 0              TC      IBNKCALL
 0531   REF  11  LAST 1403   16,3151   40154 0              FCADR   ZATTEROR
 0532                        16,3152  0 0003 1              RELINT
 0533   REF   3  LAST 1424   16,3153  1 3467 0              TCF     PURGENCY

 0534   REF   5  LAST 1423   16,3154  55'464 1              TS      PERROR
 0535   REF   3  LAST 1425   16,3155  3 4740 0   JUSTOUT    CA      OURRCBIT         INITIALIZATION - FIRST MANUAL PASS.
 0536   REF  43  LAST 1425   16,3156  26 111 1              ADS     DAPBOOLS
 0537   REF 283  LAST 1423   16,3157  3 4755 1              CA      ZERO
 0538   REF   5  LAST 1416   16,3160  55'446 1              TS      DXERROR
 0539   REF   6  LAST 1425   16,3161  55'447 0              TS      DXERROR +1
 0540   REF   4  LAST 1416   16,3162  55'450 0              TS      DYERROR
 0541   REF   5  LAST 1425   16,3163  55'451 1              TS      DYERROR +1
 0542   REF   4  LAST 1417   16,3164  55'452 1              TS      DZERROR
 0543   REF   5  LAST 1425   16,3165  55'453 0              TS      DZERROR +1
 0544   REF   2  LAST 1416   16,3166  55'454 1              TS      PLAST
 0545   REF   2  LAST 1416   16,3167  55'455 0              TS      QLAST
 0546   REF   2  LAST 1417   16,3170  55'456 0              TS      RLAST
 0547   REF   1              16,3171  54 042 0              TS      Q-RHCCTR
 0548   REF   1              16,3172  54 044 0              TS      P-RHCCTR
 0549   REF   1              16,3173  3 3132 1              CA      PQRBIT
 0550   REF  34  LAST 1425   16,3174  7 1262 1              MASK    RCSFLAGS
 0551   REF  35  LAST 1425   16,3175  55'262 1              TS      RCSFLAGS         BITS 10 AND 11 OF RCSFLAGS ARE 0.
 0555   REF   1             16,3176   0 3201 1             TC       ZEROENBL
 05551                      16,3177   0 0003 1             RELINT
 0556   REF   3  LAST 1423  16,3200   1 3446 0             TCF      JETSOFF
 0557   REF   2  LAST 1425  16,3201  22 0044 1  ZEROENBL LXCH     R-RHCCTR
 0558   REF   2  LAST 1425  16,3202   3 0042 1             CA       Q-RHCCTR
 0559   REF   1             16,3203  53'463 0              DXCH     SAVEHAND
 0560   REF 284  LAST 1425  16,3204   3 4755 1             CA       ZERO
 0561   REF   1             16,3205  54 043 1              TS       P-RHCCTR
 0562   REF   3  LAST 1426  16,3206  54 042 0              TS       Q-RHCCTR
 0563   REF   3  LAST 1426  16,3207  54 044 0              TS       R-RHCCTR
 05630                      16,3210   0 0004 0             INHINT
 05631                      16,3211   0 0006 1             EXTEND
 05632  REF   5  LAST 1396  16,3212  23'265 1              QXCH     C13QSAV
 05633  REF   9  LAST 1396  16,3213   0 6022 1             TC       C13STALL

 0564   REF   1             16,3214   3 3623 0             CA       BITS8,9
 0565                       16,3215   0 0006 1             EXTEND
 0566   REF  23  LAST 1396  16,3216  05 013 0              WOR      CHAN13              COUNTERS ZEROED AND ENABLED
 0567   REF   6  LAST 1426  16,3217   0 1265 1             TC       C13QSAV

 0568   REF 285  LAST 1426  16,3220   3 4755 1  RATEDAMP CA       ZERO
 0569   REF   2  LAST 1426  16,3221  54 043 1              TS       P-RHCCTR
 0570   REF   1             16,3222   1 3232 0             TCF      RATERROR

 05701 *REF  36  LAST 1425  16,3223   4 1262 1  RHCMOVED CS       RCSFLAGS            SET JUSTIN BIT TO 1
 05702 *REF  33  LAST 1424  16,3224   7 4743 1             MASK     BIT9
 05703 *REF  37  LAST 1426  16,3225  27'262 1              ADS      RCSFLAGS
 0571  *REF   4  LAST 1425  16,3226   3 4740 0             CA       OURRCBIT            P CONTROL
 0572   REF  44  LAST 1425  16,3227   7 0111 1             MASK     DAPBOOLS
 0573                       16,3230   0 0006 1             EXTEND
 0574   REF   1             16,3231   1 3154 0             BZF      JUSTOUT -1
 0575   REF  27  LAST 1425  16,3232   3 0032 0  RATERROR CA       CDUX                FINDCDUW REQUIRES THAT CDUXD=CDUX DURING
 0576   REF  22  LAST 1425  16,3233  55'634 0              TS       CDUXD               X-AXIS OVERRIDE
 0577   REF   3  LAST 1426  16,3234  10 043 1              CCS      P-RHCCTR
 0578                       16,3235   1 3240 0             TCF      +3
 0579                       16,3236   1 3240 0             TCF      +2
 0580                       16,3237   1 3240 0             TCF      +1
 0581                       16,3240   6 0000 1             DOUBLE                       LINEAR/QUADRATIC CONTROLLER SCALING
 0582                       16,3241   6 0000 1             DOUBLE                       (SEE EXPLANATION IN Q,R-AXES RCS
 0583   REF   1             16,3242   6 3133 0             AD       LINRATP              AUTOPILOT)
 0584                       16,3243   0 0006 1             EXTEND
 0585   REF   4  LAST 1426  16,3244   7 0043 1             MP       P-RHCCTR
 0586   REF 277  LAST 1416  16,3245   3 0001 0             CA       L
 0587                       16,3246   0 0006 1             EXTEND
 0588   REF   6  LAST  296  16,3247   7 1444 0             MP       STIKSENS
 0589   REF   3  LAST 1425  16,3250  57'454 0              XCH      PLAST
 0590                       16,3251   4 0000 0             COM
 0591   REF   4  LAST 1426  16,3252   6 1454 0             AD       PLAST
 0592   REF  25  LAST 1418  16,3253  55'736 0              TS       DAPTEMP1
 0593   REF   2  LAST 1426  16,3254   0 3201 1             TC       ZEROENBL            INTERVAL.  ZERO AND ENABLE ACA COUNTERS.
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0593                          16,3255   0 0003 1              RELINT
0594     REF   5  LAST 1426   16,3256   4 1454 1              CS      PLAST
0595     REF  15  LAST 1417   16,3257   6 1421 1              AD      OMEGAP
0596     REF   1              16,3260  55'427 0               TS      EDOTP
0597     REF  26  LAST 1426   16,3261  11'736 0               CCS     DAPTEMP1       IF P COMMAND CHANGE EXCEEDS BREAKOUT
0598                          16,3262   1 3265 1              TCF     +3             LEVEL, GO TO DIRECT RATE CONTROL. IF NOT
0599                          16,3263   1 3273 0              TCF     +8             CHECK FOR DIRECT RATE CONTROL LAST TIME.
0600                          16,3264   1 3265 1              TCF     +1
0601     REF   5  LAST  296   16,3265   6 1476 0              AD      -RATEDB
0602                          16,3266   0 0006 1              EXTEND
0603                          16,3267   6 3273 1              BZMF    +4
0604     REF   1              16,3270   3 4771 1              CA      40CYC
0605     REF   2  LAST 1414   16,3271  55'445 1               TS      TCP
0606     REF   1              16,3272   0 3304 0              TC      PEGI
0607     REF  38  LAST 1426   16,3273   3 1262 0              CA      RCSFLAGS       CHECK FOR DIRECT RATE COMMAND LAST TIME.
0608     REF   2  LAST 1424   16,3274   7 4742 0              MASK    PBIT
0609                          16,3275   0 0006 1              EXTEND
0610                          16,3276   1 3300 0              BZF     +2
0611     REF   2  LAST 1427   16,3277   0 3304 0              TC      PEGI           TO PURE RATE COMMAND
0612     REF   7  LAST 1425   16,3300   3 1446 0              CA      DXERROR        PSEUDO-AUTO CONTROL.
0613     REF   1              16,3301  55'751 1               TS      E              X-ATTITUDE ERROR (SP)
0614     REF   6  LAST 1425   16,3302  55'464 1               TS      PERROR         LOAD P-AXIS ERROR FOR MODE1 FDAI DISPLAY
0615     REF   4  LAST 1425   16,3303   0 3473 1              TC      PURGENCY +4
0616     REF  28  LAST 1426   16,3304   3 0032 0   PEGI       CA      CDUX           DIRECT RATE CONTROL.
0617     REF  23  LAST 1426   16,3305  55'634 0               TS      CDUXD
0618     REF 286  LAST 1426   16,3306   3 4755 1              CA      ZERO
0619     REF   8  LAST 1427   16,3307  55'446 1               TS      DXERROR
0620     REF   9  LAST 1427   16,3310  55'447 0               TS      DXERROR +1
0621     REF   7  LAST 1427   16,3311  55'464 1               TS      PERROR         ZERO P-AXIS ERROR FOR MODE1 FDAI DISPLAY
0622     REF   2  LAST 1427   16,3312  11'427 0               CCS     EDOTP
0623                          16,3313   0 3316 0              TC      +3
0624                          16,3314   0 3316 0              TC      +2
0625                          16,3315   0 3316 0              TC      +1
0626     REF   1              16,3316  55'736 0               TS      ABSEDOTP
0627     REF   1              16,3317   6 1476 0              AD      TARGETDB
0628                          16,3320   0 0006 1              EXTEND                 IF RATE ERROR IS LESS THAN DEADBAND,
0629     REF   1              16,3321   6 3331 0              BZMF    LAST           FIRE, AND SWITCH TO PSEUDO-AUTO.
0630     REF   3  LAST 1427   16,3322   3 1445 0              CA      TCP
0631                          16,3323   0 0006 1              EXTEND                 IF TIME IN RATE COMMAND EXCEEDS 4 SEC.,
0632     REF   2  LAST 1427   16,3324   6 3331 0              BZMF    LAST
0633     REF  39  LAST 1427   16,3325   4 1262 1              CS      RCSFLAGS
0634     REF   3  LAST 1427   16,3326   7 4742 0              MASK    PBIT
0635     REF  40  LAST 1427   16,3327  27'262 1               ADS     RCSFLAGS       BIT 10 IS 1.
0636                          16,3330   1 3334 1              TCF     +4
0637     REF   4  LAST 1427   16,3331   4 4742 0   LAST       CS      PBIT
0638     REF  41  LAST 1427   16,3332   7 1262 1              MASK    RCSFLAGS
0639     REF  42  LAST 1427   16,3333  55'262 1               TS      RCSFLAGS       BIT 10 IS 0.
0640     REF   3  LAST 1427   16,3334   4 1427 0              CS      EDOTP
0641                          16,3335   0 0006 1              EXTEND
0642     REF   1              16,3336   7 1550 1              MP      1/ANETP        1/2JTACC SCALED AT 2EXP(7)/PI
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 0643   REF 494  LAST 1423    16,3337  20 001 1          DAS     A
 0644   REF  10  LAST 1419    16,3340  0 2310 1          TC      OVERSUB
 0645                         16,3341  0 0006 1          EXTEND
 0646   REF   1               16,3342  7 7721 0          MP      25/32              A CONTAINS TJET SCALED AT 2EXP(4)(16/25)
 0647   REF   5  LAST 1423    16,3343  55'524 1          TS      TJP                4. JET TIME
 0648   REF   2  LAST 1427    16,3344  3 1736 1          CA      ABSEDOTP
 0649   REF   2  LAST  131    16,3345  6 1475 0          AD      -2JETLIM           COMPARING DELTA RATE WITH 2 JET LIMIT
 0650                         16,3346  0 0006 1          EXTEND
 0651                       - 16,3347  6 3352 0          BZMF    +3

 0652   REF  29  LAST 1421    16,3350  3 6245 1          CA      SIX
 0653                         16,3351  1 3361 1          TCF     +80
 0654   REF   6  LAST 1428    16,3352  3 1524 0          CA      TJP
 0655   REF   7  LAST 1428    16,3353  27'524 1          ADS     TJP
A0656                                               GOES TO PJETSLEC FOR TWO JETS

A0657                                             P-JET-SELECTION-ROUTINE (ROTATION)

A0658                                             INPUT:   NUMBERT       4,5,6 FOR WHICH PAIR OR 4 JETS
A0659                                                      TJP           + FOR +P ROTATION

A0660                                             OUTPUT:  CHANNEL 6
A0661                                                      PJUMPADR                 FOR P-AXIS SKIP
A0662                                                      (JTLST CALL)             (SMALL TJP)

A0663                                               ORDER OF POLICIES TRIED IN CASE OF FAILURE.
A0664                                                      +P                -P
A0665                                                      7,15              8,16
A0666                                                      4,12              3,11
A0667                                                      4,7               8,11
A0668                                                      7,12              11,16
A0669                                                      12,15             3,16
A0670                                                      4,15              3,8
A0671                                                      ALARM             ALARM
 0672   REF   1               16,3354  3 4747 1          CA      AORBSYST
 0673   REF  31  LAST 1330    16,3355  7 0101 0          MASK    FLAGWRD5
 0674   REF 495  LAST 1428    16,3356  10 000 0          CCS     A
 0675   REF 157  LAST 1423    16,3357  3 4753 1          CA      ONE
 0676   REF  34  LAST 1422    16,3360  6 4751 0          AD      FOUR
 0677   REF   3  LAST 1422    16,3361  55'742 0          TS      NUMBERT
 0678   REF 158  LAST 1428    16,3362  3 4753 1 PJETSLEC CA      ONE
 0679   REF 278  LAST 1426    16,3363  54 001 1          TS      L
 0680   REF   8  LAST 1428    16,3364  11'524 1          CCS     TJP
 0681                         16,3365  1 3372 0          TCF     +5
 0682   REF   4  LAST 1426    16,3366  1 3446 0          TCF     JETSOFF
 0683                         16,3367  1 3371 0          TCF     +2
 0684   REF   5  LAST 1428    16,3370  1 3446 0          TCF     JETSOFF
 0685                         16,3371  22 007 0          ZL
 0686   REF 159  LAST 1428    16,3372  6 4753 1          AD      ONE
 0687   REF   1               16,3373  55'736 0          TS      ABSTJ
 0688    REF    4  LAST 1422     16,3374  23'743 0               LXCH    ROTINDEX
 0689    REF    1                16,3375  0 3535 1               TC      SELECTP
 0690    REF   20  LAST 1428     16,3376  4 6245 0               CS      SIX
 0691    REF    4  LAST 1428     16,3377  6 1742 1               AD      NUMBERT
 0692                            16,3400  0 0006 1               EXTEND
 0693                            16,3401  1 3403 1               BZF     +2

 0694    REF   94  LAST 1411     16,3402  4 4752 1               CS      TWO
 0695    REF   35  LAST 1428     16,3403  6 4751 0               AD      FOUR
 0696    REF    2  LAST  134     16,3404  55'521 1               TS      NO.PJETS
 0697    REF    2  LAST 1422     16,3405  3 1740 0               CA      POLYTEMP
 0698    REF    2  LAST 1396     16,3406  0 5744 0               TC      WRITEP
 0699    REF    2  LAST 1428     16,3407  4 1736 0               CS      ABSTJ
 0700    REF    1                16,3410  6 3616 0               AD      +150MST6
 0701                            16,3411  0 0006 1               EXTEND
 0702    REF    2  LAST 1421     16,3412  6 3630 1               BZMF    QRAXIS          GO TO QRAXIS OR TO GTS.

 0703    REF    1                16,3413  6 3576 0               AD      -136MST6
 0704                            16,3414  0 0006 1               EXTEND
 0705                            16,3415  6 3422 0               BZMF    +5

 0706    REF    3  LAST 1429     16,3416  27'736 0               ADS     ABSTJ
 0707    REF    5  LAST 1429     16,3417  51'743 0               INDEX   ROTINDEX
 0708    REF    1                16,3420  3 3625 0               CA      MINTIMES
 0709    REF    9  LAST 1428     16,3421  55'524 1               TS      TJP

 0710    REF    4  LAST 1429     16,3422  3 1736 1               CA      ABSTJ
 0711                            16,3423  22 007 0               ZL
 0712                            16,3424  0 0004 0               INHINT
 0713    REF    4  LAST 1404     16,3425  53'471 0               DXCH    T6FURTHA
 0714    REF   55  LAST 1425     16,3426  0 4674 0               TC      IBNKCALL
 0715    REF    1                16,3427   37143 0               CADR    JTLST
 0716    REF   39  LAST 1421     16,3430  4 4740 1               CS      BIT12
 0717    REF   43  LAST 1427     16,3431  7 1262 1               MASK    RCSFLAGS
 0718    REF   44  LAST 1429     16,3432  55'262 1               TS      RCSFLAGS        BIT 12 SET TO 0.
 0719    REF    1                16,3433  0 3435 0               TC      ALTSYST
 0720    REF    3  LAST 1429     16,3434  1 3630 0               TCF     QRAXIS

 0721    REF   32  LAST 1428     16,3435  3 0101 1  ALTSYST      CA      FLAGWRD5        ALTERNATE P-AXIS JETS
 0722    REF  279  LAST 1428     16,3436  54 001 1               TS      L
 0723    REF    2  LAST 1428     16,3437  3 4747 1               CA      ACRBSYST
 0724                            16,3440  0 0006 1               EXTEND
 0725    REF   19  LAST 1406     16,3441  06 001 0               RXOR    LCHAN
 0726    REF   33  LAST 1429     16,3442  54 101 0               TS      FLAGWRD5
 0727                            16,3443  0 0003 1               RELINT
 0728    REF  406  LAST 1415     16,3444  0 0002 0               TC      Q

 0729    REF    2  LAST 1429     16,3445  0 3435 0  CKALT        TC      ALTSYST

 0730    REF    3  LAST 1429     16,3446  0 5743 1  JETSOFF      TC      WRITEP -1
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L        P-AXIS RCS AUTOPILOT                                                               USER'S PAGE NO.  18       E6 S4

 0731    REF 287   LAST 1427    16,3447   3 4755 1              CA      ZERO
 0732    REF  10   LAST 1429    16,3450   55'524 1              TS      TJP
 0733    REF   4   LAST 1429    16,3451   1 3630 0              TCF     QRAXIS
R0734    (NOTE -- M13 = 1 IDENTICALLY IMPLIES NULL MULTIPLICATION.)

 0735    REF  13   LAST 1413    16,3452   3 0033 1   CALCPERR   CA      CDUY                 P-ERROR CALCULATION.
 0736                           16,3453   0 0006 1              EXTEND
 0737    REF   7   LAST 1413    16,3454   21'635 1              MSU     CDUYD                CDU VALUE - ANGLE DESIRED (Y-AXIS)
 0738                           16,3455   0 0006 1              EXTEND
 0739    REF   9   LAST 1415    16,3456   7 1414 0              MP      M11                  (CDUY-CDUYD)M11  SCALED AT PI RADIANS
 0740    REF   2   LAST 1427    16,3457   57'751 0              XCH     E                    SAVE FIRST TERM (OF TWO)
 0741    REF  29   LAST 1427    16,3460   3 0032 0              CA      CDUX                 THIRD COMPONENT
 0742                           16,3461   0 0006 1              EXTEND
 0743    REF  24   LAST 1427    16,3462   21'634 0              MSU     CDUXD                CDU VALUE - ANGLE DESIRED (X-AXIS)
R0744                                                           EXTEND
R0745                                                           MP      M13
 0746    REF   5   LAST 1400    16,3463   6 1274 1              AD      DELPEROR             KALCMANU INERFACE ERROR
 0747    REF   3   LAST 1430    16,3464   27'751 1              ADS     E                    SAVE SUM OF TERMS.  COULD BE OVERFLOW.
 0748    REF   8   LAST 1427    16,3465   57'464 0              XCH     PERROR               SAVE P-ERROR FOR EIGHT-BALL DISPLAY.
 0749    REF 407   LAST 1429    16,3466   0 0002 0              TC      Q                    RETURN TO CALLER

R0750    P-AXIS URGENCY FUNCTION CALCULATION.

 0751    REF   2   LAST 1405    16,3467   0 3452 1   PURGENCY   TC      CALCPERR             CALCULATE P-AXIS ERRORS.
 0752    REF  12   LAST 1400    16,3470   4 1642 1              CS      OMEGARD              THIS CODING IS COMMON TO BOTH LM DAP AND
 0753    REF  16   LAST 1427    16,3471   6 1421 1              AD      OMEGAP               SRS-BACKUP MODE.
 0754    REF   4   LAST 1427    16,3472   55'427 0              TS      EDOTR                EDOTR = OMEGAP - OMEGARD AT PI/4 RAD/SEC


 0755    REF 160   LAST 1428    16,3473   4 4753 0              CS      ONE
 0756    REF   2   LAST  133    16,3474   55'505 1              TS      AXISCTR
 0757    REF  45   LAST 1426    16,3475   3 0111 0              CA      DAPBOOLS
 0758    REF   8   LAST 1417    16,3476   7 4737 1              MASK    CSMDOCKD
 0759                           16,3477   0 0006 1              EXTEND
 0760    REF   1                16,3500   1 3511 0              BZF     HEADTJET
 0761                           16,3501   0 0004 0              INHINT                       IF CSMDOCKD = 1, GO TO DOCKED RCS LOGIC
 0762    REF  56   LAST 1429    16,3502   0 4674 0              TC      IBNKCALL
 0763    REF   1                16,3503    43736 1              CADR    SPSRCS

 0764    REF  11   LAST 1430    16,3504   3 1524 0              CA      TJP
 0765                           16,3505   0 0006 1              EXTEND
 0766    REF   1                16,3506   1 3445 0              BZF     OKALT                IF TJP = ZERO, CHANGE ADRBSYST.
 0767                           16,3507   0 0003 1              RELINT
 0768    REF   2   LAST 1423    16,3510   1 3354 1              TCF     PJETSLEC -6              SELECT ADRBSYST AND USE TWO JETS
 0769    REF 288   LAST 1430    16,3511   3 4755 1   HEADTJET   CA      ZERO
 0770    REF   1                16,3512   55'500 1              TS      SENSETYP
 0771                           16,3513   0 0004 0              INHINT
 0772    REF  57   LAST 1430    16,3514   0 4674 0              TC      IBNKCALL
 0773    REF   1                16,3515    27304 1              CADR    TJETLAW
 0774                           16,3516   0 0003 1              RELINT
 0775    REF    1                 16,3517   4 1740 1            CS       FIREFCT
 0776    REF    1                 16,3520   6 3534 0            AD       -FOURDEG
 0777                             16,3521   0 0006 1            EXTEND
 0778    REF    3   LAST 1430     16,3522   6 3354 0            BZMF     PJETSLEC -6
 0779    REF   12   LAST 1430     16,3523   1 1524 1            CCS      TJP
 0780                             16,3524   1 3526 1            TCF      +2
 0781    REF    6   LAST 1428     16,3525   1 3446 0            TCF      JETSOFF
 0782    REF    1                 16,3526   6 3533 1            AD       -160MST6
 0783                             16,3527   0 0006 1            EXTEND
 0784    REF    4   LAST 1431     16,3530   6 3354 0            BZMF     PJETSLEC -6
 0785    REF   31   LAST 1429     16,3531   3 6245 1            CA       SIX
 0786    REF    5   LAST 1431     16,3532   1 3361 1            TCF      PJETSLEC -1
 0787                             16,3533    77377 1  -160MST6  DEC      -256
 0788                             16,3534    75117 1  -FOURDEG  DEC      -.08888
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P0789      JET POLICY CONSTRUCTION SUBROUTINE

A0790                                                                INPUT: ROTINDEX, NUMBERT

A0791                                                                OUTPUT: POLYTEMP (JET POLICY)

A0792                                                            THIS SUBROUTINE SELECT A SUBSET OF THE DESIRED JETS WHICH HAS NO FAILURE
 0793    REF  32  LAST 1431    16,3535  3 6245 1  SELECTP   CA      SIX
 0794    REF   1               16,3536  55'741 0            TS      TEMPNUM
 0795    REF   5  LAST 1429    16,3537  51'742 1            INDEX   NUMBERT
 0796    REF   1               16,3540  3 3567 0            CA      TYPEP
 0797    REF   6  LAST 1429    16,3541  51'743 0            INDEX   ROTINDEX
 0798    REF   1               16,3542  7 3560 0            MASK    JETSALL
 0799    REF   3  LAST 1429    16,3543  55'740 1            TS      POLYTEMP
 0800    REF   6  LAST  213    16,3544  7 1260 0            MASK    CH6MASK
 0801    REF 456  LAST 1428    16,3545  10  000 0           CCS     A
 0802                          16,3546  1 3550 0            TCF     +2
 0803    REF 408  LAST 1430    16,3547  0 0002 0            TC      Q
 0804    REF   2  LAST 1432    16,3550  11'741 0            CCS     TEMPNUM
 0805                          16,3551  1 3555 0            TCF     +4
 0806    REF  49  LAST 1422    16,3552  0 5567 0            TC      ALARM
 0807                          16,3553   02003 0            OCT     02003
 0808    REF   7  LAST 1431    16,3554  1 3446 0            TCF     JETSOFF          *****TCF  ALARMJET ********************
 0809    REF   6  LAST 1432    16,3555  55'742 0  SELECTYZ  TS      NUMBERT
 0810    REF   2  LAST 1429    16,3556  1 3536 0            TCF     SELECTP +1
 0811    REF   1               16,3557  1 2773 1  -1        TCF     ABORTYZ +2
 0812                          16,3560   00252 1  JETSALL   OCT     00252
 0813                          16,3561   00125 1            OCT     00125               +P
 0814                          16,3562   00140 1            OCT     00140               -Y
 0815                          16,3563   00006 1            OCT     00006               -Z
 0816                          16,3564   00220 1            OCT     00220               +Y
 0817                          16,3565   00011 1            OCT     00011               +Z
 0818                          16,3566   00151 1            OCT     00151               +V
 0819                          16,3567   00146 1  TYPEP     OCT     00146               -U
 0820                          16,3570   00226 1            OCT     00226               -V
 0821                          16,3571   00231 1            OCT     00231               +U
 0822                          16,3572   00151 1            OCT     00151               +V
 0823                          16,3573   00132 1            OCT     00132               1-3
 0824                          16,3574   00245 1            OCT     00245               2-4
 0825                          16,3575   00377 1            OCT     00377               ALL
 0826    REF   2  LAST 1429    16,3576            INCXYZ    =       -136MST6
 0827                          16,3576   77445 1  -136MST6  DEC     -218
 0828                          16,3577   00004 0            DEC     4
 0829                          16,3600   00002 0            DEC     2
 0830                          16,3601   07776 0            OCT     07776
 0831                          16,3602   00005 1            DEC     5
 0832                          16,3603   00011 1            DEC     9
 0833                          16,3604   00012 1            DEC     10
 0834                          16,3605   07776 0            OCT     07776
 0835                          16,3606   00003 1            DEC     3
 0836                          16,3607   00010 0            DEC      8
 0837                          16,3610   00007 0            DEC      7
 0838                          16,3611   07776 0            OCT      07776         THESE INDEXES OF  MASK JETSALL WILL
 0839                          16,3612   07776 0            OCT      07776         CHANGE THE INSTRUCTION AT  SELECTP +4
 0840                          16,3613   07776 0            OCT      07776         TO BE    TC  JETSALL -1
 0841                          16,3614   07776 0            OCT      07776         ONLY USED FOR TRANSLATION FAILURE
 0842                          16,3615   07776 0            OCT      07776
 0843                          16,3616   00360 1  +150MST6 DEC      240
 0844                          16,3617   07400 1  07400OCT OCT      07400
R0845       1-JET LAW FIXED CONSTANTS

 0846                          16,3620   00266 0  NORMSCL  OCT      266
 0847                          16,3621   74631 0  -100MS   DEC      -.1
 0848                          16,3622   06315 0  200MS    DEC      .2
 0849   REF   5  LAST   960       7721            25/32    =        PRIO31         (DEC .78125)
 0850                          16,3623   00600 1  BITS8,9  OCTAL    00600
 0851                          16,3624   00632 0  1/40     DEC      .02500
 0852                          16,3625   77751 1  MINTIMES DEC      -22
 0853                          16,3626   00026 0           DEC      22
 0854   REF   2  LAST 1420     16,3627   02734 0  PSKIPADR GENADR SKIPPAXS

A0855                                             GOES TO Q,R-AXES RCS AUTOPILOT
 0856   REF   7  LAST 1400     16,3630  4 1644 1  QRAXIS   CS       OMEGARD
 0857   REF   8  LAST 1419     16,3631  6 1423 0           AD       OMEGAR
 0858   REF  11  LAST 1428     16,3632  0 2310 1           TC       OVERSUB
 0859   REF   2  LAST  131     16,3633  55'437 1           TS       EDOTR
 0860   REF   7  LAST 1400     16,3634  4 1643 0           CS       OMEGAQD
 0861   REF  13  LAST 1418     16,3635  6 1422 1           AD       OMEGAQ
 0862   REF  12  LAST 1433     16,3636  0 2310 1           TC       OVERSUB
 0863   REF   3  LAST  131     16,3637  55'436 0           TS       EDOTQ
 0864                          16,3640  0 0006 1           EXTEND
 0865   REF   1                16,3641  3 3644 1           DCA      QERRCALL
 0866                          16,3642  52 006 0           DTCB

 0867   REF  22  LAST 1419     E6,1536                     EBANK=   AOSQ
 0868   REF   1                16,3643   02124 1  QERRCALL 2CADR    CALLQERR
 0868   REF   1                16,3644   36106 0
 0001                              17,2124                             BANK    17
 0002     REF    3  LAST 1397      17,2000                             SETLOC  OAPS2
 0003                              17,2124                             BANK

 0004     REF   25  LAST 1430      E6,1634                             EBANK=  COUXO

 0005     REF    1                                                     COUNT*  $$/OAPQR

R0006
 00061    PEF   55  LAST 1425      17,2124   3 4737 0   CALLQEPR CA      BIT13          CALCULATE Q,P ERROPS UNLESS THESE AXES
 00062                             17,2125   0 0006 1            EXTENO                 ARE IN MANUAL RATE COMMANO.
 00063    REF   17  LAST 1425      17,2126   02 031 1            PANO    CHAN31
 00064    REF  497  LAST 1432      17,2127   1C 000 0            CCS     A
 00065                             17,2130   1 2135 0            TCF     +5             IN AUTO CCMPUTE C,R EPPCRS
 0007     REF   46  LAST 1430      17,2131   4 C111 1            CS      OAPBOCLS       IN MANUAL RATE COMMANO?
 00071    REF    5  LAST 1426      17,2132   7 4740 1            MASK    OUPRCBIT
 00072                             17,2133   0 0006 1            EXTENO
 00073    REF    1                 17,2134   1 2136 0            BZF     Q,PORGTS       IF SO BYPASS CALCULATICN OF ERPORS.
 00074    REF    2  LAST 1405      17,2135   0 2655 0            TC      OEPRCALC

P0008
 0009     REF    2  LAST 1404      17,2136   11'630 1   Q,RORGTS CCS     COTROLEP       CHOOSE CONTROL SYSTEM FCR THIS DAP PASS:
 0010     REF    1                 17,2137   1 2636 1            TCE     GOTOGTS          GTS (ALTERNATES WITH RCS WHEN OOCKEO)
 0011     PEF    1                 17,2140   1 2623 0            TCF     TRYGTS           GTS IF ALLOWEC, CTHEPWISE RCS
 0012     PEF  289  LAST 1430      17,2141   3 4755 1   RCS      CAF     ZERO             RCS (TPYGTS MAY BRANCH TC HERE)
 0013     REF    3  LAST 1434      17,2142   55'630 1            TS      COTRCLER

 0014     REF    4  LAST 1433      17,2143   53'437 1            OXCH    EOOTO
 0015     PEF    1                 17,2144   C 3200 0            TC      RCT-TCUV
 0016     PEF   11  LAST 1416      17,2145   53'427 0            OXCH    OMEGAU

A0017                                                   X - TRANSLATION:

A0018                                                   INPUT:   BITS 7,B CE CH31 (TRANSLATION CONTROLLEP)
A0019                                                            ULLAGEP
A0020                                                            APSELAG, OPIFTBIT
A0021                                                            ACC4OR2X, ACRBTRAN

A0022                                                   OUTPUT:  NEXTU, NEXTV         COOES OF TRANSLATION FCR AFTEP POTATION
A0023                                                            SENSETYP             TELL POTATION OIRECTION ANO OFSIRE

P0024     X-TRANS POLICIES ARE EITHER 4 JETS OP A OIAGONAL PAIR.  IN 2-JET TPANSLATICN THE SYSTEM IS SPECIFIEO.  A FAILURE
R0026     WILL CVERPIDE THIS SPECIFICATICN.  AN ALAPM RESULTS WHEN NO POLICY IS AVAILABLE BECAUSE OF FAILURES.

 0028     REF   44  LAST 1421      17,2146   3 4745 0   SENSEGET CA      BIT7           INPUT BITS OVEPRIOE THE INTERNAL BITS
 0029                              17,2147   C 0006 1            EXTENO                 SENSETYP WILL NCT CPPCSE ANYTRANS
 0030     REE   18  LAST 1434      17,2150   C2 031 1            PAND    CHAN31
 0031                              17,2151   C 0006 1            EXTENO
 0032     REF    1                 17,2152   1 2200 0            BZF     +XORULGE
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0033   REF  43  LAST 1357   17,2153  3 4744 1              CA      BITB
0034                        17,2154  0 0006 1              EXTENO
0035   REF  19  LAST 1434   17,2155  02 031 1              RANO    CHAN3J
0036                        17,2156  0 0006 1              EXTENO
0037   REF   1              17,2157  1 2201 1              BZF     -XTRANS

0038   REF   3  LAST  737   17,2160  3 4746 0              CA      ULLAGER
0039   REF  47  LAST 1434   17,2161  7 0111 1              MASK    OAPBOOLS
0040   REF 498  LAST 1434   17,2162  1C 000 0              CCS     A
0041   REF   2  LAST 1434   17,2163  1 2200 0              TCF     +XCRULGE

0042   REF   4  LAST 1405   17,2164  55'473 1              TS      NEXTU          STORE NULL TRANSLATICN PCLICIES
0043   REF   4  LAST 1405   17,2165  55'474 0              TS      NFXTV
0047   REF  48  LAST 1435   17,2166  4 0111 1              CS      OAPBOOLS       BURNING CR ORIFTING?
0048   REF   4  LAST 1419   17,2167  7 4744 0              MASK    ORIFTBIT
0049                        17,2170  C 0006 1              EXTENO
0050   REF   1              17,2171  1 2176 1              BZF     TSENSE
0051   REF  22  LAST 1376   17,2172  3 0106 0              CA      FLGWRD10       OPS (INCLUOING OOCKEO) OR APS?
0052   REF  14  LAST  857   17,2173  7 4737 1              MASK    APSFLBIT
0053   REF 499  LAST 1435   17,2174  10 000 0              CCS     A
0054   REF  95  LAST 1429   17,2175  3 4752 0              CAF     TWC            FAVOR +X JETS OURING AN APS BURN.
0055   REF   2  LAST 1430   17,2176  55'500 1  TSENSE      TS      SENSETYP
0056   REF   1              17,2177  1 2232 1              TCF     QRCONTRL

0057   REF 161  LAST 1430   17,2200  3 4753 1  +XORULGE    CAF     ONE
0058   REF  36  LAST 1429   17,2201  6 4751 0  -XTRANS     AO      FOUR
0059   REF   7  LAST 1432   17,2202  55'743 1              TS      ROTINOEX
0060   REF   7  LAST 1385   17,2203  6 7750 1              AO      NEG3
00601  REF   3  LAST 1435   17,2204  55'500 1              TS      SENSETYP       FAVOR APPROPRIATE JETS OURING TRANS.
0061   REF  49  LAST 1435   17,2205  3 C111 0              CA      OAPBCCLS
0062   REF   2  LAST  296   17,2206  7 4741 0              MASK    ACC4OR2X
0063   REF 500  LAST 1435   17,2207  1C 000 0              CCS     A
0064   REF   1              17,2210  1 2352 0              TCF     TRANS4

0065   REF  50  LAST 1435   17,2211  3 0111 0              CA      DAPBOOLS
0066   REF   1              17,2212  7 4742 0              MASK    AORBTRAN
0067   REF 501  LAST 1435   17,2213  10 C00 0              CCS     A
0068   REF 162  LAST 1435   17,2214  3 4753 1              CA      ONE            THREE FOR B
0069   REF  96  LAST 1435   17,2215  6 4752 0              AO      TWO            TWC FOR A SYSTEM 2 JET X TRANS
0070   REF   7  LAST 1432   17,2216  55'742 0  TSNUMBRT    TS      NUMBERT

0071   REF   1              17,2217  0 3225 1              TC      SELCTSUB

0072   REF   4  LAST 1432   17,2220  11'740 1              CCS     POLYTEMP
0073                        17,2221  1 2224 0              TCF     +3
0074   REF  50  LAST 1432   17,2222  0 5567 0              TC      ALARM
0075                        17,2223   C2002 1              OCT     02002
0076   REF   3  LAST 1397   17,2224  3 5764 1              CA      003140CT
0077   REF   5  LAST 1435   17,2225  7 1740 1              MASK    POLYTEMP
0078   REF   5  LAST 1435   17,2226  55'473 1  TSNEXTS     TS      NEXTU
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 0079    REF   4  LAST 1435   17,2227  4 5764 0             CS      00314OCT
 0080    REF   6  LAST 1435   17,2230  7 1740 1             MASK    POLYTEMP
 0081    REF   5  LAST 1435   17,2231  55'474 0             TS      NEXTV

A0082                                                Q,R-AXES RCS CONTROL MODE SELECTION

A0083                                                  SWITCHES                INDICATION WHEN SET

A0085                                                  BIT13/CHAN31            AUTO, GO TO ATTSTEER
A0086                                                  PULSES                  MINIMUM IMPULSE MODE
A0087                                                  (OTHERWISE)             RATE COMMAND/ATTITUDE HOLD MODE

 0088    REF  56  LAST 1434   17,2232  3 4737 0  QRCONTRL   CA      BIT13              CHECK MODE SELECT SWITCH.
 0089                         17,2233  0 0006 1             EXTEND
 0090    REF  20  LAST 1435   17,2234  02 031 1             RAND    CHAN31             BITS INVERTED
 0091    REF 502  LAST 1435   17,2235  10 000 0             CCS     A
 0092    REF   1              17,2236  1 2710 1             TCF     ATTSTEER
 0093    REF   3  LAST 1422   17,2237  3 4735 1  CHKBIT10   CAF     PULSES             PULSES = 1 FOR MIN IMP USE OF RHC
 0094    REF  51  LAST 1435   17,2240  7 0111 1             MASK    DAPBOOLS
 0095                         17,2241  0 0006 1             EXTEND
 0096    REF   1              17,2242  1 2354 0             BZF     CHEKSTIK           IN ATT-HOLD/RATE-COMMAND IF BIT10=0

R0097    MINIMUM IMPULSE MODE

 0098                         17,2243  0 0004 0             INHINT
 0099    REF  58  LAST 1430   17,2244  0 4674 0             TC      IBNKCALL
 0100    REF  12  LAST 1425   17,2245   40154 0             CADR    ZATTEROR
 0101    REF 290  LAST 1434   17,2246  3 4755 1             CA      ZERO
 0102    REF   3  LAST 1407   17,2247  55'450 0             TS      QERROR
 0103    REF   3  LAST 1407   17,2250  55'452 1             TS      RERROR             FOR DISPLAYS
 0104                         17,2251  0 0003 1             RELINT

 0105                         17,2252  0 0006 1             EXTEND
 0106    REF  21  LAST 1436   17,2253  00 031 0             READ    CHAN31
 0107    REF   1              17,2254  55'736 0             TS      TEMP31             IS EQUAL TO DAPTEMP1
 0108    REF   2  LAST 1404   17,2255  11'461 1             CCS     OLDQRMIN
 0109    REF   1              17,2256  1 2300 1             TCF     CHECKIN

 0110    REF   2  LAST 1436   17,2257  3 1736 1  FIREQR     CA      TEMP31
 0111    REF  61  LAST 1425   17,2260  7 4753 0             MASK    BIT1
 0112                         17,2261  0 0006 1             EXTEND
 0113    REF   1              17,2262  1 2304 0             BZF     +QMIN

 0114    REF   3  LAST 1436   17,2263  3 1736 1             CA      TEMP31
 0115    REF  53  LAST 1410   17,2264  7 4752 1             MASK    BIT2
 0116                         17,2265  0 0006 1             EXTEND
 0117    REF   1              17,2266  1 2310 0             BZF     -QMIN

 0118    REF   4  LAST 1436   17,2267  3 1736 1             CA      TEMP31
 0119    REF  49  LAST 1404   17,2270  7 4747 0             MASK    BIT5
 0120                           17,2271   0 0006 1             EXTEND
 0121     REF    1              17,2272   1 2314 1             BZF      +RMIN

 0122     REF    5  LAST 1436   17,2273   3 1736 1             CA       TEMP31
 0123     REF   66  LAST 1410   17,2274   7 4746 1             MASK     BIT6
 0124                           17,2275   0 0006 1             EXTEND
 0125     REF    1              17,2276   1 2316 0             BZF      -RMIN

 0126     REF    1              17,2277   1 3112 1             TCF      XTRANS

 0127     REF    6  LAST 1437   17,2300   4 1736 0  CHECKIN    CS       TEMP31
 0128     REF    1              17,2301   7 2351 0             MASK     OCT63
 0129     REF    3  LAST 1436   17,2302   55'461 1             TS       OLDQRMIN
 0130     REF    2  LAST 1437   17,2303   1 3112 1             TCF      XTRANS

 0131     REF    1              17,2304   3 3136 0  +QMIN      CA       14MS
 0132     REF    3  LAST 1403   17,2305   55'525 0             TS       TJU
 0133     REF    2  LAST 1437   17,2306   4 3136 1             CS       14MS
 0134     REF    1              17,2307   1 2320 0             TCF      MINQR
 0135     REF    3  LAST 1437   17,2310   4 3136 1  -QMIN      CS       14MS
 0136     REF    4  LAST 1437   17,2311   55'525 0             TS       TJU
 0137     REF    4  LAST 1437   17,2312   3 3136 0             CA       14MS
 0138     REF    2  LAST 1437   17,2313   1 2320 0             TCF      MINQR
 0139     REF    5  LAST 1437   17,2314   3 3136 0  +RMIN      CA       14MS
 0140                           17,2315   1 2317 1             TCF      +2
 0141     REF    6  LAST 1437   17,2316   4 3136 1  -RMIN      CS       14MS
 0142     REF    5  LAST 1437   17,2317   55'525 0             TS       TJU
 0143     REF    2  LAST 1403   17,2320   55'526 0  MINQR      TS       TJV
 0144     REF    1              17,2321   3 2350 0             CA       MINADR
 0145     REF    1              17,2322   55'477 0             TS       RETJADR
 0146     REF  163  LAST 1435   17,2323   3 4753 1             CA       ONE
 0147     REF    4  LAST 1437   17,2324   55'461 1             TS       OLDQRMIN
 0148     REF    3  LAST 1430   17,2325   55'505 1  MINRTN     TS       AXISCTR
 0149     REF   52  LAST 1436   17,2326   3 0111 0             CA       DAPBOOLS
 0150     REF    9  LAST 1430   17,2327   7 4737 1             MASK     CSMDOCKD
 0151                           17,2330   0 0006 1             EXTEND
 0152     REF    1              17,2331   1 2341 1             BZF      MIMRET
 0153     REF    4  LAST 1437   17,2332   51'505 0             INDEX    AXISCTR          IF DOCKED,USE 60MS MINIMUM IMPULSE
 0154     REF    6  LAST 1437   17,2333   11'525 0             CCS      TJU
 0155     REF    1              17,2334   3 4776 0             CA       60MS
 0156                           17,2335   1 2337 0             TCF      +2
 0157     REF    2  LAST 1437   17,2336   4 4776 1             CS       60MS
 0158     REF    5  LAST 1437   17,2337   51'505 0             INDEX    AXISCTR
 0159     REF    7  LAST 1437   17,2340   55'525 0             TS       TJU
 0160     REF   53  LAST 1437   17,2341   3 0111 0  MIMRET     CA       DAPBOOLS
 0161     REF    2  LAST 1435   17,2342   7 4742 0             MASK     ACRBTRAN
 0162     REF  503  LAST 1436   17,2343   10 000 0             CCS      A
 0163     REF  164  LAST 1437   17,2344   3 4753 1             CA       ONE
 0164     REF   97  LAST 1435   17,2345   6 4752 0             AD       TWO
 0165     REF    8  LAST 1435   17,2346   55'742 0             TS       NUMBERT
 0166    REF    1               17,2347   1 2756 0              TCF      AFTERTJ

 0167    REF    3  LAST   256      4776             60MS        =        OCT140
 0168    REF    1               17,2350   C2325 1   MINAOR      GENAOR   MINRTN
 0169                           17,2351   C0063 1   OCT63       OCT      63
 0170    REF    1               17,3136             14MS        =        +TJMINT6

 0171    REF   37  LAST  1435   17,2352   3 4751 0  TRANS4      CA       FOUR
 0172    REF    1               17,2353   1 2216 1              TCF      TSNUMBRT

AC173                                               RATE COMMAND MOOE:

A0174                                               OESCRIPTION (SAME AS P-AXIS)

 0175    REF    2  LAST  1404   17,2354  55'632 0   CHEKSTIK    TS       INGTS              NOT IN GTS WHEN IN ATT HOLO
 0176    REF  165  LAST  1437   17,2355   4 4753 0              CS       ONE                1/ACCS WILL DO THF NULLING ORIVES
 0177    REF    4  LAST  1434   17,2356  55'630 1               TS       COTRCLER           COME BACK TC RCS NEXT TIME
 0178    REF   51  LAST  1424   17,2357   3 4735 1              CA       BIT15
 0179    REF    2  LAST  1424   17,2360   7 1443 1              MASK     CH31TEMP
 0180                           17,2361   0 0006 1              EXTENO
 0181    REF    1               17,2362   1 2377 1              BZF      RHCACTIV           BRANCH IF OUT OF OETENT.
 0182    REF    6  LAST  1434   17,2363   3 4740 0              CA       OURRCBIT           ***********
 0183    REF   54  LAST  1437   17,2364   7 0111 1              MASK     OAPBOOLS           *IN OETENT*   CHECK FCR MANUAL CONTROL
 0184                           17,2365   0 0006 1              EXTENO                      ***********   LAST TIME.
 0185    REF    1               17,2366   1 2710 1              BZF      STILLRCS
 0186    REF   34  LAST  1426   17,2367   4 4743 1              CS       BIT9
 0187    REF   45  LAST  1429   17,2370   7 1262 1              MASK     RCSFLAGS
 0188    REF   46  LAST  1438   17,2371  55'262 1               TS       RCSFLAGS           BIT 9 IS 0.
 0189    REF    1               17,2372   1 2374 1              TCF      OAMPING
 0190    REF    6  LAST  1425      4771             40CYCL      =        OCT50
 0191    REF   62  LAST  1436      4753             1/10S       =        BIT1
 0192                           17,2373   C0056 1   LINRAT      DEC      46
R0193    ==============================
 0194    REF  291  LAST  1436   17,2374   3 4755 1  OAMPING     CA       ZERO
 0195    REF    2  LAST  1426   17,2375  55'462 1               TS       SAVEHANC
 0196    REF    3  LAST  1438   17,2376  55'463 0               TS       SAVEHANO +1
 0197    REF    4  LAST  1438   17,2377  11'462 1   RHCACTIV    CCS      SAVEHANC           *******************
 0198                           17,2400   1 2403 0              TCF      +3                  Q,R MANUAL CONTROL  WC = A*(B+|0|)*0
 0199                           17,2401   1 2403 0              TCF      +2                 *******************
 0200                           17,2402   1 2403 0              TCF      +1
 0201                           17,2403   6 0000 1              OOUBLE                        WHERE
 0202                           17,2404   6 0000 1              OOUBLE
 0203    REF    1               17,2405   6 2373 1              AO       LINRAT                       WC = COMMANDEO ROTATIONAL RATE
 0204                           17,2406   0 0006 1              EXTENO                                A  = QUADRATIC SENSITIVITY FACTOR
 0205    REF    5  LAST  1438   17,2407   7 1462 1              MP       SAVEHAND                     B  = LINEAR/QUAORATIC SENSITIVITY
 0206    REF  280  LAST  1429   17,2410   3 0001 0              CA       L                            |0|= ABS. VALUE CF DEFLECTION
 0207                           17,2411   0 0006 1              EXTENO                                0  = HAND CCNTRCLLER OEFLECTION
 0208    REF    7  LAST  1426   17,2412   7 1444 0              MP       STIKSENS
 0209    REF    3  LAST  1425   17,2413  57'455 1               XCH      QLAST              COMMANO Q RATE      SCALEO 45 OEG/SEC
 0210                           17,2414   4 CC00 0              COM
 0211   REF   4  LAST 1438    17,2415  6 1455 1             AD      QLAST
 0212   REF   5  LAST 1416    17,2416  55'740 1             TS      DAPTEMP3
 0213   REF   6  LAST 1438    17,2417  11'463 0             CCS     SAVEHAND +1
 0214                         17,2420  1 2423 1             TCF     +3
 0215                         17,2421  1 2423 1             TCF     +2
 0216                         17,2422  1 2423 1             TCF     +1
 0217                         17,2423  6 0000 1             DOUBLE
 0218                         17,2424  6 0000 1             DOUBLE
 0219   REF   2  LAST 1438    17,2425  6 2373 1             AD      LINRAT
 0220                         17,2426  0 0006 1             EXTEND
 0221   REF   7  LAST 1439    17,2427  7 1463 0             MP      SAVEHAND +1
 0222   REF 281  LAST 1438    17,2430  3 0001 0             CA      L
 0223                         17,2431  0 0006 1             EXTEND
 0224   REF   8  LAST 1438    17,2432  7 1444 0             MP      STIKSENS
 0225   REF   3  LAST 1425    17,2433  57'456 1             XCH     RLAST
 0226                         17,2434  4 0000 0             COM
 0227   REF   4  LAST 1439    17,2435  6 1456 1             AD      RLAST
 0228   REF   3  LAST  134    17,2436  55'741 0             TS      DAPTEMP4
 0229   REF   5  LAST 1439    17,2437  4 1455 0             CS      QLAST          INTERVAL.
 0230   REF  14  LAST 1433    17,2440  6 1422 1             AD      OMEGAQ
 0231   REF   1               17,2441  55'436 0             TS      QRATEDIF
 0232   REF   5  LAST 1439    17,2442  4 1456 0             CS      RLAST
 0233   REF   9  LAST 1433    17,2443  6 1423 0             AD      OMEGAR
 0234   REF   1               17,2444  55'437 1             TS      RRATEDIF
 0235   REF   2  LAST 1439    17,2445  53'437 1   ENTERQR   DXCH    QRATEDIF       TRANSFORM RATES FROM Q,R TO U,V AXES
 0236   REF   2  LAST 1434    17,2446  0 3200 0             TC      ROT-TOUV
 0237   REF   1               17,2447  53'427 0             DXCH    URATEDIF
 0238   REF   6  LAST 1439    17,2450  11'740 1             CCS     DAPTEMP3       CHECK IF Q COMMAND CHANGE EXCEEDS
 0239                         17,2451  0 2454 0             TC      +3             BREAKOUT LEVEL.  IF NOT, CHECK R.
 0240                         17,2452  0 2454 0             TC      +2
 0241                         17,2453  0 2454 0             TC      +1
 0242   REF   6  LAST 1427    17,2454  6 1476 0             AD      -RATEDB
 0243                         17,2455  0 0006 1             EXTEND
 0244                         17,2456  6 2460 1             BZMF    +2
 0245   REF   1               17,2457  1 2476 1             TCF     ENTERUV -2     BREAKOUT LEVEL EXCEEDED.  DIRECT RATE.
 0246   REF   4  LAST 1439    17,2460  11'741 0             CCS     DAPTEMP4       R COMMAND BREAKOUT CHECK.
 0247                         17,2461  0 2464 0             TC      +3
 0248                         17,2462  0 2464 0             TC      +2
 0249                         17,2463  0 2464 0             TC      +1
 0250   REF   7  LAST 1439    17,2464  6 1476 0             AD      -RATEDB
 0251                         17,2465  0 0006 1             EXTEND
 0252                         17,2466  6 2470 0             BZMF    +2
 0253   REF   2  LAST 1439    17,2467  1 2476 1             TCF     ENTERUV -2     BREAKOUT LEVEL EXCEEDED.  DIRECT RATE.
 0254   REF  47  LAST 1438    17,2470  3 1262 0             CA      RCSFLAGS       BREAKOUT LEVEL NOT EXCEEDED.  CHECK FOR
 0255   REF   2  LAST 1425    17,2471  7 4741 0             MASK    QRBIT          DIRECT RATE CONTROL LAST TIME.
 0256                         17,2472  0 0006 1             EXTEND
 0257                         17,2473  1 2475 1             BZF     +2
 0258   REF   3  LAST 1439    17,2474  1 2500 1             TCF     ENTERUV        CONTINUE DIRECT RATE CONTROL.
 0259   REF   2  LAST 1438    17,2475  1 2710 1             TCF     STILLRCS       PSEUDO-AUTO CONTROL.
 0260   REF   1               17,2476  3 4771 1             CA      40CYCL
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L         Q,R-AXES RCS AUTOPILOT                                                               USER'S PAGE NO.   7      E6 S4

 0261   REF   2  LAST 1414   17,2477  55'457 1            TS      TCQR
 0262                        17,2500  0 0004 0  ENTERUV   INHINT                         DIRECT RATE CONTROL.
 0263   REF  59  LAST 1436   17,2501  0 4674 0            TC      IBNKCALL
 0264   REF  13  LAST 1436   17,2502   40154 0            FCADR   ZATTEROR
 0265                        17,2503  0 0003 1            RELINT
 0266   REF 292  LAST 1438   17,2504  3 4755 1            CA      ZERO
 0267   REF   6  LAST 1425   17,2505  55'450 0            TS      DYERROR
 0268   REF   7  LAST 1440   17,2506  55'451 1            TS      DYERROR +1
 0269   REF   6  LAST 1425   17,2507  55'452 1            TS      DZERROR
 0270   REF   7  LAST 1440   17,2510  55'453 0            TS      DZERROR +1
 0271   REF   2  LAST 1439   17,2511  11'426 1            CCS     URATEDIF
 0272                        17,2512  1 2515 0            TCF     +3
 0273                        17,2513  1 2515 0            TCF     +2
 0274                        17,2514  1 2515 0            TCF     +1
 0275   REF   2  LAST 1427   17,2515  6 1476 0            AD      TARGETDB               IF TARGET DB IS EXCEEDED, CONTINUE
 0276                        17,2516  0 0006 1            EXTEND                         DIRECT RATE CONTROL.
 0277   REF   1              17,2517  6 2533 0            BZMF    VDB
 0278   REF   1              17,2520  11'427 0            CCS     VRATEDIF
 0279                        17,2521  1 2524 1            TCF     +3
 0280                        17,2522  1 2524 1            TCF     +2
 0281                        17,2523  1 2524 1            TCF     +1
 0282   REF   3  LAST 1440   17,2524  6 1476 0            AD      TARGETDB
 0283                        17,2525  0 0006 1            EXTEND
 0284                        17,2526  6 2530 0            BZMF    +2
 0285   REF   1              17,2527  1 2544 1            TCF     QRTIME
 0286   REF 293  LAST 1440   17,2530  3 4755 1            CA      ZERO
 0287   REF   2  LAST 1440   17,2531  55'427 0            TS      VRATEDIF
 0288   REF   2  LAST 1440   17,2532  1 2544 1            TCF     QRTIME
 0289   REF   3  LAST 1440   17,2533  11'427 0  VDB       CCS     VRATEDIF
 0290                        17,2534  0 2537 1            TC      +3
 0291                        17,2535  0 2537 1            TC      +2
 0292                        17,2536  0 2537 1            TC      +1
 0293   REF   4  LAST 1440   17,2537  6 1476 0            AD      TARGETDB               IF TARGET DB IS EXCEEDED, CONTINUE
 0294                        17,2540  0 0006 1            EXTEND                         DIRECT RATE CONTROL.  IF NOT, FIRE AND
 0295   REF   1              17,2541  6 2553 0            BZMF    TOPSEUDO               SWITCH TO PSEUDO-AUTO CONTROL ON NEXT
 0296   REF 294  LAST 1440   17,2542  3 4755 1            CA      ZERO                   PASS.
 0297   REF   3  LAST 1440   17,2543  55'426 1            TS      URATEDIF
 0298   REF   3  LAST 1440   17,2544  3 1457 0  QRTIME    CA      TCQR                   DIRECT RATE TIME CHECK.
 0299                        17,2545  0 0006 1            EXTEND
 0300                        17,2546  6 2553 0            BZMF    +5                     BRANCH IF TIME EXCEEDS 4 SEC.
 0301   REF  48  LAST 1439   17,2547  4 1262 1            CS      RCSFLAGS
 0302   REF   3  LAST 1439   17,2550  7 4741 0            MASK    QRBIT
 0303   REF  49  LAST 1440   17,2551  27'262 1            ADS     RCSFLAGS               BIT 11 IS 1.
 0304                        17,2552  0 2556 0            TC      +4
 0305   REF   4  LAST 1440   17,2553  4 4741 0  TOPSEUDO  CS      QRBIT
 0306   REF  50  LAST 1440   17,2554  7 1262 1            MASK    RCSFLAGS
 0307   REF  51  LAST 1440   17,2555  55'262 1            TS      RCSFLAGS               BIT 11 IS 0.
 0308   REF   1              17,2556  3 2622 0            CA      HANDADR
 0309   REF   2  LAST 1437   17,2557  55'477 0            TS      RETJADR
 0310   REF 166  LAST 1438   17,2560  3 4753 1            CA      ONE
 0311    REF   6  LAST 1437    17,2561  55'505 1  BACKHAND TS      AXISCTR

 0312    REF  38  LAST 1438    17,2562  3 4751 0           CA      FOUR
 0313    REF   9  LAST 1437    17,2563  55'742 0           TS      NUMBERT

 0314    REF   7  LAST 1441    17,2564  51'505 0           INDEX   AXISCTR
 0315    REF   3  LAST 1404    17,2565  51'534 1           INDEX   SKIPU
 0316                          17,2566  1 2567 0           TCF     +1
 0317    REF  39  LAST 1441    17,2567  3 4751 0           CA      FOUR
 0318    REF   8  LAST 1441    17,2570  51'505 0           INDEX   AXISCTR
 0319    REF   4  LAST 1441    17,2571  55'534 0           TS      SKIPU
 0320    REF   1               17,2572  1 3034 1           TCF     LOOPER

 0321    REF   9  LAST 1441    17,2573  51'505 0           INDEX   AXISCTR
 0322    REF   4  LAST 1440    17,2574  11'426 1           CCS     URATEDIF       INDEX  AXIS     QUANITY
 0323    REF 295  LAST 1440    17,2575  3 4755 1           CA      ZERO             0     -U      1/JETACC-ADSU
 0324                          17,2576  1 2600 1           TCF     +2               1     +U      1/JETACC+ADSU
 0325    REF 167  LAST 1440    17,2577  3 4753 1           CA      ONE             16     -V      1/JETACC-ADSV
 0326    REF  10  LAST 1441    17,2600  51'505 0           INDEX   AXISCTR         17     +V      1/JETACC+ADSV
 0327    REF   1               17,2601  6 3755 0           AD      AXISDIFF       JETACC = 2 JET ACCELERATION (1 FOR FAIL)

 0328    REF 504  LAST 1437    17,2602  50 000 1           INDEX   A
 0329    REF   1               17,2603  4 1570 0           CS      1/ANET2 +1
 0330                          17,2604  0 0006 1           EXTEND
 0331    REF  11  LAST 1441    17,2605  5 1505 0           INDEX   AXISCTR        URATEDIF IS SCALED AT PI/4 RAD/SEC
 0332    REF   5  LAST 1441    17,2606  7 1426 1           MP      URATEDIF        JET TIME IN A       SCALED 32 SEC
 0333    REF 409  LAST 1432    17,2607  54 002 1           TS      Q
 0334    REF 505  LAST 1441    17,2610  20 001 1           DAS     A
 0335    REF 410  LAST 1441    17,2611  6 0002 0           AD      Q
 0336    REF 506  LAST 1441    17,2612  54 000 0           TS      A               OVERFLOW SKIP
 0337                          17,2613  1 2615 0           TCF     +2
 0338    REF 411  LAST 1441    17,2614  3 0002 0           CA      Q              RIGHT SIGN AND BIGGER THAN 150MS
 0339    REF  12  LAST 1441    17,2615  51'505 0  SETTIME  INDEX   AXISCTR
 0340    REF   8  LAST 1437    17,2616  55'525 0           TS      TJU            SCALED AT 10.67 WHICH IS CLOSE TO 10.24
 0341    REF   2  LAST 1438    17,2617  1 2756 0           TCF     AFTERTJ

 0342    REF 296  LAST 1441    17,2620  3 4755 1  ZEROTJ   CA      ZERO
 0343    REF   1               17,2621  1 2615 0           TCF     SETTIME

 0344    REF   1               17,2622   02561 1  HANDADR  GENADR  BACKHAND

A0345                                             GTS WILL BE TRIED IF
A0346                                                1. USEQRJTS= 0,
A0347                                                2. ALLOWGTS POS,
A0348                                                3. JETS ARE OFF(Q,R-AXES)
 0349    REF   4  LAST  858    17,2623  3 4736 1  TRYGTS   CAF     USEQRJTS       IS JET USE MANDATORY.        (AS LONG AS
 0350    REF  55  LAST 1438    17,2624  7 0111 1           MASK    DAPBOOLS       USEQRJTS BIT IS NOT BIT 15, CCS IS SAFE)
 0351    REF 507  LAST 1441    17,2625  10 000 0           CCS     A
 0352    REF   1               17,2626  1 2141 0           TCF     RCS
 0353    REF   2  LAST 1404    17,2627  11'502 0           CCS     ALLOWGTS       NO.  DOES AOSTASK CK CONTROL FOR GTS?
 0354                               17,2630  1 2632 0             TCF     +2
 0355    REF    2  LAST 1441        17,2631  1 2141 0             TCF     RCS
 0356                               17,2632  0 0006 1             EXTEND
 0357    REF    6  LAST 1405        17,2633  00 005 1             READ    CHAN5
 0358    REF  508  LAST 1441        17,2634  10 000 0             CCS     A
 0359    REF    1                   17,2635  1 2641 1             TCF     CHKINGTS
 0360                               17,2636  0 0006 1   GOTOGTS   EXTEND
 0361    REF    1                   17,2637  3 2654 1             DCA     GTSCADR
 0362                               17,2640  52 006 0             DTCB

 0363    REF    3  LAST 1438        17,2641  11'632 0   CHKINGTS  CCS     INGTS           WAS THE TRIM GIMBAL CONTROLLING
 0364                               17,2642  1 2644 1             TCF     +2                YES.  SET UP A DAMPED NULLING DRIVE.
 0365    REF    3  LAST 1442        17,2643  1 2141 0             TCF     RCS               NO.  NULLING WAS SET UP BEFORE. DO RCS
 0366                               17,2644  0 0004 0             INHINT
 0367    REF   60  LAST 1440        17,2645  0 4674 0             TC      IBNKCALL
 0368    REF    1                   17,2646   43327 0             CADR    TIMEGMBL
 0369                               17,2647  0 0003 1             RELINT
 0370    REF  297  LAST 1441        17,2650  3 4755 1             CAF     ZERO
 0371    REF    4  LAST 1442        17,2651  55'632 0             TS      INGTS
 0372    REF    4  LAST 1442        17,2652  1 2141 0             TCF     RCS

 0373    REF   26  LAST 1434        E6,1634                       EBANK=  CDUXD
 0374    REF    1                   17,2653   03076 0   GTSCADR   2CADR   GTS
 0374    REF    1                   17,2654   42106 0
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P0375   SUBROUTINE TO COMPUTE Q,R-AXES ATTITUDE ERRORS FOR USE IN THE RCS AND GTS CONTROL LAWS AND THE DISPLAYS.

 0377   REF  14  LAST 1430   17,2655  30 033 1  QERRCALC CAE     CDUY               Q-ERROR CALCULATION
 0378                        17,2656  0 0006 1           EXTEND
 0379   REF   8  LAST 1430   17,2657  21'635 1           MSU     CDUYD              CDU ANGLE - ANGLE DESIRED (Y-AXIS)
 0380   REF  27  LAST 1427   17,2660  55'736 0           TS      DAPTEMP1           SAVE FOR RERRCALC
 0381                        17,2661  0 0006 1           EXTEND
 0382   REF   4  LAST 1416   17,2662  7 1415 1           MP      M21                (CDUY-CDUYD)*M21 SCALED AT PI RADIANS
 0383   REF   4  LAST 1430   17,2663  55'751 1           TS      E
 0384   REF  17  LAST 1413   17,2664  30 034 0           CAE     CDUZ               SECOND TERM CALCULATION:
 0385                        17,2665  0 0006 1           EXTEND
 0386   REF   7  LAST 1414   17,2666  21'636 1           MSU     CDUZD              CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0387   REF   9  LAST 1419   17,2667  55'737 1           TS      DAPTEMP2           SAVE FOR RERRCALC
 0388                        17,2670  0 0006 1           EXTEND
 0389   REF   7  LAST 1416   17,2671  7 1417 0           MP      M22                (CDUZ-CDUZD)*M22 SCALED AT PI RADIANS
 0390   REF   3  LAST 1400   17,2672  6 1275 0           AD      DELQERROR          KALCMANU INERFACE ERROR
 0391   REF   5  LAST 1443   17,2673  6 1751 0           AD      E
 0392   REF   4  LAST 1436   17,2674  57'450 1           XCH     QERROR             SAVE Q-ERROR FOR EIGHT-BALL DISPLAY.

 0393   REF  28  LAST 1443   17,2675  31'736 1  RERRCALC CAE     DAPTEMP1           R-ERROR CALCULATION:
 0394                        17,2676  0 0006 1           EXTEND                     CDU ANGLE -ANGLE DESIRED (Y-AXIS)
 0395   REF   4  LAST 1416   17,2677  7 1416 1           MP      M31                (CDUY-CDUYD)*M31 SCALED AT PI RADIANS
 0396   REF   6  LAST 1443   17,2700  55'751 1           TS      E
 0397   REF  10  LAST 1443   17,2701  31'737 0           CAE     DAPTEMP2           SECOND TERM CALCULATION:
 0398                        17,2702  0 0006 1           EXTEND                     CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0399   REF   5  LAST 1416   17,2703  7 1420 1           MP      M32                (CDUZ-CDUZD)*M32 SCALED AT PI RADIANS
 0400   REF   3  LAST 1400   17,2704  6 1276 0           AD      DELRERROR          KALCMANU INERFACE ERROR
 0401   REF   7  LAST 1443   17,2705  6 1751 0           AD      E
 0402   REF   4  LAST 1436   17,2706  57'452 0           XCH     RERROR             SAVE R-ERROR FOR EIGHT-BALL DISPLAY.
 0403   REF 412  LAST 1441   17,2707  0 0002 0           TC      Q
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P0404   "ATTSTEER" IS THE ENTRY POINT FOR Q,R-AXES (U,V-AXES) ATTITUDE CONTROL USING THE REACTION CONTROL SYSTEM

 0406   REF   3  LAST 1439   17,2710                ATTSTEER EQUALS STILLRCS       "STILLRCS" IS THE RCS EXIT FROM TRYGTS.

 0407   REF   5  LAST 1443   17,2710  3 1452 0  STILLRCS CA      RERROR
 0408   REF 509  LAST 1442   17,2711  22 000 1           LXCH    A
 0409   REF   5  LAST 1443   17,2712  3 1450 1           CA      QERROR
 0410   REF   3  LAST 1439   17,2713  0 3200 0           TC      ROT-TOUV
 0411   REF   2  LAST  132   17,2714  53'751 1           DXCH    UERROR

A0412                                           PREPARES CALL TO TJETLAW (OR SPSRCS(DOCKED))
A0413                                           PREFORMS SKIP LOGIC ON U OR V AXIS IF NEEDED.
 0414   REF   1              17,2715  3 3142 0  TJLAW    CA      TJLAWADR
 0415   REF   3  LAST 1440   17,2716  55'477 0           TS      RETJADR
 0416   REF 168  LAST 1441   17,2717  3 4753 1           CA      ONE
 0417   REF  13  LAST 1441   17,2720  55'505 1           TS      AXISCTR
 0418   REF  14  LAST 1444   17,2721  51'505 0           INDEX   AXISCTR
 0419   REF   5  LAST 1441   17,2722  51'534 1           INDEX   SKIPU
 0420                        17,2723  1 2724 0           TCF     +1
 0421   REF  40  LAST 1441   17,2724  3 4751 0           CA      FOUR
 0422   REF  15  LAST 1444   17,2725  51'505 0           INDEX   AXISCTR
 0423   REF   6  LAST 1444   17,2726  55'534 0           TS      SKIPU
 0424   REF   2  LAST 1441   17,2727  1 3034 1           TCF     LOOPER
 0425   REF  16  LAST 1444   17,2730  51'505 0           INDEX   AXISCTR
 0426   REF   3  LAST 1444   17,2731  3 1750 1           CA      UERROR
 0427   REF   8  LAST 1443   17,2732  55'751 1           TS      E
 0428   REF  17  LAST 1444   17,2733  51'505 0           INDEX   AXISCTR
 0429   REF  12  LAST 1434   17,2734  3 1426 0           CA      OMEGAU
 0430   REF   2  LAST  131   17,2735  55'427 0           TS      EDOT
 0431   REF  56  LAST 1441   17,2736  3 0111 0           CA      DAPBOOLS
 0432   REF  10  LAST 1437   17,2737  7 4737 1           MASK    CSMDOCKD
 0433   REF 510  LAST 1444   17,2740  10 000 0           CCS     A
 0434                        17,2741  1 2744 0           TCF     +3
 0435   REF   2  LAST 1430   17,2742  0 3304 0           TC      TJETLAW
 0436   REF   3  LAST 1441   17,2743  1 2756 0           TCF     AFTERTJ
 0437   REF  57  LAST 1444   17,2744  4 0111 1   +3      CS      DAPBOOLS       DOCKED.  IF GIMBAL USABLE DO GTS CONTROL
 0438   REF   5  LAST 1441   17,2745  7 4736 0           MASK    USEQRJTS         ON THE NEXT PASS.
 0439   REF 511  LAST 1444   17,2746  10 000 0           CCS     A              USEQRJTS BIT MUST NOT BE BIT 15.
 0440   REF   5  LAST 1438   17,2747  55'630 1           TS      COTROLER       GIMBAL USABLE.  STORE POSITIVE VALUE.
 0441                        17,2750  0 0004 0           INHINT
 0442   REF  61  LAST 1442   17,2751  0 4674 0           TC      IBNKCALL
 0443   REF   2  LAST 1430   17,2752   43736 1           CADR    SPSRCS         DETERMINE RCS CONTROL
 0444                        17,2753  0 0003 1           RELINT
 0445   REF  41  LAST 1444   17,2754  3 4751 0           CAF     FOUR           ALWAYS CALL FOR 2-JET CONTROL ABOUT U,V.
 0446   REF  10  LAST 1441   17,2755  55'742 0           TS      NUMBERT        FALL THROUGH TO JET SELECTION, ETC.

A0447                                           Q,R-JET-SELECTION-LOGIC

A0448                                           INPUT: AXISCTR        0,1 FOR  U,V
A0449                                                  SNUFFBIT       ZERO TJETU,V AND TRANS. ONLY IF SET IN A DPS BURN
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A0450                                                                TJU,TJV        JET TIME SCALED 10.24 SEC.
A0451                                                                NUMBERT        INDICATES NUMBER OF JETS AND TYPE OF POLICY
A0452                                                                RETJADR        WHERE TO RETURN TO

A0453                                                       OUTPUT:  NO.U(V)JETS  RATE DERIVATION FEEDBACK
A0454                                                                CHANNEL 5
A0455                                                                SKIPU,SKIPV FOR LESS THAN 150MS FIRING

A0456                                                       NOTES:  IN CASE OF FAILURE IN DESIRED ROTATION POLICY,"ALL" UNFAILED
A0457                                                               JETS OF THE DESIRED POLICY ARE SELECTED. SINCE THERE ARE ONLY
A0458                                                               TWO JETS, THIS MEANS THE OTHER ONE OR NONE, THE ALARM IS SENT
A0459                                                               IF NONE CAN BE FOUND.

A0460                                                               TIMES LESS THAN 14 MSEC ARE TAKEN TO CALL FOR A SINGLE-JET
A0461                                                               MINIMUM IMPULSE, WITH THE JET CHOSEN SEMI-RANDOMLY.

 0462   REF  34  LAST 1429   17,2756   3 0101 1  AFTERTJ  CA      FLAGWRD5          IF SNUFFBIT SET DURING A DPS BURN GO TO
 0463   REF   1              17,2757   7 4737 1           MASK    SNUFFBIT            XTRANS; THAT IS, INHIBIT CONTROL.
 0464                        17,2760   0 0006 1           EXTEND
 0465   REF   1              17,2761   1 2772 0           BZF     DOROTAT
 0466   REF  23  LAST 1435   17,2762   4 0106 1           CS      FLGWRD10
 0467   REF  15  LAST 1435   17,2763   7 4737 1           MASK    APSFLBIT
 0468                        17,2764   0 0006 1           EXTEND
 0469   REF   2  LAST 1445   17,2765   1 2772 0           BZF     DOROTAT
 0470   REF  58  LAST 1444   17,2766   3 0111 0           CA      DAPBOOLS
 0471   REF   5  LAST 1435   17,2767   7 4744 0           MASK    DRIFTBIT
 0472                        17,2770   0 0006 1           EXTEND
 0473   REF   3  LAST 1437   17,2771   1 3112 1           BZF     XTRANS

 0474   REF  98  LAST 1437   17,2772   3 4752 0  DOROTAT  CAF     TWO
 0475   REF 282  LAST 1439   17,2773  54 0001 1           TS      L
 0476   REF  18  LAST 1444   17,2774  51'505 0            INDEX   AXISCTR
 0477   REF   9  LAST 1441   17,2775  11'525 0            CCS     TJU
 0478                        17,2776   1 3003 0           TCF     +5
 0479   REF   1              17,2777   1 3026 1           TCF     NOROTAT
 0480                        17,3000   1 3002 1           TCF     +2
 0481   REF   2  LAST 1445   17,3001   1 3026 1           TCF     NOROTAT
 0482                        17,3002  22 0007 0           ZL
 0483   REF 169  LAST 1444   17,3003   6 4753 1           AD      ONE
 0484   REF   5  LAST 1429   17,3004  55'736 0            TS      ABSTJ

 0485   REF  19  LAST 1445   17,3005   3 1505 0           CA      AXISCTR
 0486   REF 283  LAST 1445   17,3006   6 0001 0           AD      L
 0487   REF   8  LAST 1435   17,3007  55'743 1            TS      ROTINDEX          0 1 2 3  = -U -V -+U +V

 0488   REF   6  LAST 1445   17,3010   3 1736 1           CA      ABSTJ
 0489   REF   1              17,3011   6 3137 1           AD      -150MS
 0490                        17,3012   0 0006 1           EXTEND
 0491   REF   1              17,3013   6 3037 0           BZMF    DOSKIP
 0492    REF   2  LAST 1435   17,3014  0 3225 1              TC       SELCTSUB

 0493    REF  20  LAST 1445   17,3015  51'505 0              INDEX    AXISCTR
 0494    REF   1              17,3016  3 3134 1              CA       INDEXES
 0495    REF 284  LAST 1445   17,3017  54 001 1              TS       L

 0496    REF   7  LAST 1436   17,3020  3 1740 0              CA       POLYTEMP
 0497                         17,3021  0 0004 0              INHINT
 0498    REF 285  LAST 1446   17,3022  50 001 0              INDEX    L
 0499    REF   4  LAST 1429   17,3023  0 5744 0              TC       WRITEP

 0500                         17,3024  0 0003 1              RELINT
 0501    REF   1              17,3025  1 3100 1              TCF      FEEDBACK

 0502    REF  21  LAST 1446   17,3026  51'505 0  NOROTAT     INDEX    AXISCTR
 0503    REF   2  LAST 1446   17,3027  3 3134 1              CA       INDEXES
 0504                         17,3030  0 0004 0              INHINT
 0505    REF 512  LAST 1444   17,3031  50 000 1              INDEX    A
 0506    REF   5  LAST 1446   17,3032  0 5743 1              TC       WRITEP -1

 0507                         17,3033  0 0003 1              RELINT
 0508    REF  22  LAST 1446   17,3034  11'505 1  LOOPER      CCS      AXISCTR
 0509    REF   4  LAST 1444   17,3035  0 1477 1              TC       RETJADR
 0510    REF   1              17,3036  1 3270 0              TCF      CLOSECUT
 0511    REF   7  LAST 1445   17,3037  4 1736 0  DOSKIP      CS       ABSTJ
 0512    REF   2  LAST 1438   17,3040  6 3136 0              AD       +TJMINT6            14MS
 0513                         17,3041  0 0006 1              EXTEND
 0514    REF   1              17,3042  6 3061 0              BZMF     NOTMIN

 0515    REF   8  LAST 1446   17,3043  27'736 0              ADS      ABSTJ
 0516    REF  23  LAST 1446   17,3044  51'505 0              INDEX    AXISCTR
 0517    REF  10  LAST 1445   17,3045  11'525 0              CCS      TJU
 0518    REF   3  LAST 1446   17,3046  3 3136 0              CA       +TJMINT6
 0519                         17,3047  1 3051 1              TCF      +2
 0520    REF   4  LAST 1446   17,3050  4 3136 1              CS       +TJMINT6
 0521    REF  24  LAST 1446   17,3051  51'505 0              INDEX    AXISCTR
 0522    REF  11  LAST 1446   17,3052  55'525 0              TS       TJU

 0523    REF   4  LAST 1435   17,3053  11'500 1              CCS      SENSETYP            ENSURE MIN-IMPULSE NOT AGAINST TRANS
 0524    REF   2  LAST 1446   17,3054  1 3060 0              TCF      NOTMIN -1
 0525                         17,3055  0 0006 1              EXTEND
 0526    REF   6  LAST  565   17,3056  00 004 0              READ     LOSCALAR
 0527    REF 170  LAST 1445   17,3057  7 4753 0              MASK     ONE
 0528    REF  11  LAST 1444   17,3060  55'742 0              TS       NUMBERT

 0529    REF   3  LAST 1446   17,3061  0 3225 1  NOTMIN      TC       SELCTSUB

 0530    REF  25  LAST 1446   17,3062  51'505 0              INDEX    AXISCTR
 0531    REF   3  LAST 1446   17,3063  3 3134 1              CA       INDEXES
 0532                         17,3064  0 0004 0              INHINT
 0533   REF    5  LAST 1429   17,3065  55'471 0               TS      T6FURTHA +1
 0534   REF    8  LAST 1446   17,3066  3 1740 0               CA      POLYTEMP
 0535   REF    6  LAST 1447   17,3067  51'471 1               INDEX   T6FURTHA +1
 0536   REF    6  LAST 1446   17,3070  0 5744 0               TC      WRITEP

 0537   REF    9  LAST 1446   17,3071  3 1736 1               CA      ABSTJ
 0538   REF    7  LAST 1447   17,3072  55'470 1               TS      T6FURTHA
 0539   REF    2  LAST 1429   17,3073  0 3143 1               TC      JTLST                IN QR BANK BY NOW

 0540                         17,3074  0 0003 1               RELINT

 0541   REF  298  LAST 1442   17,3075  3 4755 1               CA      ZERO
 0542   REF   26  LAST 1446   17,3076  51'505 0               INDEX   AXISCTR
 0543   REF    7  LAST 1444   17,3077  55'534 0               TS      SKIPU

 0544   REF   44  LAST 1381   17,3100  4 6250 1     FEEDBACK  CS      THREE
 0545   REF   12  LAST 1446   17,3101  6 1742 1               AD      NUMBERT
 0546                         17,3102  0 0006 1               EXTEND
 0547                         17,3103  6 3106 0               BZMF    +3

 0548   REF   99  LAST 1445   17,3104  3 4752 0               CA      TWO
 0549                         17,3105  1 3107 0               TCF     +2
 0550   REF  171  LAST 1446   17,3106  3 4753 1               CA      ONE
 0551   REF   27  LAST 1447   17,3107  51'505 0               INDEX   AXISCTR
 0552   REF    2  LAST  134   17,3110  55'522 1               TS      NO.UJETS
 0553   REF    3  LAST 1444   17,3111  1 3034 1               TCF     LOOPER

 0554   REF  299  LAST 1447   17,3112  3 4755 1     XTRANS    CA      ZERO
 0555   REF   12  LAST 1446   17,3113  55'525 0               TS      TJU
 0556   REF    3  LAST 1437   17,3114  55'526 0               TS      TJV
 0557   REF   42  LAST 1444   17,3115  3 4751 0               CA      FOUR
 0558                         17,3116  0 0004 0               INHINT
 0559   REF    8  LAST 1447   17,3117  57'534 1               XCH     SKIPU
 0560                         17,3120  0 0006 1               EXTEND
 0561                         17,3121  1 3123 0               BZF     +2
 0562   REF    1              17,3122  0 5747 0               TC      WRITEU -1
 0563   REF   43  LAST 1447   17,3123  3 4751 0               CA      FOUR
 0564   REF    2  LAST 1404   17,3124  57'535 0               XCH     SKIPV
 0565                         17,3125  0 0003 1               RELINT

 0566                         17,3126  0 0006 1               EXTEND
 0567   REF    2  LAST 1446   17,3127  1 3270 0               BZF     CLOSEOUT
 0568                         17,3130  0 0004 0               INHINT
 0569   REF    1              17,3131  0 5760 0               TC      WRITEV -1
 0570                         17,3132  0 0003 1               RELINT

 0571   REF    3  LAST 1447   17,3133  1 3270 0               TCF     CLOSEOUT
 0572                         17,3134   00004 0     INDEXES   DEC     4
 0573                         17,3135   00015 0               DEC     13
 0574                         17,3136   00026 0     +TJMINT6  DEC     22
 0575                          17,3137   77417 0  -150MS    DEC      -240
 0576                          17,3140   00600 1  BIT8,9    OCT      00600
 0577                          17,3141   00266 D  SCLNORM   OCT      266
 0578   REF   1                17,3142   C2720 0  TJLAWAOR  GENAOR  TJLAW +3         RETURN ADDRESS FOR RCS ATTITUDE CONTROL

A0579                                             THE JET LIST:
A0580                                             THIS IS A WAITLIST FCR T6RURTS.

A0581                                             CALLED BY:
A0582                                                       CA   TJ                TIME WHEN NEXT JETS WILL BE WRITTEN
A0583                                                       TS   T6FURTHA
A0584                                                       CA   INDEX             AXIS TO BE WIRTTEN AT IJ (FROM NOW)
A0585                                                       TS   T6FURTHA +1
AD586                                                       TC JTLST

A0587                                             EXAMPLE-  U-AXIS AUTOPILOT WILL WRITE ITS ROTATION CODE OF
A0588                                             JETS INTO CHANNEL 5.   IF IT DESIRES TO TURN OFF THIS PCLICY WITHIN
A0589                                             150MS AND THEN FIRE NEXTU, A CALL TO JTLST IS MADE WITH T6FURTHA
A0590                                             CCNTAINING THE TIME TC TURN OFF THE POLICY, T6FURTHA +1 THE INDEX
A0591                                             OF THE U-AXIS(4), AND NEXTU WILL CCNTAIN THE "U-TRANS" POLICY OR ZERO.

A0592                                             THE LIST IS EXACTLY 3 LONG.(THIS LEADS TO SKIP LOGIC AND 150MS LIMIT)
A0593                                              THE INPUT IS THE LAST MEMBER OF THE LIST

A0594                                             RETURNS BY:
AD595                                                   +  TC   Q

A0596                                             DEFINITIONS:(OUTPUT)
AC597                                             TIME6                  TIME OF NEXT RUPT
A0598                                             T6NEXT                 DELTA TIME TC NEXT RUPT
A0599                                             T6FURTHA               DELTA TIME FROM 2ND TC LAST RUPT
A060D                                             NXT6ACR                AXIS INDEX        0 - P-AXIS
AD601                                             T6NEXT +1              AXIS INDEX        4 - U-AXIS
A0602                                             T6FURTHA +1            AXIS INDEX       13 - V-AXIS
 0603   REF   8  LAST 1447     17,3143   4 1470 1  JTLST     CS      T6FURTHA
 0604   REF   5  LAST 1404     17,3144   6 0031 0            AD      TIME6
 0605                          17,3145   0 0006 1            EXTEND
 0606   REF   1                17,3146   6 3163 0            BZMF    MIDORLST         TIME6 - T IS IN A

 0607   REF   4  LAST 1404     17,3147   23'465 1            LXCH    NXT6ADR
 0608   REF   9  LAST 1404     17,3150   53'467 1            DXCH    T6NEXT
 0609   REF   9  LAST 1448     17,3151   53'471 0            DXCH    T6FURTHA
 0610   REF   6  LAST 1448     17,3152   54 031 1            TS      TIME6
 0611   REF   5  LAST 1448     17,3153   23'465 1            LXCH    NXT6ACR

 D612                          17,3154   C 0006 1  TURNON    EXTEND
 06121  REF   7  LAST 1426     17,3155   23'265 1            QXCH    C13QSAV
 D6122  REF  10  LAST 1426     17,3156   C 6022 1            TC      C13STALL

 06123  REF  52  LAST 1438     17,3157   3 4735 1            CA      BIT15
 0613                          17,3160  C CC06 1           EXTENO
 0614    REF  24  LAST 1426    17,3161  05 013 0           WOR     CHAN13
 0615    REF   8  LAST 1448    17,3162  0 1265 1           TC      C13QSAV

 0616    PEF  10  LAST 1448    17,3163  6 1466 1  MIOCRLST AD      T6NEXT
 0617                          17,3164  0 0006 1           EXTENO
 0618    REF   1               17,3165  6 3174 0           BZMF    LASTCHG           TIME6 + T6NEXT - T  IS IN A

 0619    REF  11  LAST 1449    17,3166  23'467 0           LXCH    T6NEXT +1
 0620    REF  10  LAST 1448    17,3167  53'471 0           OXCH    T6FURTHA
 0621                          17,3170  C 0006 1           EXTEND
 0622    REF   7  LAST 1448    17,3171  60 031 0           SU      TIME6
 0623    REF  12  LAST 1449    17,3172  53'467 1           OXCH    T6NEXT

 0624    REF 413  LAST 1443    17,3173  C 0002 0           TC      Q

 0625    REF 513  LAST 1446    17,3174  4 0000 0  LASTCHG  CS      A
 0626    REF  27  LAST 1387    17,3175  6 4754 C           AO      NEGO
 0627    REF  11  LAST 1449    17,3176  55'470 1           TS      T6FURTHA

 0628    REF 414  LAST 1449    17,3177  C 0002 0           TC      Q


R0629      ROT-TOUV IS ENTERED WITH THE Q-COMPONENT OF THE QUANTITY TO BE TRANSFORMED IN A AND THE R-COMPONENT IN L.
R0631    ROT-TOUV TRANSFORMS THE QUANTITY INTO THE NON-ORTHOGONAL U-V AXIS SYSTEM. IN THE U-V SYSTEM NO CROSS-COUPLING IS
R0633    PRODUCED FROM RCS JET FIRINGS. AT THE COMPLETION OF ROT-TOUV, THE U-COMPONENT OF THE TRANSFORMED QUANTITY IS IN
R0635    A AND THE V-COMPONENT IS IN L.

 0636    REF   1               17,3200  23'737 0  ROT-TOUV LXCH    ROTEMP2           (R) IS PUT INTO ROTEMP2
 0637                          17,3201  C 0006 1           EXTEND
 0638    REF   2  LAST  135    17,3202  7 1626 0           MP      COEFFQ
 0639    REF   2  LAST 1449    17,3203  57'737 0           XCH     ROTEMP2           (R) GOES TO A AND COEFFQ.(Q) TO ROTEMP2
 0640                          17,3204  C 0006 1           EXTENO
 0641    REF   1               17,3205  7 1627 1           MP      COEFFR
 0642    REF 286  LAST 1446    17,3206  54 001 1           TS      L                 COEFFR.(R) IS PUT INTO L
 0643    REF   3  LAST 1449    17,3207  6 1737 0           AO      ROTEMP2
 0644    REF   1               17,3210  55'736 0           TS      ROTEMP1           COEFFQ.(Q)+COEFFR.(R) IS PUT IN ROTEMP1
 0645                          17,3211  1 3215 0           TCF     +4
 0646    REF 514  LAST 1449    17,3212  5C 000 1           INOEX   A                 COEFFQ.(Q) + COEFFR.(R) HAS OVERFLOWED
 0647    REF   8  LAST 1412    17,3213  4 4734 1           CS      LIMITS            AND IS LIMITED TO POSMAX OR NEGMAX
 0648    REF   2  LAST 1449    17,3214  55'736 0           TS      ROTEMP1
 0649    REF   4  LAST 1449    17,3215  4 1737 1           CS      ROTEMP2
 0650    REF 287  LAST 1449    17,3216  6 0001 0           AO      L                 -COEFFQ.(Q) + COEFFR.(R) IS NOW IN A
 0651                          17,3217  54 007 1           TS      7
 0652                          17,3220  1 3223 0           TCF     +3
 0653    REF 515  LAST 1449    17,3221  5C 000 1           INOEX   A                 -COEFFQ.(Q) + COEFFR.(R) HAS OVERFLOWED
 0654    REF   9  LAST 1449    17,3222  4 4734 1           CS      LIMITS            AND IS LIMITED TO POSMAX OR NEGMAX
 0655    REF   3  LAST 1449    17,3223  23'736 1           LXCH    ROTEMP1           COEFFQ.(Q) + COEFFR.(R) IS PUT INTO L
 0656    REF 415  LAST 1449    17,3224  C 0002 0           TC      Q
 0657    REF   9  LAST 1445    17,3225  51'743 0  SELCTSUB INDEX   ROTINDEX
 0658    REF   1              17,3226   3 3257 1              CA       ALLJETS
 0659    REF  13  LAST 1447   17,3227  51'742 1              INDEX    NUMBERT
 0660    REF   1              17,3230   7 3263 1              MASK     TYPEPOLY
 0661    REF   9  LAST 1447   17,3231  55'740 1              TS       POLYTEMP

 0662    REF   7  LAST  213   17,3232   7 1257 1              MASK     CH5MASK
 0663    REF 516  LAST 1449   17,3233  10 000 0              CCS      A
 0664                         17,3234   1 3236 1              TCF      +2

 0665    REF 416  LAST 1449   17,3235   0 0002 0              TC       Q

 0666    REF  45  LAST 1447   17,3236   3 6250 0              CA       THREE
 0667    REF  14  LAST 1450   17,3237  55'742 0   FAILOOP    TS       NUMBERT
 0668    REF  10  LAST 1449   17,3240  51'743 0              INDEX    ROTINDEX
 0669    REF   2  LAST 1450   17,3241   3 3257 1              CA       ALLJETS
 0670    REF  15  LAST 1450   17,3242  51'742 1              INDEX    NUMBERT
 0671    REF   2  LAST 1450   17,3243   7 3263 1              MASK     TYPEPOLY
 0672    REF  10  LAST 1450   17,3244  55'740 1              TS       POLYTEMP
 0673    REF   8  LAST 1450   17,3245   7 1257 1              MASK     CH5MASK
 0674                         17,3246   0 0006 1              EXTEND
 0675    REF   1              17,3247   1 3235 1              BZF      FAILOOP -2
 0676    REF  16  LAST 1450   17,3250  11'742 0              CCS      NUMBERT
 0677    REF   2  LAST 1450   17,3251   1 3237 0              TCF      FAILOOP
 0678    REF  28  LAST 1447   17,3252  51'505 0              INDEX    AXISCTR
 0679    REF  13  LAST 1447   17,3253  55'525 0              TS       TJU
 0680    REF  51  LAST 1435   17,3254   0 5567 0              TC       ALARM
 0681                         17,3255    02004 1              OCT      02004
 0682    REF   3  LAST 1445   17,3256   1 3026 1              TCF      NORCTAT
 0683                         17,3257    00110 1   ALLJETS    OCT      00110              -U        6 13
 0684                         17,3260    00022 1              OCT      00022              -V        2  9
 0685                         17,3261    00204 1              OCT      00204              +U        5 14

 0686                         17,3262    00041 1              OCT      00041              +V        1 10
 0687                         17,3263    00125 1   TYPEPOLY   OCT      00125              -X  1 5 9  13
 0688                         17,3264    00252 1              OCT      00252              +X 2 6 10 14
 0689                         17,3265    00146 1              OCT      00146              A   2 5 10 13
 0690                         17,3266    00231 1              OCT      00231              B   1 6 9 14
 0691                         17,3267    00377 1              OCT      00377              ALL 1 2 5 6 9 10 13 14

R0692    THE FOLLOWING SETS THE INTERRUPT FLIP-FLOP AS SOON AS POSSIBLE, WHICH PERMITS A RETURN TO THE INTERRUPTED JOB.

 0694    REF   1              17,3270   3 3272 0   CLOSEOUT   CA       ADRRUPT
 0695    REF   1              17,3271   0 7757 0              TC       MAKERUPT

 0696    REF   1              17,3272    03273 1   ADRRUPT    ADRES    ENDJASK

 0697    REF   5  LAST 1420   17,3273  53'753 0   ENDJASK    DXCH     DAPARUPT
 0698    REF  13  LAST 1420   17,3274  52 011 0              DXCH     ARUPT
 0699    REF   2  LAST 1420   17,3275  53'755 0              DXCH     DAPBQRPT
 0700    REF   4  LAST 1420   17,3276  56 017 1              XCH      BRUPT
 0701    REF 417  LAST 145·   17,3277  22 002 0             LXCH    Q
 0702    REF  10  LAST 1421   17,3300  3 4735 1             CAF     NEGMAX          NEGATIVE DAPZRUPT SIGNALS JASK IS OVER.
 0703    REF   4  LAST 1420   17,3301  53 757 1             DXCH    DAPZRUPT
 0704    REF   2  LAST 1420   17,3302  52 016 1             DXCH    ZRUPT
 0705    REF   1              17,3303  1 5272 1             TCF     NOQRSM
 0706                            7757                       BLOCK   3
 0707    REF   5  LAST 1294      6000                       SETLOC  FFTAG6
 0708                            7757                       BANK

 0709    REF   1                                            COUNT*  $$/DAP

 0710                            7757  0 0006 1  MAKERUPT   EXTEND
 0711    REF   2  LAST 1450      7760  07 757 0             EDRUPT  MAKERUPT
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R0001    PROGRAM DESCRIPTION

R0002    DESIGNED BY: R. D. GOSS AND F. S. WEISSMAN

R0003    CODED BY: P. S. WEISSMAN 28 FEBRUARY 1968

R0004        TJETLAW IS CALLED AS A SUBROUTINE WHEN THE LEM IS NOT DOCKED AND THE  AUTOPILOT IS IN THE AUTOMATIC OR
R0006    ATTITUDE-HOLD MODE TO CALCULATE THE JET-FIRING-TIME (TJET) REQUIRED FOR THE AXIS INDICATED BY AXISCTR:
R0008                          -1 INDICATES THE P-AXIS
R0009                          +0 INDICATES THE U-AXIS
R0010                          +1 INDICATES THE V-AXIS.
R0011    THE REGISTERS E AND EDOT CONTAIN THE APPROPRIATE ATTITUDE ERROR AND ERROR RATE AND SENSETYP SHOWS WHETHER
R0013    UNBALANCED COUPLES ARE PREFERRED.  TJETLAW ALSO USES VARIOUS FUNCTIONS OF ACCELERATION AND DEADBAND WHICH ARE
R0015    COMPUTED IN THE 1/ACCONT SECTION OF 1/ACCS AND ARE STORED IN SUCH AN ORDER THAT THEY CAN BE CONVENIENTLY
R0017    ACCESSED BY INDEXING.
R0018        THE SIGN OF THE REQUIRED ROTATION IS CARRIED THROUGH TJETLAW AS ROTSENSE AND IS FINALLY APPLIED TO TJET JUST
R0020    PREVIOUS TO ITS STORAGE IN THE LOCATION CORRESPONDING TO THE AXIS (TJP, TJU OR TJV).  THE NUMBER OF JETS THAT
R0022    TJETLAW ASSUMES WILL BE USED IS INDICATED BY THE SETTING OF NUMBERT FOR THE U- OR V-AXIS.  TWO JETS ARE ALWAYS
R0024    ASSUMED FOR THE P-AXIS  ALTHOUGH FOUR JETS WILL BE FIRED WHEN FIREFCT IS MORE NEGATIVE THAN -4.0 DEGREES
R0026    (FIREFCT IS THE DISTANCE TO A SWITCH CURVE IN THE PHASE PLANE) AND A LONG FIRING IS CALLED FOR.
R0028        IN ORDER TO AVOID SCALING DIFFICULTIES, SIMPLE ALGORITHMS TAGGED RLFLAW1, -2 AND -3 ARE RESORTED TO WHEN THE
R0030    ERROR AND/OR ERROR RATE ARE LARGE.

R0031    CALLING SEQUENCE:
R0032                TC      TJETLAW          (MUST BE IN JASK)
R0033       OR
R0034                INHINT                   (MUST BE IN JASK)
R0035                TC      IBNKCALL
R0036                CADR    TJETLAW
R0037                RELINT

R0038    EXIT: RETURN TO Q.

R0039    INPUT:
R0040       FROM THE CALLER: E, EDOT, AXISCTR, SENSETYP, TJP,-U,-V.
R0041       FROM 1/ACCONT: 48 ERASABLES BEGINNING AT BLOCKTOP (INCLUDING FLAT, ZONE3LIM AND ACCSWU,-V).

R0043    OUTPUT:
R0044       TJP,-U OR -V, NUMBERT (CAPTEMP5), FIREFCT (CAPTEMP3).

R0045    DEBRIS:
R0046       A, L, Q, E, EDOT, CAPTEMP1-6, CAPTREG1-4.

R0047    ALARM: NONE


 0048                                17,3304                      BANK    17
 0049    REF    4   LAST 1434        17,2000                      SETLOC  DAPS2
 0050                                17,3304                      BANK
 0051    REF   13   LAST 1431        E6,1524                      EBANK=  TJP
 0052    REF   1                                     COUNT* $$/DAPTJ

 0053                         17,3304  0 0006 1  TJETLAW  EXTEND                  SAVE Q FOR RETURN.
 0054    REF   1              17,3305  23'744 1           QXCH    HOLDQ

P0055    SET INDEXERS TO CORRESPOND TO THE AXIS AND TO THE SIGN OF EDOT

 0056    REF  29  LAST 1450   17,3306  51'505 0           INDEX   AXISCTR         AXISDIFF(-1)=NO OF LOCATIONS BET P AND U
 0057    REF   2  LAST 1441   17,3307  3 3755 0           CAF     AXISDIFF        AXISDIFF(0) = 0
 0058    REF   1              17,3310  55'745 1           TS      ADRSDIF1        AXISDIFF(+1)=NO OF LOCATIONS BET V AND U

 0059    REF   3  LAST 1444   17,3311  31'427 1           CAE     EDOT            IF EDOT NEGATIVE, PICK UP SET OF VALUES
 0060                         17,3312  0 0006 1           EXTEND                    THAT ALLOW USE OF SAME CODING AS FOR
 0061    REF   1              17,3313  6 3320 0           BZMF    NEGEDOT           POSITIVE EDOT.
 0062    REF   2  LAST 1453   17,3314  31'745 0           CAE     ADRSDIF1        SET A SECOND INDEXER WHICH MAY BE
 0063    REF   1              17,3315  55'743 1           TS      ADRSDIF2          MODIFIED BY A DECISION FOR MAX JETS.
 0064    REF   1              17,3316  3 3757 1           CAF     SENSOR          FOR POSITIVE EDOT, ROTSENSE IS
 0065    REF   1              17,3317  1 3330 0           TCF     SETSENSE          INITIALIZED POSITIVE.

 0066    REF   9  LAST 1444   17,3320  4 1751 1  NEGEDOT  CS      E               IN ORDER FOR NEG EDOT CASE TO USE CODING
 0067    REF  10  LAST 1453   17,3321  55'751 1           TS      E                 OF POS EDOT, MUST MODIFY AS FOLLOWS:
 0068    REF   4  LAST 1453   17,3322  4 1427 0           CS      EDOT              1.COMPLEMENT E AND EDOT.
 0069    REF   5  LAST 1453   17,3323  55'427 0           TS      EDOT              2.SET SENSE OF ROTATION TO NEGATIVE
 0070    REF  63  LAST 1438   17,3324  3 4753 1           CAF     BIT1                (REVERSED LATER IF NECESSARY).
 0071    REF   3  LAST 1453   17,3325  27'745 1           ADS     ADRSDIF1          3.INCREMENT INDEXERS BY ONE SO THAT
 0072    REF   2  LAST 1453   17,3326  55'743 1           TS      ADRSDIF2            THE PROPER PARAMETERS ARE ACCESSED.
 0073    REF   2  LAST 1453   17,3327  4 3757 0           CS      SENSOR
 0074    REF   1              17,3330  55'737 1  SETSENSE TS      ROTSENSE

P0075    TEST MAGNITUDE OF E (ATTITUDE ERROR, SINGLE-PRECISION, SCALED AT PI RADIANS):
P0077             IF GREATER THAN (OR EQUAL TO) PI/16 RADIANS, GO TO THE SIMPLIFIED TJET ROUTINE.
P0079             IF LESS THAN PI/16 RADIANS. RESCALE TO PI/4.

 0080    REF  11  LAST 1453   17,3331  31'751 0           CAE     E               PICK UP ATTITUDE ERROR FOR THIS AXIS
 0081                         17,3332  0 0006 1           EXTEND
 0082    REF  50  LAST 1436   17,3333  7 4747 0           MP      BIT5            SHIFT RIGHT TEN BITS; IF A-REGISTER IS
 0083    REF 517  LAST 1450   17,3334  10 0000 0          CCS     A                 ZERO, RESCALE AND TEST EDOT.
 0084    REF   1              17,3335  1 3717 1           TCF     RUFLAW2
 0085    REF   1              17,3336  1 3340 1           TCF     SCALEE
 0086    REF   1              17,3337  1 3663 0           TCF     RUFLAW1
 0087    REF  57  LAST 1436   17,3340  3 4737 0  SCALEE   CAF     BIT13           ERROR IS IN L SCALED AT PI/16.  RESCALE
 0088                         17,3341  0 0006 1           EXTEND                    IT TO PI/4 AND SAVE IT.
 0089    REF 288  LAST 1449   17,3342  7 0001 1           MP      L
 0090    REF  12  LAST 1453   17,3343  55'751 1           TS      E

P0091    TEST MAGNITUDE OF EDOT (ERROR RATE SCALED AT PI/4 RADIANS/SECOND)
P0092             IF GREATER THAN (OR EQUAL TO) PI/32 RADIANS/SECOND, GO TO THE SIMPLIFIED TJET ROUTINE.
P0094             IF LESS THAN PI/32 RADIANS/SECOND, THEN RESCALE TO PI/32 RADIANS/SECOND.

 0096    REF   6  LAST 1453   17,3344  31'427 1           CAE     EDOT            PICK UP SINGLE-PRECISION ERROR-RATE
 0097                        17,3345  0 0006 1              EXTEND              FOR THIS AXIS=
 0098   REF  58  LAST 1425   17,3346  7 4750 0              MP      BIT4        SHIFT RIGHT ELEVEN BITS, IF THE A-REG IS
 0099                        17,3347  0 0006 1              EXTEND              ZERO, THEN RESCALE AND USE FINELAW.
 0100   REF   1              17,3350  1 3352 1              BZF     SCALEDOT
 0101   REF   1              17,3351  1 3725 0              TCF     RUFLAW3
R0102   *** FINELAW STARTS HERE ***

 0103   REF   7  LAST 1453   17,3352  23'427 1  SCALEDOT LXCH    EDOT        EDOT IS SCALED AT PI/32 RADIANS/SECOND.

 0104   REF   8  LAST 1454   17,3353  31'427 1              CAE     EDOT        COMPUTE (EDOT)(EDOT)
 0105                        17,3354  0 0006 1              EXTEND
 0106                        17,3355  7 0000 0              SQUARE              PRODUCT SCALED AT PI(2)/2(10) RAD/SEC.
 0107                        17,3356  0 0006 1              EXTEND
 0108   REF  58  LAST 1453   17,3357  7 4737 1              MP      BIT13       SHIFT RIGHT TWO BITS TO RESCALE EDOTSQ
 0109   REF   1              17,3360  55'736 0              TS      EDOTSQ        TO PI(2)/2(8) RAD(2)/SEC(2).

 0110   REF  13  LAST 1453   17,3361  11'751 1  ERRTEST  CCS     E           DOES BIG ERROR (THREE DEG BEYOND THE
 0111                        17,3362  1 3365 0              TCF     +3          DEADBAND) REQUIRE MAXIMUM JETS?
 0112                        17,3363  1 3365 0              TCF     +2
 01125                       17,3364  1 3365 0              TCF     +1
 0113   REF   1              17,3365  6 3760 0              AD      -3DEG
 0114                        17,3366  0 0006 1              EXTEND
 0115   REF   4  LAST 1453   17,3367  5 1745 0              INDEX   ADRSDIF1
 0116   REF   1              17,3370  61'600 0              SU      FIREDB
 0117                        17,3371  0 0006 1              EXTEND
 0118   REF   1              17,3372  6 3377 1              BZMF    SENSTEST    IF NOT: ARE UNBALANCED JETS PREFERRED?
 0119   REF 100  LAST 1447   17,3373  3 4752 0  MAXJETS  CAF     TWO         IF YES : INCREMENT ADDRESS LOCATOR AND
 0120   REF   3  LAST 1453   17,3374  27'743 1              ADS     ADRSDIF2      SET SWITCH FOR JET SELECT LOGIC TO 4.
 0121   REF  44  LAST 1447   17,3375  3 4751 0              CAF     FOUR          (ALWAYS DO THIS FOR P-AXIS)
 0122   REF   1              17,3376  1 3402 0              TCF     TJCALC
 0123   REF   5  LAST 1446   17,3377  11'500 1  SENSTEST CCS     SENSETYP    DOES TRANSLATION PREFER MIN JETS.
 0124   REF   2  LAST 1454   17,3400  1 3402 0              TCF     TJCALC      YES.  USE MIN-JET PARAMETERS.
 0125   REF   1              17,3401  1 3373 1              TCF     MAXJETS     NO.   GET MAX-JET PARAMETERS.
 0126   REF  17  LAST 1450   17,3402  55'742 0  TJCALC   TS      NUMBERT     SET TO +0,1,4 FOR (U,V-AXES) JET SELECT.

R0127   BEGINNING OF TJET CALCULATIONS:

 0128   REF   2  LAST 1454   17,3403  4 1736 0              CS      EDOTSQ      SCALED AT PI(2)/2(8).
 0129                        17,3404  0 0006 1              EXTEND
 0130   REF   4  LAST 1454   17,3405  5 1743 0              INDEX   ADRSDIF2
 0131   REF   8  LAST  135   17,3406  7 1566 1              MP      1/ANET1     .5/ACC SCALED AT 2(6)/PI SEC(2)/RADIAN.
 0132   REF   5  LAST 1454   17,3407  51'745 0              INDEX   ADRSDIF1
 0133   REF   2  LAST 1454   17,3410  6 1600 0              AD      FIREDB      DEADBAND SCALED AT PI/4 RADIAN.
 0134                        17,3411  0 0006 1              EXTEND
 0135   REF  14  LAST 1454   17,3412  61'751 0              SU      E           ATTITUDE ERROR SCALED AT PI/4 RADIAN.
 0136   REF   2  LAST 1431   17,3413  55'740 1              TS      FIREFCT     -E-.5(EDOTSQ)/ACC-DB AT PI/4 RADIAN.
 0137                        17,3414  0 0006 1              EXTEND
 0138   REF   1              17,3415  6 3575 0              BZMF    ZON1,2,3

 0139   REF   6  LAST 1454   17,3416  51'745 0  ZONE4,5  INDEX   ADRSDIF1
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L        TJET LAW                                                                                  USER'S PAGE NO.   4       E6 S4

 0140    REF    1               17,3417  31'572 0              CAE     1/ACOAST             .5/ACC SCALED AT  2(6)/PI WHERE
 0141                           17,3420  0 0006 1              EXTEND                          ACC = MAX(AMIN, ADB-).
 0142    REF    3  LAST 1454    17,3421  7 1736 0              MP      EDOTSQ               SCALED AT PI/2(8).
 0143    REF   15  LAST 1454    17,3422  6 1751 0              AD      E                    SCALED AT PI/4
 0144    REF    7  LAST 1454    17,3423  51'745 0              INDEX   ADRSDIF1
 0145    REF    1               17,3424  6 1602 1              AD      COASTDB              SCALED AT PI/4  POS. FOR NEG. INTERCEPT.
 0146                           17,3425  0 0006 1              EXTEND                       TEST E+.5(EDOTSQ)/ACC+DB AT PI/4 RADIAN.
 0147    REF    1               17,3426  6 3461 1              BZMF    ZONE5                IF FUNCTION NEGATIVE, FIND TJET.
A0148                                                                                       IF FUNCTION POSITIVE, IN ZONE 4.

R0149      ZONE 4 IS THE COAST REGION.  HOWEVER, IF THE JETS ARE ON AND DRIVING TOWARD
R0151        A. THE AXIS WITHIN + OR - (DB + FLAT) FOR DRIFTING FLIGHT, OR
R0152        B. THE USUAL TARGET PARABOLA FOR POWERED FLIGHT
R0153    THEN THE THRUSTERS ARE KEPT ON.

 0154    REF   30  LAST 1453    17,3427  51'505 0  ZONE4       INDEX   AXISCTR              IS THE CURRENT VALUE IN TJET NON-ZERO
 0155    REF    1               17,3430  4 1525 0              CS      TJETU                  WITH SENSE OPPOSITE TO EDOT,
 0156                           17,3431  0 0006 1              EXTEND                         (I.E., ARE JETS ON AND FIRING TOWARD
 0157    REF    2  LAST 1453    17,3432  7 1737 1              MP      ROTSENSE               THE DESIRABLE STATE).
 0158                           17,3433  0 0006 1              EXTEND
 0159    REF    1               17,3434  6 3455 0              BZMF    COASTTJ              NO.  COAST.

 0160    REF    1               17,3435  11'554 0  JETSON      CCS     FLAT                 YES. IS THIS DRIFTING OR POWERED FLIGHT?
 0161    REF    1               17,3436  1 3447 1              TCF     DRIFT/ON             DRIFTING. GO MAKE FURTHER TEST.

 0162    REF    3  LAST 1454    17,3437  4 1740 1              CS      FIREFCT              POWERED (OR ULLAGE). CAN TARGET PARABOLA
 0163    REF    8  LAST 1455    17,3440  51'745 0              INDEX   ADRSDIF1               BE REACHED FROM THIS POINT IN THE
 0164    REF    1               17,3441  6 1604 1              AD      AXISDIST               PHASE PLANE?
 0165                           17,3442  0 0006 1              EXTEND
 0166    REF    2  LAST 1455    17,3443  6 3455 0              BZMF    COASTTJ              NO. SET TJET = 0.
 0167    REF    1               17,3444  0 3561 0              TC      Z123COMP             YES. CALCULATE TJET AS THOUGH IN ZONE 1
 0168    REF    4  LAST 1455    17,3445  31'740 0              CAE     FIREFCT                AFTER COMPUTING THE REQUIRED
 0169    REF    1               17,3446  1 3615 1              TCF     ZONE1                  PARAMETERS.

 0170    REF    9  LAST 1455    17,3447  51'745 0  DRIFT/ON    INDEX   ADRSDIF1             CAN TARGET STRIP OF AXIS BE REACHED FROM
 0171    REF    3  LAST 1454    17,3450  4 1600 1              CS      FIREDB                 THIS POINT IN THE PHASE PLANE?
 0172                           17,3451  6 0000 1              DOUBLE
 0173    REF    5  LAST 1455    17,3452  6 1740 0              AD      FIREFCT
 0174                           17,3453  0 0006 1              EXTEND
 0175                           17,3454  6 3457 1              BZMF    +3
 0176    REF  300  LAST 1447    17,3455  3 4755 1  COASTTJ     CAF     ZERO                 NO.  SET TJET = 0.
 0177    REF    1               17,3456  1 3521 0              TCF     RETURNTJ

 0178    REF    2  LAST 1455    17,3457  0 3561 0              TC      Z123COMP             YES. CALCULATE TJET AS THOUGH IN ZONE 2
 0179    REF    1               17,3460  1 3602 1              TCF     ZONE2,3                OR 3 AFTER COMPUTING REQUIRED VALUES.

 0180    REF  289  LAST 1453    17,3461  54 001 1  ZONE5       TS      L                    TEMPORARILY STORE FUNCTION IN L.
 0181    REF    3  LAST 1455    17,3462  11'737 1              CCS     ROTSENSE             MODIFY ADRSDIF2 FOR ACCESSING 1/ANET2
 0182                           17,3463  1 3467 0              TCF     +4                   AND ACCFCTZ5, WHICH MUST BE PICKED UP
 0183    REF   22  LAST 1356    17,3464  0 5675 0              TC      CCSHOLE              FROM THE NEXT LOWER REGISTER IF THE
 0184   REF 101  LAST 1454   17,3465  4 4752 1             CS      TWO                (ACTUAL) ERROR RATE IS NEGATIVE.
 0185   REF   5  LAST 1454   17,3466  27'743 1             ADS     ADRSCIF2

 0186   REF 290  LAST 1455   17,3467  30 001 0   +4        CAE     L
 0187                        17,3470  0 0006 1             EXTEND
 0188   REF   6  LAST 1456   17,3471  5 1743 0             INDEX   ADRSCIF2           TTOAXIS AND HH ARE THE PARAMETERS UPON
 0189   REF   1              17,3472  7 1575 0             MP      ACCFCTZ5             WHICH THE APPROXIMATIONS TO TJET ARE
 0190                        17,3473  20 001 1             DOUBL                        BASED.
 0191                        17,3474  20 001 1             DOUBL
 0192   REF   1              17,3475  53'747 0             DXCH    HH                 DOUBLE PRECISION H SCALED AT 8 SEC(2).
 0193   REF   7  LAST 1456   17,3476  51'743 0             INDEX   ADRSCIF2
 0194   REF   2  LAST 1441   17,3477  31'567 1             CAE     1/ANET2            SCALED AT 2(7)/PI SEC(2)/RAD.
 0195                        17,3500  0 0006 1             EXTEND
 0196   REF   9  LAST 1454   17,3501  7 1427 0             MP      EDOT               SCALED AT PI/2(5)
 0197   REF   1              17,3502  55'741 0             TS      TTOAXIS            SCALED AT 4 SEC.

R0198   TEST WHETHER TJET GREATER THAN 50 MSEC.
 0199                        17,3503  0 0006 1             EXTEND
 0200   REF   1              17,3504  7 3767 0             MP      -.05AT2            H - .05 TTOAXIS - .00125 G.T. ZERO
 0201   REF   2  LAST 1456   17,3505  6 1746 0             AD      HH                   (SCALED AT 8 SEC(2) ).
 0202   REF   9  LAST 1300   17,3506  6 7751 0             AD      NEG2
 0203                        17,3507  0 0006 1             EXTEND
 0204   REF   1              17,3510  6 3536 1             BZMF    FORMULA1

R0205   TEST WHETHER TJET GREATER THAN 150 MSEC.
 0206   REF   2  LAST 1456   17,3511  31'741 1             CAE     TTOAXIS
 0207                        17,3512  0 0006 1             EXTEND
 0208   REF   1              17,3513  7 3770 0             MP      -.15AT2            H - .15 TTOAXIS - .01125 G.T. ZERO
 0209   REF   3  LAST 1456   17,3514  6 1746 0             AD      HH                   (SCALED AT 8 SEC(2) )
 0210   REF   1              17,3515  6 3761 1             AD      -.0112AB
 0211                        17,3516  0 0006 1             EXTEND
 0212   REF   1              17,3517  6 3546 0             BZMF    FORMULA2

R0213   IF TJET GREATER THAN 150 MSEC, ASSIGN IT VALUE OF 250 MSEC, SINCE THIS
R0214     IS ENOUGH TO ASSURE NO SKIP NEXT CSP (100 MSEC).

 0215   REF  31  LAST 1328   17,3520  3 4741 1  FULLTIME CAF     BIT11              250 MSEC SCALED AT 4 SEC.

R0216   RETURN TO CALLING PROGRAM WITH JET TIME SCALED AS TIME6 AND SIGNED.

 0217                        17,3521  0 0006 1  RETURNTJ EXTEND                   ALL BRANCHES TERMINATE HERE WITH TJET
 0218   REF   4  LAST 1455   17,3522  7 1737 1             MP      ROTSENSE             (SCALED AT 4 SEC) IN THE ACCUMULATOR.
 0219   REF  31  LAST 1455   17,3523  51'505 0             INDEX   AXISCTR            ROTSENSE APPLIES SIGN AND CHANGES SCALE.
 0220   REF   2  LAST 1455   17,3524  55'525 0             TS      TJETU
 0221                        17,3525  0 0006 1             EXTEND
 0222   REF  32  LAST 1456   17,3526  5 1505 0             INDEX   AXISCTR
 0223   REF   2  LAST  135   17,3527  7 1546 0             MP      ACCSWU             SET SWITCH FOR JET SELECT IF ROTATION IS
 0224   REF 291  LAST 1456   17,3530  30 001 0             CAE     L
 0225                        17,3531  0 0006 1             EXTEND                       IN A SENSE FOR WHICH 1/ACCS HAS FORCED
 0226                        17,3532  6 3535 1             BZMF    +3                   A MAX-JET CALCULATION.
 0227  REF  45  LAST 1454   17,3533  3 4751 0             CAF     FOUR
 0228  REF  18  LAST 1454   17,3534  55'742 0             TS      NUMBERT
 0229  REF   2  LAST 1453   17,3535  0 1744 1             TC      HOLDQ            RETURN VIA SAVED Q.

R0230      TJET = H/(.025 + TTOAXIS)   FOR TJET LESS THAN 50 MSEC.

 0231  REF   1              17,3536  4 3766 1  FORMULA1 CS      -.025AT4         .025 SEC SCALED AT 4.
 0232  REF   3  LAST 1456   17,3537  6 1741 1           AD      TTOAXIS          SCALED AT 4 SECONDS.
 0233  REF   4  LAST 1456   17,3540  53'747 0           DXCH    HH               STORE DENOMINATOR IN FIRST WORD OF H,
 0234                       17,3541  0 0006 1           EXTEND                     WHICH NEED NOT BE PRESERVED. PICK UP
 0235  REF   5  LAST 1457   17,3542  11'746 1           DV      HH                 DP H AND DIVIDE BY DENOMINATOR.
 0236                       17,3543  0 0006 1           EXTEND
 0237  REF  84  LAST 1415   17,3544  7 4736 0           MP      BIT14            RESCALE TJET FROM 2 TO USUAL 4 SEC.
 0238  REF   1              17,3545  1 3656 0           TCF     CHKMINTJ         CHECK THAT TJET IS NOT LESS THAN MINIMUM

R0239      TJET = (H + .00375)/(0.1 + TTOAXIS)   FOR TJET GREATER THAN 50 MSEC.

 0240                       17,3546  0 0006 1  FORMULA2 EXTEND
 0241  REF   1              17,3547  3 3772 0           DCA     .00375A8         .00375 SEC(2) SCALED AT 8.
 0242  REF   6  LAST 1457   17,3550  21'747 0           DAS     HH               STORE NUMERATORIN DP H, WHICH NEED NOT
A0243                                                                              BE PRESERVED.
 0244  REF   4  LAST 1457   17,3551  31'741 1           CAE     TTOAXIS          SCALED AT 4 SEC.
 0245  REF   1              17,3552  6 3762 1           AD      .1AT4            0.1 SEC SCALED AT 4.
 0246  REF   7  LAST 1457   17,3553  53'747 0           DXCH    HH               STORE DENOMINATOR IN FIRST WORD OF H,
 0247                       17,3554  0 0006 1           EXTEND                     WHICH NEED NOT BE PRESERVED.  PICK UP
 0248  REF   8  LAST 1457   17,3555  11'746 1           DV      HH                 DP NUMERATOR AND DIVIDE BY DENOMINATOR
 0249                       17,3556  0 0006 1           EXTEND
 0250  REF  85  LAST 1457   17,3557  7 4736 0           MP      BIT14            RESCALE TJET FROM 2 TO USUAL 4 SEC.
 0251  REF   2  LAST 1455   17,3560  1 3521 0           TCF     RETURNTJ         END SUBROUTINE.

R0252  SUBROUTINIZED COMPUTATIONS REQUIRED FOR ALL ENTRIES INTO CODING FOR ZONES 1, 2, AND 3.

R0254  REACHED BY TC FROM 3 POINTS IN TJETLAW.

 0255  REF   5  LAST 1456   17,3561  4 1737 1  Z123COMP CS      RDTSENSE         USED IN RETURNTJ SECTION TO RESCALE TJET
 0256  REF   6  LAST 1457   17,3562  55'737 1           TS      RDTSENSE           AS TIME6 AND GIVE IT PROPER SIGN.
 0257  REF  10  LAST 1456   17,3563  31'427 1           CAE     EDOT             SCALED AT PI/2(5) RAD/SEC.
 0258                       17,3564  0 0006 1           EXTEND
 0259  REF   8  LAST 1456   17,3565  5 1743 0           INDEX   ADRSDIF2
 0260  REF   9  LAST 1454   17,3566  7 1566 1           MP      1/ANET1          SCALED AT 2(7)/PI SEC(2)/RAD.
 0261  REF   5  LAST 1457   17,3567  55'741 0           TS      TTOAXIS          STORE TIME-TO-AXIS SCALED AT 4 SECONDS.
 0262  REF   1              17,3570  6 3773 1           AD      -TJMAX
 0263                       17,3571  0 0006 1           EXTEND                   IS TIME TO AXIS LESS THAN 150 MSEC.
 0264                       17,3572  6 3574 1           BZMF    +2
 0265  REF   1              17,3573  1 3520 1           TCF     FULLTIME         NO.  FIRE JETS, DO NOT CALCULATE TJET.
 0266                       17,3574  0 0002 0           RETURN                   YES.  GO ON TO FIND TJET

 0267  REF   3  LAST 1455   17,3575  0 3561 0  ZON1,2,3 TC      Z123COMP         SUBROUTINIZED PREPARATION FOR ZONE1,2,3.

R0268  IF THE (NEG) DISTANCE BEYOND PARABOLA IS LESS THAN FLAT, USE SPECIAL
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R0269   LOGIC TO ACQUIRE MINIMUM IMPULSE LIMIT CYCLE.  DURING POWERED FLIGHT
R0270   OR ULLAGE, FLAT = 0

 0271   REF   6  LAST 1455   17,3576  31'740 0           CAE    FIREFCT         SCALED AT PI/4 RAD.
 0272   REF   2  LAST 1455   17,3577  6 1554 1           AD     FLAT
 0273                        17,3600  0 0006 1           EXTEND
 0274   REF   2  LAST 1455   17,3601  6 3615 0           BZMF   ZONE1           NOT IN SPECIAL ZONES.

R0275   FIRE FOR AXIS OR, IF CLOSE, FIRE MINIMUM IMPULSE.  IF ON AXIS, COAST.

 0276   REF   1              17,3602  4 1555 1  ZONE2,3  CS     ZONE3LIM        HEIGHT OF MIN-IMPULSE ZONE SET BY 1/ACCS
 0277   REF   6  LAST 1457   17,3603  6 1741 1           AD     TTOAXIS           35 MSEC IN DRIFTING FLIGHT
 0278                        17,3604  0 0006 1           EXTEND                   ZERO WHEN TRYING TO ENTER GTS CONTROL.
 0279   REF   1              17,3605  6 3610 0           BZMF   ZONE3
 0280   REF   7  LAST 1458   17,3606  31'741 1  ZONE2    CAE    TTOAXIS         FIRE TO AXIS.
 0281   REF   3  LAST 1457   17,3607  1 3521 0           TCF    RETURNTJ
 0282   REF  11  LAST 1457   17,3610  11'427 0  ZONE3    CCS    EDOT            CHECK IF EDOT IS ZERO.
 0283   REF  67  LAST 1437   17,3611  3 4746 0           CAF    BIT6            FIRE A ONE-JET MINIMUM IMPULSE.
 0284   REF   4  LAST 1458   17,3612  1 3521 0           TCF    RETURNTJ        TJET = +0.
 0285   REF  23  LAST 1455   17,3613  0 5675 0           TC     CCSHOLE         CANNOT BE BECAUSE NEG EDOT COMPLEMENTED.
 0286   REF   5  LAST 1458   17,3614  1 3521 0           TCF    RETURNTJ        TJET = +0.

 0287                        17,3615  0 0006 1  ZONE1    EXTEND
 0288   REF  10  LAST 1455   17,3616  5 1745 0           INDEX  ADRSDIF1
 0289   REF   2  LAST 1455   17,3617  61'604 1           SU     AXISDIST        SCALED AT PI/4 RAD.
 0290                        17,3620  0 0006 1           EXTEND
 0291   REF   9  LAST 1457   17,3621  5 1743 0           INDEX  ADRSDIF2
 0292   REF   1              17,3622  7 1574 1           MP     ACCFCTZ1        SCALED AT 2(7)/PI SEC(2)/RAD.
 0293                        17,3623  20 001 1           DDOUBL
 0294                        17,3624  20 001 1           DDOUBL
 0295   REF   9  LAST 1457   17,3625  53'747 0           DXCH   HH              DOUBLE PRECISION H SCALED AT 8 SEC(2)

R0296   TEST WHETHER TOTAL TIME REQUIRED GREATER THAN 150 MSEC:
R0297                          2                                    2
R0298     IS .5(.150 - TTOAXIS)  - H   NEGATIVE (SCALED AT 8 SECONDS )

 0299   REF   8  LAST 1458   17,3626  31'741 1           CAE    TTOAXIS         TTOAXIS SCALED AT 4 SECONDS.
 0300   REF   2  LAST 1457   17,3627  6 3773 1           AD     -TJMAX          -.150 SECOND SCALED AT 4.
 0301                        17,3630  0 0006 1           EXTEND
 0302                        17,3631  7 0000 0           SQUARE
 0303                        17,3632  0 0006 1           EXTEND
 0304   REF  10  LAST 1458   17,3633  61'746 0           SU     HH              HIGH WORD OF H SCALED AT 8 SEC(2).
 0305                        17,3634  0 0006 1           EXTEND
 0306   REF   2  LAST 1457   17,3635  6 3520 0           BZMF   FULLTIME        YES. NEED NOT CALCULATE TJET.

R0307   TEST WHETHER TIME BEYOND AXIS GREATER THAN 50 MSEC TO DETERMINE WHICH APPROXIMATION TO USE.

 0309   REF  11  LAST 1458   17,3636  31'746 0           CAE    HH
 0310   REF  10  LAST 1456   17,3637  6 7751 0           AD     NEG2
 0311                        17,3640  0 0006 1           EXTEND
 0312   REF   1                17,3641  6 3651 0                BZMF    FORMULA3

R0313      TJET = H/0.1 + TTDAXIS + .0375   FOR APPROXIMATION OVER MORE THAN 50 MSEC.

 0315   REF   1                17,3642  3 3763 0                CAF     .1AT2             STORE .1 SEC SCALED AT 2 FOR DIVISION
 0316   REF  12  LAST 1458     17,3643  53'747 0                DXCH    HH                DP H SCALED AT 8 SEC(2) NEED NOT BE
 0317                          17,3644  0 0006 1                EXTEND                      PRESERVED.
 0318   REF  13  LAST 1459     17,3645  11'746 1                DV      HH                QUOTIENT SCALED AT 4 SECONDS.
 0319   REF   9  LAST 1458     17,3646  6 1741 1                AD      TTDAXIS           SCALED AT 4 SEC.
 0320   REF   1                17,3647  6 3764 1                AD      .0375AT4          .0375 SEC SCALED AT 4.
 0321   REF   6  LAST 1458     17,3650  1 3521 0                TCF     RETURNTJ          END COMPUTATION.

R0322      TJET = H/.025  + TTDAXIS   FOR APPROXIMATION OVER LESS THAN 50 MSEC.

 0323   REF   1                17,3651  4 3765 1  FORMULA3 CS      -.025AT2           STORE +.025 SEC SCALED AT 2 FOR DIVISION
 0324   REF  14  LAST 1459     17,3652  53'747 0                DXCH    HH                PICK UP DP H AT 8, WHICH NEED NOT BE
 0325                          17,3653  0 0006 1                EXTEND                      PRESERVED.
 0326   REF  15  LAST 1459     17,3654  11'746 1                DV      HH                QUOTIENT SCALED AT 4 SECONDS.
 0327   REF  10  LAST 1459     17,3655  6 1741 1                AD      TTDAXIS           SCALED AT 4 SEC.

R0328   IF COMPUTED JET TIME IS LESS THAN TJMIN, TJET IS SET TO ZERO.
R0329   MINIMUM IMPULSES REQUIRED IN ZONE 3 ARE NOT SUBJECT TO THIS CONSTRAINT, NATURALLY.
 0331   REF   1                17,3656  6 3775 1  CHKMINTJ AD      -TJMIN             IS COMPUTED TIME LESS THAN THE MINIMUM.
 0332                          17,3657  0 0006 1                EXTEND
 0333   REF   3  LAST 1455     17,3660  6 3455 0                BZMF    COASTTJ           YES, SET TIME TO ZERO.
 0334   REF   1                17,3661  6 3774 0                AD      TJMIN             NO, RESTORE COMPUTED TIME.
 0335   REF   7  LAST 1459     17,3662  1 3521 0                TCF     RETURNTJ          END COMPUTATION.
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P0336    *** ROUGHLAW ***

R0337      BEFORE ENTRY TO RUFLAW:
R0338        1. INDEXERS ADRSDIF1 AND ADRSDIF2 ARE SET ON BASIS OF AXIS, AND SIGN OF EDOT.
R0340        2. IF EDOT WAS NEGATIVE, E AND EDOT ARE ROTATED INTO UPPER HALF-PLANE AND ROTSENSE IS MADE NEGATIVE.
R0342        3. E IS SCALED AT PI RADIANS AND EDOT AT PI/4 RAD/SEC.
R0343           (EXCEPT THE RUFLAW3 ENTRY WHEN E IS AT PI/4)

R0344      RUFLAW1: ERROR MORE NEGATIVE THAN PI/16 RAD.  FIRE TO A RATE OF 6.5 DEG/SEC (IF JET TIME EXCEEDS 20 MSEC.).
R0346      RUFLAW2: ERROR MORE POSITIVE THAN PI/16 RAD.  FIRE TO AN OPPOSING RATE OF 6.5 DEG/SEC.
R0348      RUFLAW3: ERROR RATE GREATER THAN PI/32 RAD/SEC AND ERROR WITHIN BOUNDS.  COAST IF BELOW FIREFCT, FIRE IF ABOVE

 0350    REF    1                17,3663  4 3776 0  RUFLAW1  CS      RUFRATE         DECREMENT EDOT BY .1444 RAD/SEC AT PI/4
 0351    REF   12  LAST 1458     17,3664  27'427 0           ADS     EDOT              WHICH IS THE TARGET RATE
 0352                            17,3665  0 0006 1           EXTEND
 0353    REF    1                17,3666  6 3707 1           BZMF    SMALRATE        BRANCH IF RATE LESS THAN TARGET.
 0354    REF    1                17,3667  0 3745 1           TC      RUFSETUP        REVERSE ROTSENSE AND INDICATE MAX JETS.
 0355    REF   13  LAST 1460     17,3670  31'427 1           CAE     EDOT            PICK UP DESIRED RATE CHANGE.

 0356                            17,3671  0 0006 1  RUFLAW12 EXTEND                  COMPUTE TJET
 0357    REF   10  LAST 1458     17,3672  5 1743 0           INDEX   ADRSDIF2          =(DESIRED RATE CHANGE)/(2-JET ACCEL.)
 0358    REF   10  LAST 1457     17,3673  7 1570 0           MP      1/ANET1 +2
 0359    REF    3  LAST  989     17,3674  6 7744 1           AD      -1/8            IF TJET, SCALED AT 32 SEC, EXCEEDS
 0360                            17,3675  0 0006 1           EXTEND                    4 SECONDS, SET TJET TO TJMAX.
 0361                            17,3676  6 3700 0           BZMF    +2
 0362    REF    3  LAST 1458     17,3677  1 3520 1           TCF     FULLTIME
 03621                           17,3700  0 0006 1           EXTEND
 03622   REF    4  LAST 1460     17,3701  1 3520 1           BZF     FULLTIME
 0363    REF   40  LAST 1429     17,3702  6 4740 0           AD      BIT12           RESTORE COMPUTED TJET TO ACCUMULATOR.
 0364    REF  518  LAST 1453     17,3703  20 001 1           DAS     A
 0365    REF  519  LAST 1460     17,3704  20 001 1           DAS     A
 0366    REF  520  LAST 1460     17,3705  20 001 1           DAS     A               RESCALED TJET AT 4 SECONDS.
 0367    REF    2  LAST 1457     17,3706  1 3656 0           TCF     CHKMINTJ        RETURN AS FROM FINELAW.

 0368    REF    2  LAST 1460     17,3707  0 3747 0  SMALRATE TC      RUFSETUP +2     SET NUMBERT AND FIREFCT FOR MAXIMUM JETS
 0369    REF    7  LAST 1457     17,3710  11'737 1           CCS     ROTSENSE
 0370    REF  172  LAST 1447     17,3711  3 4753 1           CAF     ONE             MODIFY INDEXER TO POINT TO 1/ANET
 0371                            17,3712  1 3714 1           TCF     +2                CORRESPONDING TO THE PROPER SENSE.
 0372    REF   13  LAST 1278     17,3713  3 7752 0           CAF     NEGONE
 0373    REF   11  LAST 1460     17,3714  27'743 1           ADS     ADRSDIF2

 0374    REF   14  LAST 1460     17,3715  4 1427 0           CS      EDOT            (.144 AT PI/4 - EDOT)=DESIRED RATE CHNG.
 0375    REF    1                17,3716  1 3671 0           TCF     RUFLAW12

 0376    REF    3  LAST 1460     17,3717  0 3745 1  RUFLAW2  TC      RUFSETUP        REVERSE ROTSENSE AND INDICATE MAX JETS.
 0377    REF    2  LAST 1460     17,3720  3 3776 1           CAF     RUFRATE
 0378    REF   15  LAST 1460     17,3721  6 1427 1           AD      EDOT            (.144 AT PI/4 + EDOT)=DESIRED RATE CHNG
 0379    REF  521  LAST 1460     17,3722  54 000 0           TS      A               IF OVERFLOW SKIP, FIRE FOR FULL TIME.
 0380    REF    2  LAST 1460     17,3723  1 3671 0           TCF     RUFLAW12          OTHERWISE, COMPUTE JET TIME.
 0381    REF    5  LAST 1460     17,3724  1 3520 1           TCF     FULLTIME
 0382    REF   4  LAST 1460   17,3725  0 3745 1  RUFLAW3  TC      RUFSETUP       EXECUTE COMMON RUFLAW SUBROUTINE.
 0383    REF  11  LAST 1458   17,3726  51'745 0           INDEX   ADRSDIF1
 0384    REF   4  LAST 1455   17,3727  4 1600 1           CS      FIREDB         CALCULATE DISTANCE FROM SWITCH CURVE
 0385    REF  16  LAST 1455   17,3730  6 1751 0           AD      E                  1/ANET1*EDOT*EDOT +E - FIREDB = 0
 0386                         17,3731  0 0006 1           EXTEND                         SCALED AT 4 PI RADIANS
 0387    REF  32  LAST 1456   17,3732  7 4741 0           MP      BIT11
 0388    REF  16  LAST 1460   17,3733  57'427 1           XCH     EDOT
 0389                         17,3734  0 0006 1           EXTEND
 0390                         17,3735  7 0000 0           SQUARE
 0391                         17,3736  0 0006 1           EXTEND
 0392    REF  12  LAST 1461   17,3737  5 1745 0           INDEX   ADRSDIF1
 0393    REF  11  LAST 1460   17,3740  7 1570 0           MP      1/ANET1 +2
 0394    REF  17  LAST 1461   17,3741  6 1427 1           AD      EDOT
 0395                         17,3742  0 0006 1           EXTEND
 0396    REF   4  LAST 1459   17,3743  6 3455 0           BZMF    COASTTJ          COAST IF BELOW IT.
 0397    REF   6  LAST 1460   17,3744  1 3520 1           TCF     FULLTIME         FIRE FOR FULL PERIOD IF ABOVE IT.

R0398    SUBROUTINE USED IN ALL ENTRIES TO ROUGHLAW.

 0399    REF   8  LAST 1460   17,3745  4 1737 1  RUFSETUP CS      ROTSENSE       REVERSE ROTSENSE WHEN ENTER HERE.
 0400    REF   9  LAST 1461   17,3746  55'737 1           TS      ROTSENSE
 0401    REF  46  LAST 1457   17,3747  3 4751 0    +2     CAF     FOUR           REQUIRE MAXIMUM (2) JETS IN U,V-AXES.
 0402    REF  19  LAST 1457   17,3750  55'742 0           TS      NUMBERT
 0403    REF  11  LAST 1451   17,3751  3 4735 1           CAF     NEGMAX         SUGGEST MAXIMUM (4) JETS IN P-AXIS.
 0404    REF   7  LAST 1458   17,3752  55'740 1           TS      FIREFCT
 0405    REF 418  LAST 1451   17,3753  0 0002 0           TC      Q

R0406    CONSTANTS FOR TJETLAW

 0407                         17,3754   77757 1           DEC     -16            AXISDIFF(INDEX) = NUMBER OF REGISTERS
 0408                         17,3755   00000 1  AXISDIFF DEC     +0               BETWEEN STORED 1/ACCS PARAMETERS FOR
 0409                         17,3756   00020 0           DEC     16               THE INDEXED AXIS AND THE U-AXIS.
 0410                         17,3757   14400 0  SENSOR   OCT     14400          RATIO OF TJET SCALING WITHIN TJETLAW
A0411                                                                              (4 SEC) TO SCALING FOR T6 (10.24 SEC).
 0412                         17,3760   75673 1  -3DEG    DEC     -.06667        -3.0 DEGREES SCALED AT 45.
 0413                         17,3761   77750 0  -.0112A8 DEC     -.00141        -.01125 SEC(2) SCALED AT 8.
 0414                         17,3762   00632 0  .1AT4    DEC     .025           0.1 SECOND SCALED AT 4.
 0415                         17,3763   01463 1  .1AT2    DEC     .05            0.1 SEC SCALED AT 2.
 0416                         17,3764   00232 1  .0375AT4 DEC     .00938         .0375 SEC SCALED AT 4.
 0417                         17,3765   77462 1  -.025AT2 DEC     -.0125         -.025 SEC SCALED AT 2.
 0418                         17,3766   77631 0  -.025AT4 DEC     -.00625
 0419                         17,3767   77145 1  -.05AT2  DEC     -.025
 0420                         17,3770   75462 0  -.15AT2  DEC     -.075
 0421                         17,3771   00007 0  .00375A8 2DEC    .00375 B-3
 0421                         17,3772   25605 0
 0422                         17,3773   76631 1  -TJMAX   DEC     -.0375         LARGEST CALCULATED TIME. .150 SEC AT 4.
 0423                         17,3774   00122 0  TJMIN    DEC     .005           SMALLEST ALLOWABLE TIME. .020 SEC AT 4.
 0424                         17,3775   77655 1  -TJMIN   DEC     -.005
 0425                         17,3776   04476 0  RUFRATE  DEC     .1444          CORRESPONDS TO TARGET RATE OF 6.5 DEG/S.
 0001    REF   3  LAST 1447    E6,1522                        EBANK= NO.UJETS
 0002                          16,3645                        BANK   16
 0003    REF   3  LAST 1413    16,2000                        SETLOC DAPS1
 0004                          16,3645                        BANK

 0005    REF   1                                              COUNT* $$/DAP

 0006    REF 102  LAST 1456    16,3645  3 4752 0  RATELOOP CA     TWO
 0007    REF   3  LAST  134    16,3646  55'743 1           TS     DAPTEMP6
 00071                         16,3647  6 0000 1           DOUBLE
 00072   REF 419  LAST 1461    16,3650  54 002 1           TS     Q
 0008    REF   4  LAST 1462    16,3651  51'743 0           INDEX  DAPTEMP6
 0009    REF  14  LAST 1452    16,3652  11'524 1           CCS    TJP
 0010                          16,3653  1 3655 0           TCF    +2
 0011    REF   1               16,3654  1 3674 0           TCF    LOOPRATE
 0012    REF   1               16,3655  6 3735 0           AD     -100MST6
 0013                          16,3656  0 0006 1           EXTEND
 0014    REF   1               16,3657  6 3713 1           BZMF   SMALLTJU
 0015    REF   5  LAST 1462    16,3660  51'743 0           INDEX  DAPTEMP6
 0016    REF  15  LAST 1462    16,3661  11'524 1           CCS    TJP
 0017    REF   2  LAST 1462    16,3662  3 3735 0           CA     -100MST6
 0018                          16,3663  1 3665 0           TCF    +2
 0019    REF   3  LAST 1462    16,3664  4 3735 1           CS     -100MST6
 0020    REF   6  LAST 1462    16,3665  51'743 0           INDEX  DAPTEMP6
 0021    REF  16  LAST 1462    16,3666  27'524 1           ADS    TJP
 0022    REF   7  LAST 1462    16,3667  51'743 0           INDEX  DAPTEMP6
 0023    REF  17  LAST 1462    16,3670  11'524 1           CCS    TJP
 0024    REF   1               16,3671  4 3621 0           CS     -100MS             0.1 AT 1
 0025                          16,3672  1 3674 0           TCF    +2
 0026    REF   2  LAST 1462    16,3673  3 3621 1           CA     -100MS
 0027                          16,3674  0 0006 1  LOOPRATE EXTEND
 0028    REF   8  LAST 1462    16,3675  5 1743 0           INDEX  DAPTEMP6
 0029    REF   3  LAST 1429    16,3676  7 1521 1           MP     NO.PJETS
 0030    REF 292  LAST 1456    16,3677  3 0001 0           CA     L
 0031    REF   9  LAST 1462    16,3700  51'743 0           INDEX  DAPTEMP6
 00311   REF  29  LAST 1443    16,3701  55'736 0           TS     DAPTEMP1           SIGNED TORQUE AT 1 JET-SEC FOR FILTER
 00312                         16,3702  0 0006 1           EXTEND
 00313   REF  51  LAST 1402    16,3703  7 4742 0           MP     BIT10              RESCALE TO 32; ONE BIT ABOUT 2 JET-MSEC
 00314                         16,3704  0 0006 1           EXTEND
 00315   REF   1               16,3705  6 3736 0           BZMF   NEGTORK
 00316   REF 420  LAST 1462    16,3706  50 002 0  STORTORK INDEX  Q                  INCREMENT DOWNLIST REGISTER.
 00317   REF   7  LAST  134    16,3707  27'513 0           ADS    DOWNTORK             NOTE: NOT INITIALIZED; OVERFLOWS.

 0032    REF  10  LAST 1462    16,3710  11'743 1           CCS    DAPTEMP6
 0033    REF   2  LAST 1420    16,3711  1 3646 1           TCF    RATELOOP +1
 0034    REF   1               16,3712  1 3722 1           TCF    ROTORQUE
 0035    REF 301  LAST 1455    16,3713  3 4755 1  SMALLTJU CA     ZERO
 0036    REF  11  LAST 1462    16,3714  51'743 0           INDEX  DAPTEMP6
 0037    REF  18  LAST 1462    16,3715  57'524 0           XCH    TJP
 0038                          16,3716  0 0006 1           EXTEND
 0039   REF   4  LAST 1093   16,3717  7 4760 0           MP     ELEVEN        10.24 PLUS
 0040   REF 293  LAST 1462   16,3720  3 0001 0           CA     L
 0041   REF   2  LAST 1462   16,3721  1 3674 0           TCF    LOOPRATE
 0042   REF  11  LAST 1443   16,3722  3 1737 0  RCTORQUE CA     DAPTEMP2
 0043   REF   7  LAST 1439   16,3723  6 1740 0           AD     DAPTEMP3
 0044                        16,3724  0 0006 1           EXTEND
 0045   REF   1              16,3725  7 1532 0           MP     1JACCR
 0046   REF   3  LAST 1419 . 16,3726  55'746 1           TS     JETRATER
 0047   REF   8  LAST 1463   16,3727  4 1740 1           CS     DAPTEMP3
 0048   REF  12  LAST 1463   16,3730  6 1737 0           AD     DAPTEMP2
 0049                        16,3731  0 0006 1           EXTEND
 0050   REF   1              16,3732  7 1531 0           MP     1JACCQ
 0051   REF   3  LAST 1418   16,3733  55'745 1           TS     JETRATEQ
 0052   REF   1              16,3734  1 2316 0           TCF    BACKP
 0053                        16,3735   77537 0  -100MST6 DEC    -160
R0054
 0055                        16,3736  4 0000 0  NEGTORK  COM
 0056   REF 421  LAST 1462   16,3737  24 002 0           INCR   Q
 0057   REF   1              16,3740  1 3706 1           TCF    STOPTORK
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L      TRIM GIMBAL CONTROL SYSTEM                                             USER'S PAGE NO.  1    EC S4

 0001                     21,3076                     BANK    21
 0002  REF   1            E6,1450                     EBANK=  QDIFF
 0003  REF   1            21,2000                     SETLOC  DAPS4
 0004                     21,3076                     BANK

 00045 REF   1                                        COUNT*  $$/DAPGT

R0005  CONTROL REACHES THIS POINT UNDER EITHER OF THE FOLLOWING TWO CONDITIONS ONCE THE DESCENT ENGINE AND THE DIGITAL
R0007  AUTOPILOT ARE BOTH ON:
R0008          A) THE TRIM GIMBAL CONTROL LAW WAS ON DURING THE PREVIOUS Q,R-AXIS TIME5 INTERRUPT (OR THE DAPIDLER
R0010             INITIALIZATION WAS SET FOR TRIM GIMBAL CONTROL AND THIS IS THE FIRST PASS), OR
R0012          B) THE Q,R-AXES RCS AUTOPILOT DETERMINED THAT THE VEHICLE WAS ENTERING (OR HAD JUST ENTERED) A COAST
R0014             ZONE WITH A SMALL OFFSET ANGULAR ACCELERATION.

R0015  GTS IS THE ENTRY TO THE GIMBAL TRIM SYSTEM FOR CONTROLLING ATTITUDE ERRORS AND RATES AS WELL AS ACCELERATIONS.

 0018  REF  14  LAST 1460 21,3076  3 7752 0  GTS      CAF     NEGONE         MAKE THE NEXT PASS THROUGH THE DAP BE
 0019  REF   6  LAST 1444 21,3077 55'630 1            TS      COTROLER         THROUGH RCS CONTROL,
 0020  REF  47  LAST 1461 21,3100  3 4751 0           CAF     FOUR             AND ENSURE THAT IT IS NOT A SKIP.
 0021  REF   9  LAST 1447 21,3101 55'534 0            TS      SKIPU
 0022  REF   3  LAST 1447 21,3102 55'535 1            TS      SKIPV

 00225 REF 103  LAST 1462 21,3103  3 4752 0           CAF     TWO
 0023  REF   5  LAST 1442 21,3104 55'632 0            TS      INGTS          SET INDICATOR OF GTS CONTROL POSITIVE.
 0024  REF   7  LAST 1421 21,3105 55'631 0            TS      QGIMTIMR       SET TIMERS TO 200 MSEC TO AVOID BOTH
 0025  REF   6  LAST 1421 21,3106 55'633 1            TS      RGIMTIMR       RUNAWAY AND INTERFERENCE BY NULLING.

R0026  THE DRIVE SETTING ALGORITHM

R0027  DEL = SGN(OMEGA + ALPHA*ABS(ALPHA)/(2*K))

R0028                                             2                 1/2                           2          3/2
R0030  NEGUSUM = ERROR*K + ALPHA*(DEL*OMEGA + ALPHA /(3*K)) + DEL*K    (DEL*OMEGA + ALPHA /(2*K))

R0032  DRIVE = -SGN(NEGUSUM)

 0033  REF  27  LAST 1297 21,3107  3 0021 1           CA      SR             SAVE THE SR.  SHIFT IT LEFT TO CORRECT
 0034  REF 522  LAST 1460 21,3110  6 0000 1           AD      A              FOR THE RIGHT SHIFT DUE TO EDITING.
 0035  REF   1            21,3111 55'505 1            TS      SAVESR

 0036  REF 104  LAST 1464 21,3112  3 4752 0  GTSGO+DN CAF     TWO            SET INDEXER FOR R-AXIS CALCULATIONS.
 0037  REF   1            21,3113  1 3115 0           TCF     GOQTRIMG +1

 0038  REF 302  LAST 1462 21,3114  3 4755 1  GOQTRIMG CAF     ZERO           SET INDEXER FOR Q-AXIS CALCULATIONS
 0039  REF   1            21,3115 55'747 0            TS      QRCNTR

 0040  REF   2  LAST 1464 21,3116 51'747 1            INDEX   QRCNTR         AOS SCALED AT PI/2
 0041  REF  23  LAST 1433 21,3117  3 1536 0           CA      AOSQ
 0042                     21,3120  0 0006 1           EXTEND
 0043  REF  54  LAST 1436 21,3121  7 4752 1           MP      BIT2           RESCALE AOS TO PI/4
 0044                          21,3122  0 0006 1           EXTEND
 0045    REF   1               21,3123  1 3127 1           BZF     GTSQAXIS -3      USE FULL SCALE FOR LARGER AOS ESTIMATES.

 0046    REF 523  LAST 1464    21,3124  50 000 1           INDEX   A
 0047    REF  10  LAST 1449    21,3125  4 4734 1           CS      LIMITS           LIMITS +1 CONTAINS NEGMAX.
 0048    REF 294  LAST 1463    21,3126  56 001 0           XCH     L                LIMITS -1 CONTAINS POSMAX.

 0049    REF   3  LAST 1464    21,3127  11'747 0           CCS     QRCNTR           PICK UP RATE FOR THIS AXIS.  RATE CELLS
 0050    REF 524  LAST 1465    21,3130  50 000 1           INDEX   A                ARE ADJACENT, NOT SEPARATED.  AT PI/4
 0051    REF   5  LAST 1434    21,3131  3 1436 1           CA      EDOTQ
 0052    REF   1               21,3132  53'743 1  GTSQAXIS DXCH    WCENTRAL

 0053    REF   4  LAST 1465    21,3133  51'747 1           INDEX   QRCNTR           COLLECT K FOR THIS AXIS
 0054    REF   3  LAST  133    21,3134  3 1504 1           CA      KQ
 0055    REF   1               21,3135  55'740 1           TS      KCENTRAL

 0056                          21,3136  0 0006 1           EXTEND                   CONTROL AUTHORITY  ZERO.  AVOID DRIVING
 0057    REF   1               21,3137  1 3575 1           BZF     POSDRIVE +1      ENGINE BELL TO THE STOPS.

 0058    REF   5  LAST 1465    21,3140  51'747 1           INDEX   QRCNTR           QDIFF, RDIFF ARE STORED IN D.P.
 0059    REF   2  LAST 1464    21,3141  31'450 1           CAE     QDIFF

 0060                          21,3142  0 0006 1  ALGORTHM EXTEND                   Q(R)DIFF IS THETA (ERROR) SCALED AT PI.
 0061    REF   2  LAST 1465    21,3143  7 1740 1           MP      KCENTRAL         FORM K*ERROR AT PI(2)/2(8), IN D.P.
 0062    REF   1               21,3144  23'736 1           LXCH    K2THETA
 0063                          21,3145  0 0006 1           EXTEND
 0064    REF  51  LAST 1453    21,3146  7 4747 0           MP      BIT5             RESCALE TO 4*PI(2)
 0065    REF   2  LAST 1465    21,3147  53'737 1           DXCH    K2THETA
 0066                          21,3150  0 0006 1           EXTEND
 0067    REF  52  LAST 1465    21,3151  7 4747 0           MP      BIT5             FIRST TERM OF NEGUSUM IN K2THETA.
 0068    REF   3  LAST 1465    21,3152  27'737 1           ADS     K2THETA  +1      NO CARRY NEEDED    D.P. AT 4*PI(2)

 0069    REF   1               21,3153  4 1743 1           CS      ACENTRAL         FORM ALPHA(2)/(2*K) AT 16*PI, IN D.P.,
 0070                          21,3154  0 0006 1           EXTEND                   LIMITING QUOTIENT TO AVOID OVERFLOW.
 0071    REF  86  LAST 1457    21,3155  7 4736 0           MP      BIT14            -ALPHA/2 IN A, SCALED AT PI/4
 0072                          21,3156  0 0006 1           EXTEND
 0073    REF   2  LAST 1465    21,3157  7 1743 1           MP      ACENTRAL         -ALPHA(2)/2 IN A,L, SCALED AT PI(2)/16
 0074    REF   3  LAST 1465    21,3160  6 1740 0           AD      KCENTRAL
 0075                          21,3161  0 0006 1           EXTEND
 0076    REF   1               21,3162  6 3177 0           BZMF    HUGEQUOT         K-ALPHA(2)/2 SHOULD BE PNZ FO DIVISION

 0077                          21,3163  0 0006 1           EXTEND
 0078    REF 525  LAST 1465    21,3164  4 0001 1           DCS     A                ALPHA(2)/2 - K
 0079    REF   4  LAST 1465    21,3165  6 1740 0           AD      KCENTRAL
 0080                          21,3166  0 0006 1           EXTEND
 0081    REF   5  LAST 1465    21,3167  11'740 1           DV      KCENTRAL         HIGH ORDER OF QUOTIENT.
 0082    REF   1               21,3170  57'745 0           XCH     A2CNTRAL
 0083    REF 295  LAST 1465    21,3171  3 0001 0           CA      L                SHIFT UP THE REMAINDER.
 0084                          21,3172  22 0007 0          LXCH    7                ZERO LOW-ORDER DIVIDEND.
 0085                          21,3173  0 0006 1           EXTEND
 0086   REF    6  LAST 1465   21,3174  11'740 1             DV     KCENTRAL
 0087   REF    2  LAST 1465   21,3175  57'746 0             XCH    A2CNTRAL +1     QUOTIENT STORED AT 16*PI , D.P.
 0088   REF    1              21,3176  1 3202 0             TCF    HAVEQUOT

 0089   REF   40  LAST 1414   21,3177  3 4733 1  HUGEQUOT   CA     POSMAX
 0090   REF  296  LAST 1465   21,3200  54 001 1             TS     L
 0091   REF    3  LAST 1466   21,3201  53'746 1             DXCH   A2CNTRAL        LIMITED QUOTIENT STORED AT 16*PI, D.P.

 0092   REF    2  LAST 1465   21,3202  3 1742 1  HAVEQUOT   CA     WCENTRAL
 0093                         21,3203  0 0006 1             EXTEND
 0094   REF   35  LAST 1438   21,3204  7 4743 1             MP     BIT9            RESCALE OMEGA AT 16*PI IN D.P.
 0095   REF    1              21,3205  53'742 0             DXCH   K2CNTRAL        LOWER WORD OVERLAYS OMEGA IN WCENTRAL

 0096                         21,3206  0 0006 1             EXTEND
 0097   REF    2  LAST 1466   21,3207  3 1742 1             DCA    K2CNTRAL
 0098   REF    1              21,3210  53'751 1             DXCH   FUNCTION

 0099   REF    3  LAST 1465   21,3211  3 1743 0             CA     ACENTRAL        GET ALPHA*ABS(ALPHA)/(2*K)
 0100                         21,3212  0 0006 1             EXTEND
 0101                         21,3213  6 3217 0             BZMF    +4

 0102                         21,3214  0 0006 1             EXTEND
 0103   REF    4  LAST 1466   21,3215  3 1746 0             DCA    A2CNTRAL
 0104                         21,3216  1 3221 1             TCF     +3

 0105                         21,3217  0 0006 1             EXTEND
 0106   REF    5  LAST 1466   21,3220  4 1746 1             DCS    A2CNTRAL

 0107   REF    2  LAST 1466   21,3221  21'751 1             DAS    FUNCTION        OMEGA + ALPHA*ABS(ALPHA)/2*K) AT 16*PI

 0108   REF    3  LAST 1466   21,3222  11'750 0             CCS    FUNCTION        DEL = +1 FOR FUNCT1 GREATER THAN ZERO.
 0109   REF    1              21,3223  1 3227 1             TCF    POSFNCT1        OTHERWISE DEL = -1
 0110                         21,3224  1 3226 0             TCF     +2
 0111   REF    1              21,3225  1 3231 0             TCF    NEGFNCT1

 0112   REF    4  LAST 1466   21,3226  11'751 1             CCS    FUNCTION +1     USE LOW ORDER WORD SINCE HIGH IS ZERO
 0113   REF   64  LAST 1453   21,3227  3 4753 1  POSFNCT1   CAF    BIT1
 0114                         21,3230  1 3232 0             TCF     +2
 0115   REF   65  LAST 1466   21,3231  4 4753 0  NEGFNCT1   CS     BIT1
 0116   REF    1              21,3232  55'744 0             TS     DEL

 0117   REF    2  LAST 1466   21,3233  11'744 0             CCS    DEL             REPLACE OMEGA BY DEL*OMEGA
 0118   REF    1              21,3234  1 3246 0             TCF    FUNCT2          POSITIVE DEL VALUE.  PROCEED.
 0119   REF    1              21,3235  1 3237 0             TCF    DEFUNCT
 0120   REF    1              21,3236  1 3243 0             TCF    NEGFNCT2

 0121   REF    3  LAST 1466   21,3237  55'741 0  DEFUNCT    TS     K2CNTRAL
 0122   REF    4  LAST 1466   21,3240  55'742 0             TS     K2CNTRAL +1
 0123   REF    2  LAST 1466   21,3241  1 3246 0             TCF    FUNCT2
 0124                             21,3242   65252 1  NEG1/3    DEC      -.33333

 0125                             21,3243  0 0006 1  NEGFNCT2  EXTEND
 0126   REF   5  LAST 1466        21,3244  4 1742 0            DCS      K2CNTRAL
 0127   REF   6  LAST 1467        21,3245  53'742 0            DXCH     K2CNTRAL

 0128                             21,3246  0 0006 1  FUNCT2    EXTEND
 0129   REF   6  LAST 1466        21,3247  3 1746 0            DCA      A2CNTRAL
 0130   REF   7  LAST 1467        21,3250  21'742 0            DAS      K2CNTRAL       DEL*OMEGA + ALPHA(2)/(2*K) AT 16*PI,D.P.

 0131   REF   7  LAST 1467        21,3251  3 1745 0  FUNCT3    CA       A2CNTRAL
 0132                             21,3252  0 0006 1            EXTEND
 0133   REF   1                   21,3253  7 3242 1            MP       NEG1/3
 0134   REF   8  LAST 1467        21,3254  53'746 1            DXCH     A2CNTRAL
 0135   REF 297  LAST 1466        21,3255  3 0001 0            CA       L
 0136                             21,3256  0 0006 1            EXTEND
 0137   REF   2  LAST 1467        21,3257  7 3242 1            MP       NEG1/3
 0138   REF   9  LAST 1467        21,3260  27'746 1            ADS      A2CNTRAL +1
 0139   REF 298  LAST 1467        21,3261  54 001 1            TS       L
 0140                             21,3262  1 3264 0            TCF       +2            A2CNTRAL NOW CONTAINS  -ALPHA(2)/(6*K),
 0141   REF  10  LAST 1467        21,3263  27'745 1            ADS      A2CNTRAL       SCALED AT 16*PI, IN D.P.

 0142                             21,3264  0 0006 1            EXTEND
 0143   REF   8  LAST 1467        21,3265  3 1742 1            DCA      K2CNTRAL       DEL*OMEGA + ALPHA(2)/(3*K) IN A2CNTRAL,
 0144   REF  11  LAST 1467        21,3266  21'746 1            DAS      A2CNTRAL       SCALED AT 16*PI, D.P.

 0145   REF  12  LAST 1467        21,3267  3 1745 0            CA       A2CNTRAL
 0146                             21,3270  0 0006 1            EXTEND
 0147   REF   4  LAST 1466        21,3271  7 1743 1            MP       ACENTRAL
 0148   REF   4  LAST 1465        21,3272  21'737 1            DAS      K2THETA
 0149   REF  13  LAST 1467        21,3273  3 1746 0            CA       A2CNTRAL +1
 0150                             21,3274  0 0006 1            EXTEND
 0151   REF   5  LAST 1467        21,3275  7 1743 1            MP       ACENTRAL       ACENTRAL MAY NOW BE OVERLAID.
 0152   REF   5  LAST 1467        21,3276  27'737 1            ADS      K2THETA  +1
 0153   REF 299  LAST 1467        21,3277  54 001 1            TS       L
 0154                             21,3300  1 3302 1            TCF       +2            TWO TERMS OF NEGUSUM ACCUMULATED, SO FAR
 0155   REF   6  LAST 1467        21,3301  27'736 0            ADS      K2THETA        SCALED AT 4*PI(2), IN D.P.

 0156   REF   9  LAST 1467        21,3302  3 1741 1  GETROOT   CA       K2CNTRAL       K*(DEL*OMEGA + ALPHA(2)/(2*K)) IS THE
 0157                             21,3303  0 0006 1            EXTEND                  TERM FOR WHICH A SQUARE ROOT IS NEEDED.
 0158   REF   7  LAST 1466        21,3304  7 1740 1            MP       KCENTRAL       K AT PI/2(8)
 0159   REF   5  LAST 1466        21,3305  53'751 1            DXCH     FUNCTION
 0160   REF  10  LAST 1467        21,3306  3 1742 1            CA       K2CNTRAL +1
 0161                             21,3307  0 0006 1            EXTEND
 0162   REF   8  LAST 1467        21,3310  7 1740 1            MP       KCENTRAL
 0163   REF   6  LAST 1467        21,3311  27'751 1            ADS      FUNCTION +1
 0164   REF 300  LAST 1467        21,3312  54 001 1            TS       L
 0165                             21,3313  1 3315 1            TCF       +2
 0166   REF   7  LAST 1467        21,3314  27'750 0            ADS      FUNCTION       DESIRED TERM IN FUNCTION, AT PI(2)/16
 0167    REF    3  LAST 1466    21,3315   11'744 0               CCS     DEL
 0168    REF    1               21,3316   1 3523 1               TCF     RSTOFGTS
 0169    REF    1               21,3317   1 3565 0               TCF     NEGUSUM
 0170    REF    1               21,3320   1 3322 0               TCF     NEGATE
 0171    REF    2  LAST 1468    21,3321   1 3565 0               TCF     NEGUSUM

 0172                           21,3322   0 0006 1   NEGATE      EXTEND
 0173    REF   11  LAST 1467    21,3323   4 1742 0               DCS     K2CNTRAL
 0174    REF   12  LAST 1468    21,3324   53'742 0               DXCH    K2CNTRAL
 0175    REF    2  LAST 1468    21,3325   1 3523 1               TCF     RSTOFGTS

 0176                           16,3741                          BANK    16
 0177    REF    5  LAST 1420    E6,1501                          EBANK=  NEGUQ
 0178    REF    4  LAST 1462    16,2000                          SETLOC  DAPS1
 0179                           16,3741                          BANK

R0180    THE WRCHN12 SUBROUTINE SETS BITS 9,10,11,12 OF CHANNEL 12 ON THE BASIS OF THE CONTENTS OF NEGUQ,NEGUR WHICH ARE
R0182    THE NEGATIVES OF THE DESIRED ACCELERATION CHANGES.  ACDT+C12 SETS Q(R)ACCDOT TO REFLECT THE NEW DRIVES.

R0184    WARNING:  ACDT+C12 AND WRCHN12 MUST BE CALLED WITH INTERRUPT INHIBITED.

 0185                           16,3741    07400 1   BGIM        OCTAL   07400
 0186    REF    8  LAST 1292       0066              CHNL12      EQUALS  ITEMP6
 0187    REF    6  LAST 1468    16,3742   4 1501 0   ACDT+C12    CS      NEGUQ
 0188                           16,3743   0 0006 1               EXTEND                          GIMBAL DRIVE REQUESTS.
 0189    REF    4  LAST  133    16,3744   7 1507 0               MP      ACCDOTQ
 0190    REF    4  LAST 1420    16,3745   23'510 1               LXCH    QACCDOT
 0191    REF    3  LAST 1421    16,3746   4 1503 1               CS      NEGUR
 0192                           16,3747   0 0006 1               EXTEND
 0193    REF    1               16,3750   7 1511 1               MP      ACCDOTR
 0194    REF    4  LAST 1421    16,3751   23'512 0               LXCH    RACCDOT

 0195    REF    7  LAST 1468    16,3752   11'501 0               CCS     NEGUQ
 0196    REF   52  LAST 1467    16,3753   3 4742 1               CAF     BIT10
 0197                           16,3754   1 3756 1               TCF      +2
 0198    REF   36  LAST 1466    16,3755   3 4743 0               CAF     BIT9
 0199    REF    1               16,3756   54 066 0               TS      CHNL12

 0200    REF    4  LAST 1468    16,3757   11'503 1               CCS     NEGUR
 0201    REF   41  LAST 1460    16,3760   3 4740 0               CAF     BIT12
 0202                           16,3761   1 3763 1               TCF      +2
 0203    REF   33  LAST 1461    16,3762   3 4741 1               CAF     BIT11
 0204    REF    2  LAST 1468    16,3763   26 066 0               ADS     CHNL12                  (STORED RESULT NOT USED AT PRESENT)

 0205    REF    1               16,3764   4 3741 1               CS      BGIM
 0206                           16,3765   0 0006 1               EXTEND
 0207    REF   72  LAST 1421    16,3766   02 012 0               RAND    CHAN12
 0208    REF    3  LAST 1468    16,3767   6 0066 1               AD      CHNL12
 0209                           16,3770   0 0006 1               EXTEND
 0210    REF   73  LAST 1468    16,3771   01 012 0               WRITE   CHAN12
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R0211
 0212    REF   2  LAST 1420   16,3772  4 4747 0         CS      CALLGMBL        TURN OFF REQUEST FOR ACDT+C12 EXECUTION.
 0213    REF  52  LAST 1440   16,3773  7 1262 1         MASK    RCSFLAGS
 0214    REF  53  LAST 1469   16,3774  55'262 1         TS      RCSFLAGS

 0215    REF 422  LAST 1463   16,3775  0 0002 0         TC      Q               RETURN TO CALLER.

 0216                         21,3326                   BANK    21
 0217    REF   3  LAST 1465   E6,1450                   EBANK=  QDIFF
 0218    REF   2  LAST 1464   21,2000                   SETLOC  DAPS4
 0219                         21,3326                   BANK
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L        TRIM GIMBAL CONTROL SYSTEM                                                      USER'S PAGE NO.   7      E? S4

R0220    SUBROUTINE TIMEGMBL:  MOD 0,  OCTOBER 1967, CRAIG WORK

R0221    TIMEGMBL COMPUTES THE DRIVE TIME NEEDED FOR THE TRIM GIMBAL TO POSITION THE DESCENT ENGINE NOZZLE SO AS TO NULL
R0223    THE OFFSET ANGULAR ACCELERATION ABOUT THE Q (OR R) AXIS.  INSTEAD OF USING AOSQ(R), TIMEGMBL USES .4*AOSQ(R),
R0225    SCALED AT PI/8.                          FOR EACH AXIS, THE DRIVE TIME IS COMPUTED AS ABS(ALPHA/ACCDOT).  A ZERO
R0227    ALPHA OR ACCDOT OR A ZERO QUOTIENT TURNS OFF THE GIMBAL DRIVE IMMEDIATELY.  OTHERWISE, THE GIMBAL IS TURNED ON
R0229    DRIVING IN THE CORRECT DIRECTION. THE Q(R)GIMTIMR IS SET TO TERMINATE THE DRIVE AND Q(R)ACCDOT
R0231    IS STORED TO REFLECT THE NEW ACCELERATION DERIVATIVE.  NEGUQ(R) WILL CONTAIN +1,+0,-1 FOR A Q(R)ACCDOT VALUE
R0233    WHICH IS NEGATIVE, ZERO, OR POSITIVE.

R0234    INPUTS:  AOSQ,AOSR, SCALED AT PI/2, AND ACCDOTQ, ACCDOTR AT PI/2(7).    PI/2(7).

R0236    OUTPUTS:   NEW GIMBAL DRIVE BITS IN CHANNEL 12,NEGUQ,NEGUR,QACCDOT AND RACCDOT, THE LAST SCALED AT PI/2(7).
R0238               Q(R)GIMTIMR WILL BE SET TO TIME AND TERMINATE GIMBAL DRIVE(S)

R0239    DEBRIS:  A,L,Q, ITEMPS 2,3,6, RUPTREG2 AND ACDT+C12 DEBRIS.

R0240    EXITS:  VIA TC Q.

R0241    ALARMS, ABORTS, :  NONE

R0242    SUBROUTINES:  ACDT+C12, IBNKCALL

R0243    WARNING:  THIS SUBROUTINE WRITES INTO CHANNEL 12 AND USES THE ITEMPS.  THEREFORE IT MAY ONLY BE CALLED WITH
R0245    INTERRUPT INHIBITED.

R0246    ERASABLE STORAGE CONFIGURATION (NEEDED BY THE INDEXING METHODS):

A0247                                                NEGUQ    ERASE    +2          NEGATIVE OF Q-AXIS GIMBAL DRIVE
A0248                                                (SPWORD) EQUALS NEGUQ +1      ANY S.P. ERASABLE NUMBER, NOW THRSTCMD
A0249                                                NEGUR    EQUALS NEGUQ +2      NEGATIVE OF R-AXIS GIMBAL DRIVE

A0250                                                ACCDOTQ  ERASE    +2          Q-JERK TERM SCALED AT PI/2(7) RAD/SEC(3)
A0251                                                (SPWORD) EQUALS ACCDOTQ +1    ANY S.P. ERASABLE NUMBER  NOW QACCDOT
A0252                                                ACCDOTR  EQUALS ACCDOTQ +2    R-JERK TERM SCALED AT PI/2(7) RAD/SEC(3)
A0253                                                                              ACCDOTQ,ACCDOTR ARE MAGNITUDES.
A0254                                                AOSQ     ERASE  +4            Q-AXIS ACC.,D.P. AT PI/2 R/SEC(2)
A0255                                                AOSR     EQUALS AOSQ +2       R-AXIS ACCELERATION SCALED AT PI/2 R/S2

 0256    REF   9  LAST 1468       0066             INDEXER  EQUALS ITEMP6
 0257                          21,3326   23146 0   OCT23146 OCTAL  23146           DECIMAL .6
 0258    REF  29  LAST 1367       0063             NZACCDOT EQUALS ITEMP3

 0259    REF 173  LAST 1460    21,3327  3 4753 1   TIMEGMBL CAF    ONE             INITIALIZE ALLOWGTS.
 0260    REF   3  LAST 1441    21,3330  55 502 0            TS     ALLOWGTS

 0261    REF 105  LAST 1464    21,3331  3 4752 0            CAF    TWO             SET UP LOOP FOR R AXIS.
 0262    REF 423  LAST 1469    21,3332  22 002 0            LXCH   Q               SAVE RETURN ADDRESS.
 0263    REF  25  LAST 1401    21,3333  22 071 1            LXCH   RUPTREG2
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0264                         21,3334  1 3336 0           TCF    +2
0265  REF 303  LAST 1464     21,3335  3 4755 1  TIMQGM8L CAF    ZERO              NCW OO THE Q-AXIS
0266  REF   1                21,3336  54 C66 0           TS     QRNOXER
0267  REF   2  LAST 1471     21,3337  5C C66 1           INOEX  ORNDXER
0268  REF   5  LAST 1468     21,3340  3 1507 I           CA     ACCOCTQ           ACCOOT IS PRFSUMEO TC BE AT PI/2(7).
0269                         21,3341  0 0006 1           EXTENO
0270  REF   1                21,3342  6 3412 0           8ZMF   TGCFFNCW          IS ACCOOT LFSS THAN OR EQUAL TO O?
0271  PEF   1                21,3343  54 063 0           TS     NZACCOOT          NO.  STORE NON-ZEPC, POSITIVE ACCOOT.

0272  REF   3  LAST 1471     21,3344  5C C66 1  ALPHATRY INCEX  QRNCXER
0273  PEF  24  LAST 1464     21,3345  4 1536 1           CS     AOSQ
0274                         21,3346  0 0006 1           EXTENO
0275  PEF   2  LAST 1471     21,3347  1 3412 I           BZF    TGCFFNCW          IS ALPHA ZERO?

0276  REF 424  LAST 1470     21,3350  54 002 1           TS     Q                 SAVE A COPY OF  -ACS.
0277                         21,3351  0 0006 1           EXTENO                   NO.  RESCALE FOR TIMEGM8L USE.
0278  REF   1                21,3352  7 3326 1           MP     OCT23146          CCTAL 23146 IS CECIMAL .6
0279  REF 425  LAST 1471     21,3353  6 0002 0           AC     Q                 -1.6*AOS AT PI/2 = -.4*AOS AT PI/8.
0280  PEF 301  LAST 1467     21,3354  54 0C1 I           TS     L                 WAS THERE OVEPFLOW?
0281  REF   1                21,3355  1 3362 1           TCF    SFTNEGU           NO.  CCMPUTE ORIVE TIME.

0282  REF 526  LAST 1465     21,3356  4 0000 0           CS     A                 PECOVER  -SGN(AOS) IN THE A REGISTER.
0283  REF   4  LAST 1471     21,3357  50 C66 1           INOEX  ORNOXER           YES.  START ORIVE WITHOUT WAITLIST.
0284  REF   8  LAST I468     21,3360  57'501 1           XCH    NEGUQ
0285  REF   1                21,3361  1 3416 0           TCF    NOTALLOW          KNOCK OOWN THE ALLOWGTS FLAG.

0286                         21,3362  0 0006 1  SETNEGU  EXTENO
0287  REF   1                21,3363  6 3370 0           8ZMF   POSALPH

0288                         21,3364  4 C000 0           COM
0289  REF  27  LAST 1368     21,3365  54 062 1           TS     ITEMP2            STORE  -ABS(.4*AOS) SCALEO AT PI/8.
0290  REF  66  LAST 1466     21,3366  4 4753 0           CS     8IT1
0291  REF   2  LAST 1471     21,3367  I 3372 0           TCF    PCSALPH +2
0292  REF  28  LAST 1471     21,3370  54 062 1  PCSALPH  TS     ITEMP2            STORE  -A8S(.4*AOS) SCALEO AT PI/8.
0293  REF  67  LAST 1471     21,3371  3 4753 1           CA     BIT1
0294  REF   5  LAST 1471     21,3372  50 066 1   +2      INOEX  QRNDXER           SGN(ACS) INTC NEGU
0295  REF   9  LAST 1471     21,3373  55'501 0           TS     NEGUQ             STOPE SGN(APLHA) AS NEGU

0296  REF   2  LAST 1471     21,3374  3 C063 1           CA     NZACCOCT
0297                         21,3375  0 0006 I           EXTENO
0298  REF  42  LAST 1468     21,3376  7 4740 1           MP     BIT12             2*ACCOOT, SCALEO AT PI/8.
0299  REF  29  LAST 1471     21,3377  6 0062 0           AO     ITEMP2            -A8S(ALPHA) + 2*ACCCCT, AT PI/8.
0300                         21,3400  0 0006 1           EXTENO
0301  REF   2  LAST 1471     21,3401  6 3416 1           8ZMF   NOTALLCW          IS CRIVE TIME MOPE THAN TWO SECONOS?
0302  REF  30  LAST 1471     21,3402  4 0062 1           CS     ITEMP2            NO.  COMPUTE ORIVE TIME.
0303                         21,3403  0 0006 1           EXTENO                   A8S(ALPHA) AT PI/8.
0304  REF   1                21,3404  7 3437 0           MP     OCT00240          CECIMAL 10/1024
0305                         21,3405  C 0006 1           EXTENO                   QUOTIENT IS ORIVE TIME AT WAITLIST.
0306  REF   3  LAST 1471     21,3406  10 063 0           OV     NZACCCCT          A8S(ALPHA)/ACCOOT AT 2(14)/100
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 0307                         21,3407  0 0006 1           EXTEND
 0308   REF    3  LAST 1471   21,3410  1 3412 1           BZF      TGOFFNOW         DRIVE TIME MUST BE GREATER THAN ZERO.

 0309   REF    1              21,3411  1 3424 1           TCF      DRIVEON

 0310   REF  304  LAST 1471   21,3412  3 4755 1  TGOFFNOW CAF      ZERO             TURN OFF GIMBAL NOW.
 0311   REF    6  LAST 1471   21,3413  50 066 1           INDEX    QRNDXER
 0312   REF   10  LAST 1471   21,3414  55'501 0           TS       NEGUQ

 0313   REF    1              21,3415  1 3426 0           TCF      DONEYET

 0314   REF    4  LAST  823   21,3416  3 6010 0  NOTALLOW CAF      OCT31
 0315   REF    7  LAST 1472   21,3417  50 066 1           INDEX    QRNDXER
 0316   REF    8  LAST 1464   21,3420  55'631 0           TS       QGIMTIMR
 0317   REF  305  LAST 1472   21,3421  3 4755 1           CAF      ZERO             DRIVE TIME IS MORE THAN 2 SECONDS, SO
 0318   REF    4  LAST 1470   21,3422  55'502 0           TS       ALLOWGTS         DO NOT PERMIT FURTHER GTS ATTITUDE-RATE
A0319                                                                               CONTROL UNTIL ADSTASK APPROVES.
 0320   REF    2  LAST 1472   21,3423  1 3426 0           TCF      DONEYET          NO WAITLIST CALL IS MADE.

 0321   REF    8  LAST 1472   21,3424  50 066 1  DRIVEON  INDEX    QRNDXER
 0322   REF    9  LAST 1472   21,3425  55'631 0           TS       QGIMTIMR         CHOOSE Q OR R AXIS.

 0323   REF    9  LAST 1472   21,3426  10 066 0  DONEYET  CCS      QRNDXER
 0324   REF    1              21,3427  1 3335 0           TCF      TIMEGMBL

 0325   REF   18  LAST 1354   21,3430  52 073 1           DXCH     RUPTREG3         PROTECT IBNKCALL ERASABLES.  ACDT+C12
 0326   REF   31  LAST 1471   21,3431  52 063 0           DXCH     ITEMP2           LEAVES ITEMPS2,3 ALONE.

 0327   REF   62  LAST 1444   21,3432  0 4674 0           TC       IBNKCALL         TURN OF CHANNEL BITS, SET Q(R)ACDOTS.
 0328   REF    2  LAST 1420   21,3433   35742 0           CADR     ACDT+C12

 0329   REF   32  LAST 1472   21,3434  52 063 0           DXCH     ITEMP2           RESTORE ERASABLES FOR IBNKCALL.
 0330   REF   19  LAST 1472   21,3435  52 073 1           DXCH     RUPTREG3

 0331   REF   26  LAST 1470   21,3436  0 0071 1           TC       RUPTREG2         RETURN TO CALLER.

 0332                         21,3437   00240 1  OCT00240 OCTAL    00240            DECIMAL 10/1024
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R0333    THE FOLLOWING SECTION IS A CONTINUATION OF THE TRIM GIMBAL CONTROL FROM THE LAST GTS ENTRY. THE QUANTITY NEGUSUM
R0335    IS COMPUTED FOR EACH AXIS (Q,R), .707*DEL*FUNCTION(3/2) + K2THETA = NEGUSUM.  NEW DRIVES ARE ENTERED TO CH 12.

R0337    THE SUBROUTINE GTSQRT ACCEPTS A DOUBLE PRECISION VALUE IN FUNCTION, FUNCTION +1 AND RETURNS A SINGLE-PRECISION
R0339    SQUARE ROOT OF THE FOURTEEN MOST SIGNIFICANT BITS OF THE ARGUMENT.  ALSO, THE CELL SHFTFLAG CONTAINS A BINARY
R0341    EXPONENT S, SUCH THAT THE SQUARE ROOT (RETURNED IN THE A REGISTER) MUST BE SHIFTED RIGHT (MULTIPLIED BY 2 TO THE
R0343    POWER (-S)) IN ORDER TO BE THE TRUE SQUARE ROOT OF THE FOURTEEN MOST SIGNIFICANT BITS OF FUNCTION, FUNCTION +1.
R0345    SQUARE ROOT ERROR IS NOT MORE THAN 2 IN THE 14TH SIGNIFICANT BIT.  CELLS CLOBBERED ARE A,L,SHFTFLAG,ININDEX,
R0347    HALFARG,SCRATCH,SR,FUNCTION, FUNCTION +1.  GTSQRT IS CALLED BY TC GTSQRT AND RETURNS VIA TC Q OR TC FUNCTION +1.
R0349    ZERO OR NEGATIVE ARGUMENTS YIELD ZERO FOR SQUARE ROOTS.

 0350    REF    8  LAST 1467    21,3440   11'750 0  GTSQRT    CCS     FUNCTION
 0351    REF    1               21,3441    1 3457 0           TCF     GOODARG             FUNCTION IS POSITIVE.  TAKE SQUARE ROOT.
 0352                           21,3442    1 3444 1           TCF      +2                 HIGH ORDER WORD IS ZERO.  TRY THE LOWER.
 0353    REF    1               21,3443    1 3450 1           TCF     ZEROOT              NEGATIVE.  USE ZERO FOR 1/2 POWER.

 0354    REF    9  LAST 1473    21,3444    3 1751 0           CA      FUNCTION +1
 0355                           21,3445    0 0006 1           EXTEND
 0356    REF    2  LAST 1473    21,3446    6 3450 0           BZMF    ZEROOT

 0357    REF    1               21,3447    1 3453 1           TCF     ZEROHIGH            PROCEED.
 0358    REF  306  LAST 1472    21,3450    3 4755 1  ZEROOT   CA      ZERO
 0359    REF    1               21,3451   55'740 1            TS      SHFTFLAG
 0360    REF  426  LAST 1471    21,3452    0 0002 0           TC      Q

 0361    REF   10  LAST 1473    21,3453   57'750 1  ZEROHIGH  XCH     FUNCTION            14 MOST SIGNIFICANT BITS ARE IN THE
 0362    REF   11  LAST 1473    21,3454   57'751 0            XCH     FUNCTION +1         LOWER WORD.  EXCHANGE THEM.
 0363    REF   24  LAST 1366    21,3455    3 4757 0           CA      SEVEN
 0364    REF    2  LAST 1473    21,3456    1 3460 1           TCF     GOODARG  +1

 0365    REF  307  LAST 1473    21,3457    3 4755 1  GOODARG  CA      ZERO
 0366    REF    2  LAST 1473    21,3460   55'740 1            TS      SHFTFLAG
 0367    REF    1               21,3461    3 5741 0           CA      TWELVE              INITIALIZE THE SCALING LOOP.
 0368    REF    1               21,3462   55'743 1            TS      ININDEX
 0369    REF    1               21,3463    1 3472 1           TCF     SCALLOOP

 0370    REF   12  LAST 1473    21,3464    3 1750 1  SCALSTRT CA      FUNCTION
 0371    REF    1               21,3465    1 3506 0           TCF     SCALDONE

 0372    REF   11  LAST 1458    21,3466    3 7751 0  MULBUSH  CA      NEG2                IF ARG IS NOT LESS THAN 1/4, INDEX IS
 0373    REF    2  LAST 1473    21,3467   27'743 1            ADS     ININDEX             ZERO, INDICATING NO SHIFT NEEDED.
 0374                           21,3470    0 0006 1           EXTEND                      BRANCH IF ARG IS NOT LESS THAN 1/4.
 0375    REF    1               21,3471    6 3464 1           BZMF    SCALSTRT            OTHERWISE COMPARE ARG WITH A REFERENCE
A0376                                                                                     WHICH IS 4 TIMES LARGER THAN THE LAST.
 0377    REF   13  LAST 1473    21,3472    4 1750 0  SCALLOOP CS      FUNCTION
 0378    REF    3  LAST 1473    21,3473   51'743 0            INDEX   ININDEX
 0379    REF   53  LAST 1448    21,3474    6 4735 1           AD      BIT15               REFFRENCE MAGNITUDE LESS OR EQUAL TO 1/4
 0380                           21,3475    0 0006 1           EXTEND
 0381    REF    1               21,3476    6 3466 0           BZMF    MULBUSH             IF ARG IS NOT LESS THAN REFFRENCE, GO
A0382                                                                                     AROUND THE MULBERRY BUSH ONCE MORE.
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 0383  REF   4  LAST 1473  21,3477  51'743 0            INDEX   ININDEX
 0384  REF  54  LAST 1473  21,3500  3 4735 1            CA      BIT15            THIS IS THE SCALE MAGNITUDE
 0385  REF   1             21,3501  57'746 0            XCH     HALFARG          2**(-ININDEX) IS THE SHIFT DIVISOR.
 0386                      21,3502  0 0006 1            EXTEND                   RESCALE ARGUMENT.
 0387  REF  14  LAST 1473  21,3503  3 1751 0            DCA     FUNCTION
 0388                      21,3504  0 0006 1            EXTEND
 0389  REF   2  LAST 1474  21,3505  11'746 1            DV      HALFARG
A0390                                                                            ININDEX AND SHFTFLAG PRESERVE INFO FOR

A0391                                                                            RESCALING AFTER ROOT PROCESS.
 0392                      21,3506  0 0006 1  SCALDONE  EXTEND
 0393  REF  15  LAST 1474  21,3507  23'751 0            QXCH    FUNCTION +1      SAVE Q FOR RETURN
 0394                      21,3510  0 0006 1            EXTEND
 0395  REF  87  LAST 1455  21,3511  7 4736 0            MP      BIT14
 0396  REF   3  LAST 1474  21,3512  55'746 1            TS      HALFARG
 0397  REF  59  LAST 1454  21,3513  7 4737 1            MASK    BIT13
 0398  REF 527  LAST 1471  21,3514  10 000 0            CCS     A
 0399  REF   1             21,3515  2 3633 1            CA      OCT11276
 0400  REF   1             21,3516  6 3631 0            AD      ROOTHALF         INITIAL GUESS IS ROOT 1/2 OR POSMAX

 0401  REF   1             21,3517  0 3635 1            TC      ROOTCYCL
 0402  REF   2  LAST 1474  21,3520  0 3635 1            TC      ROOTCYCL
 0403  REF   3  LAST 1474  21,3521  0 3635 1            TC      ROOTCYCL

 0404  REF  16  LAST 1474  21,3522  0 1751 0            TC      FUNCTION +1

R0405  ************************************************************************************************************


 0407  REF   1             21,3523  0 3440 1  RSTOFGTS  TC      GTSQRT
 0408  REF  13  LAST 1468  21,3524  57'741 1  PRODUCT   XCH     K2CNTRAL
 0409                      21,3525  0 0006 1            EXTEND
 0410  REF  14  LAST 1474  21,3526  7 1741 0            MP      K2CNTRAL
 0411  REF  15  LAST 1474  21,3527  53'742 0            DXCH    K2CNTRAL
 0412                      21,3530  0 0006 1            EXTEND                                THE PRODUCT OF
 0413  REF 302  LAST 1471  21,3531  7 0001 1            MP      L                  1/2                      2          1/2
 0414  REF  16  LAST 1474  21,3532  27'742 0            ADS     K2CNTRAL +1      K    *(DEL*OMEGA + ALPHA /(2*K))
 0415  REF 303  LAST 1474  21,3533  54 001 1            TS      L                                   AND
 0416                      21,3534  1 3536 0            TCF      +2                                         2
 0417  REF  17  LAST 1474  21,3535  27'741 0            ADS     K2CNTRAL          DEL*(DEL*OMEGA + ALPHA /(2*K)) NOW IN
A0418                                                                            K2CNTRAL

 0419  REF   5  LAST 1474  21,3536  3 1743 0  DOSHIFT   CA      ININDEX
 0420                      21,3537  0 0006 1            EXTEND                   MULTIPLY IN THE FACTOR 2(-S), RETURNED
 0421  REF  88  LAST 1474  21,3540  7 4736 0            MP      BIT14            BY THE GTSQRT SUBROUTINE
 0422  REF   3  LAST 1473  21,3541  27'740 1            ADS     SHFTFLAG
 0423                      21,3542  0 0006 1            EXTEND
 0424  REF   1             21,3543  1 3562 1            BZF     ADDITIN
 0425  REF   4  LAST 1474  21,3544  51'740 0            INDEX   SHFTFLAG
 0426  REF  55  LAST 1474  21,3545  3 4735 1            CA      BIT15
 0427   REF  18  LAST 1474   21,3546  57'741 1            XCH     K2CNTRAL
 0428                        21,3547  0 0006 1            EXTEND
 0429   REF  19  LAST 1475   21,3550  7 1741 0            MP      K2CNTRAL
 0430   REF   7  LAST 1467   21,3551  21'737 1            DAS     K2THETA
 0431   REF  20  LAST 1475   21,3552  57'741 1            XCH     K2CNTRAL
 0432                        21,3553  0 0006 1            EXTEND
 0433   REF  21  LAST 1475   21,3554  7 1742 0            MP      K2CNTRAL +1
 0434   REF   8  LAST 1475   21,3555  27'737 1            ADS     K2THETA  +1
 0435   REF 304  LAST 1474   21,3556  54 001 1            TS      L
 0436                        21,3557  1 3561 1            TCF      +2
 0437   REF   9  LAST 1475   21,3560  27'736 0            ADS     K2THETA

 0438   REF   3  LAST 1468   21,3561  1 3565 0            TCF     NEGUSUM

 0439                        21,3562  0 0006 1  ADDITIN   EXTEND
 0440   REF  22  LAST 1475   21,3563  3 1742 1            DCA     K2CNTRAL
 0441   REF  10  LAST 1475   21,3564  21'737 1            DAS     K2THETA           NOW ADD IN THE K2THETA TERM.
 0442   REF  11  LAST 1475   21,3565  11'736 0  NEGUSUM   CCS     K2THETA           TEST SIGN OF HIGH ORDER PART.
 0443   REF   1              21,3566  1 3572 0            TCF     NEGDRIVE
 0444                        21,3567  1 3571 0            TCF      +2
 0445   REF   2  LAST 1465   21,3570  1 3574 0            TCF     POSDRIVE

 0446   REF  12  LAST 1475   21,3571  11'737 1            CCS     K2THETA  +1       SIGN TEST FOR LOW ORDER PART.
 0447   REF  68  LAST 1471   21,3572  3 4753 1  NEGDRIVE  CA      BIT1
 0448                        21,3573  1 3575 1            TCF      +2               STOP GIMBAL DRIVE FOR A ZERO NEGUSUM.
 0449   REF  69  LAST 1475   21,3574  4 4753 0  POSDRIVE  CS      BIT1
 0450   REF 305  LAST 1475   21,3575  54 001 1            TS      L                 SAVE FOR DRIVE REVERSAL TEST.
 0451   REF   6  LAST 1465   21,3576  51'747 1            INDEX   QRCNTR
 0452   REF  11  LAST 1472   21,3577  57'501 1            XCH     NEGUQ

 0453                        21,3600  0 0006 1            EXTEND
 0454   REF 306  LAST 1475   21,3601  7 0001 1            MP      L                 MULTIPLY OLD NEGU AND NEW NEGU.
 0455   REF 307  LAST 1475   21,3602  10 001 1            CCS     L
 0456   REF   1              21,3603  1 3620 1            TCF     LOUPE             NON-ZERO GIMBAL DRIVE BEING CONTINUED.

 0457   REF   1              21,3604  1 3615 1            TCF     ZEROLOUP          NO REVERSAL PROBLEM HERE.

 0458   REF   1              21,3605  1 3607 1            TCF     REVERSAL          NON-ZERO GIMBAL DRIVE BEING REVERSED.
 0459   REF   2  LAST 1475   21,3606  1 3615 1            TCF     ZEROLOUP          NO REVERSAL PROBLEM HERE.

 0460   REF   7  LAST 1475   21,3607  51'747 1  REVERSAL  INDEX   QRCNTR            A ZERO-DRIVE PAUSE IS NEEDED HERE.  ZERO
 0461   REF   5  LAST 1468   21,3610  55'510 0            TS      QACCDOT           IS IN A REGISTER FROM CCS ON (-1).
 0462   REF   8  LAST 1475   21,3611  51'747 1            INDEX   QRCNTR
 0463   REF   1              21,3612  4 3632 1            CS      GMBLBITA
 0464                        21,3613  0 0006 1            EXTEND
 0465   REF  74  LAST 1468   21,3614  03 012 1            WAND    CHAN12

 0466   REF  54  LAST 1469   21,3615  4 1262 1  ZEROLOUP  CS      RCSFLAGS          SET UP REQUEST FOR ACDT+C12 CALL.
 0467   REF   3  LAST 1469   21,3616  7 4747 0            MASK    CALLGMBL
 0468   REF  55  LAST 1475   21,3617  27'262 1            ADS     RCSFLAGS
 0469   REF    9  LAST 1475    21,3620  11'747 0  LOUPE     CCS     QRCNTR            HAVE BOTH AXES BEEN PROCESSED?
 0470   REF    2  LAST 1464    21,3621  1 3114 1            TCF     GOQTRIMG          NO.  DO Q AXIS NEXT.

 0471   REF    2  LAST 1464    21,3622  3 1505 0            CA      SAVESR            RESTORE THE SR
 0472   REF   28  LAST 1464    21,3623  54 021 0            TS      SR

 0473                          21,3624  0 0006 1  GOCLOSE   EXTEND                    TERMINATE THE JASK.
 0474   REF    1               21,3625  3 3630 1            DCA     CLOSEADR
 0475                          21,3626  52 006 0            DTCB

 0476   REF   25  LAST 1471    E6,1536                      EBANK=  AOSQ
 0477   REF    4  LAST 1447    21,3627   03270 1  CLOSEADR  2CADR   CLOSECUT          TERMINATE THE JASK.
 0477                          21,3630   36106 0
R0478
 0479   REF    6  LAST 1423      5741             TWELVE    EQUALS  OCT14
 0480                          21,3631   26501 1  ROOTHALF  OCTAL   26501             SQUARE ROOT OF 1/2
 0481                          21,3632   01400 1  GMBLBITA  OCTAL   01400             INDEXED WRT GMBLBITB   DO NOT MOVE******
 0482                          21,3633   11276 1  OCT11276  OCTAL   11276             POSMAX - ROOTHALF
 0483                          21,3634   06000 1  GMBLBITB  OCTAL   06000             INDEXED WRT GMBLBITA   DO NOT MOVE******
R0484
R0485   SUBROUTINE ROOTCYCL:  BY CRAIG WORK,3 APRIL 68
R0486   ROOTCYCL IS A SUBROUTINE WHICH EXECUTES ONE NEWTON SQUARE ROOT ALGORITHM ITERATION.  THE INITIAL GUESS AT THE
R0488   SQUARE ROOT IS PRESUMED TO BE IN THE A REGISTER AND ONE-HALF THE SQUARE IS TAKEN FROM HALFARG.  THE NEW APPROXI-
R0490   MATION TO THE SQUARE ROOT IS RETURNED IN THE A REGISTER.  DEBRIS:   A,L,SR,SCRATCH.  ROOTCYCL IS CALLED FROM
R0492   LOCATION (LOC) BY A TC ROOTCYCL, AND RETURNS (TC Q) TO LOC +1.

R0493   WARNING:  IF THE INITIAL GUESS IS NOT GREATER THAN THE SQUARE, DIVIDE OR ADD OVERFLOW IS A REAL POSSIBILITY.

 0495   REF    1               21,3635  55'745 1  ROOTCYCL  TS      SCRATCH           STORE X
 0496   REF   29  LAST 1476    21,3636  54 021 0            TS      SR                X/2 NOW IN SR
 0497   REF    4  LAST 1474    21,3637  3 1746 0            CA      HALFARG           ARG/2 IN THE A REG
 0498                          21,3640  22 007 0            ZL                        PREPARE FOR DIVISION
 0499                          21,3641  0 0006 1            EXTEND
 0500   REF    2  LAST 1476    21,3642  11'745 1            DV      SCRATCH           (ARG/X)/2
 0501   REF   30  LAST 1476    21,3643  6 0021 1            AD      SR                (X + ARG/X)/2 IN THE A REG
 0502   REF  427  LAST 1473    21,3644  0 0002 0            TC      Q

R0503
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R0001     PROGRAM NAME: 1/ACCS
R0002     PROGRAM WRITTEN BY: BOB COVELLI AND MIKE HOUSTON
R0003     LAST MODIFICATION: FEB.14,1969 BY G.KALAN

R0004     PROGRAM DESCRIPTION:

R0005        1/ACCS PROVIDES THE INTERFACE BETWEEN THE GUIDANCE PROGRAMS AND THE DIGITAL AUTOPILOT. WHENEVER THERE IS A
R0007     CHANGE IN THE MASS OF THE VEHICLE, IN THE DEADBAND SELECTED, IN THE VEHICLE CONFIGURATION (ASCENT-DESCENT-
R0009     DOCKED), AND DURING A FRESH START OR A RESTART, 1/ACCS IS CALLED TO COMMUNICATE THE DATA CHANGES TO THE DAP.

R0011        THE INPUTS TO 1/ACCS ARE MASS, ACCELERATION (ABDELV), DEADBAND (DB), OFFSET ACCELERATIONS (AOSQ AND AOSR),
R0013     STAGE VERIFY BIT (CHAN30,BIT2), DOCKED BIT (DAPBOOLS,BIT13), DRIFT BIT (DAPBOOLS,BIT8), USEQRJTS (DAPBOOLS,
R0015     BIT14), AND SURFACE FLAG (FLAGWRD8,BIT8), AND CH5MASK.

R0016        1/ACCS COMPUTES THE JET ACCELERATIONS (1JACC, 1JACCQ, 1JACCR) AS FUNCTIONS OF MASS. 1JACCU AND 1JACCV ARE
R0018     FORMED BY RESOLVING 1JACCQ NAD 1JACCR. IN THE DESCENT CASE, THE DESCENT ENGINE MOMENT ARM (L,PVT-CG) IS ALSO
R0020     COMPUTED AS A FUNCTION OF MASS. THE RATE OF CHANGE OF ACCELERATION DUE TO ROTATION OF THE GIMBAL (ACCDOTQ,
R0022     ACCDOTR) IS ALSO COMPUTED IN THE DESCENT CASE.

R0023        AFTER THE ABOVE COMPUTATIONS, THE PROGRAM 1/ACCONT COMPUTES THE RECIPROCAL  NET ACCELERATIONS ABOUT THE P, U,
R0025     AND V AXES (2 JETS FOR P AXIS, BOTH 1 AND 2 JETS FOR U AND V AXES), AND THE RECIPROCAL COAST ACCELERATIONS ABOUT
R0027     THE P, U, AND V AXES. THE ACCELERATION FUNCTIONS (ACCFCTZ1 AND ACCFCTZ5)ARE ALSO COMPUTED FOR THESE AXES. THE
R0029     FIRE AND COAST DEADBANDS AND AXISDIST ARE COMPUTED FOR EACH AXIS. FLAT AND ZONE3LIM, THE WIDTH AND HEIGHT OF THE
R0031     MINIMUM IMPULSE ZONE, ARE COMPUTED. 1/ACCONT ALSO SETS ACCSWU AND ACCSWV, WHICH INDICATE WHEN 1 JET ACCELERATION
R0033     IS NOT SUFFICIENT TO PRODUCE MINIMUM ACCELERATION. AT THE COMPLETION OF 1/ACCS, THE ACCSOKAY BIT IS SET.


R0035     SUBROUTINES CALLED:

R0036               TIMEGMBL
R0037               MAKECADR
R0038               ROT45DEG

R0039     CALLING SEQUENCE:

A0040                                                       TC      BANKCALL        (1/ACCS MUST BE CALL BY BANKCALL
A0041                                                       CADR    1/ACCS

R0042     NORMAL EXIT: VIA BANKJUMP       ALARM AND ABORT EXIT MODES: NONE.

R0043     INPUT/OUTPUT: SEE PROGRAM DESCRIPTION

R0044     DEBRIS:

R0045     ALL OF THE EXECUTIVE TEMPORARY REGISTERS, EXCEPT FIXLOC AND OVFIND, AND THE CORE SET AREA FROM MPAC TO BANKSET.

R0047     RESTRICTIONS:

R0048     1/ACCS MUST BE CALLED BY BANKCALL
R0049     EBANK IS SET TO 6, BUT NOT RESTORED.
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L      AOSTASK AND AOSJOB                                                   USER'S PAGE NO.  2      EO S4

 0050                        21,3645                      BANK    21
 0051  REF   3  LAST 1469    21,2000                      SETLOC  DAPS4
 0052                        21,3645                      BANK

 0053  REF   1                                            COUNT*  $$/DAPAO

 0054  REF  26  LAST 1476    E6,1536                      EBANK=  AOSQ

R0055  ENTRY IS THROUGH 1/ACCJOB OR 1/ACCSET WHEN 1/ACCS IS TO BE DONE AS A SEPARATE NOVAC JOB.

R0057  IT IS POSSIBLE FOR MORE THAN ONE OF THESE JOBS TO BE SET UP CONCURRENTLY.  HOWEVER, SINCE THERE IS NO CHECK OF
R0059  NEWJOB, A SECOND MANIFESTATION CANNOT BE STARTED UNTIL THE FIRST IS COMPLETED.

 0061  REF 308  LAST 1473    21,3645  3 4755 1  1/ACCSET CAF     ZERO           ENTRY FROM FRESH START/RESTART CODING.
 0062  REF  27  LAST 1478    21,3646  55'536 1           TS      AOSQ             NULL THE OFFSET ESTIMATES FOR 1/ACCS.
 0063  REF  10  LAST 1419    21,3647  55'540 0           TS      AOSR
 0064  REF   6  LAST 1419    21,3650  55'424 0           TS      ALPHAQ           NULL THE OFFSET ESTIMATES FOR DOWNLIST
 0065  REF   5  LAST 1419    21,3651  55'425 1           TS      ALPHAR

 0066  REF 314  LAST 1394    21,3652  0 4616 1  1/ACCJOB TC      BANKCALL       1/ACCS ASSUMES ENTRY VIA BANKCALL.
 0067  REF   2  LAST  858    21,3653   40465 1           CADR    1/ACCS +2      SKIP EBANK SETTING.

 0068  REF 158  LAST 1384    21,3654  0 5155 0           TC      ENDOFJOB

 00682                       20,2463                      BANK    20
 00683 REF   5  LAST 1406    20,2000                      SETLOC  DAPS3
 00684                       20,2463                      BANK
 00685 REF   3 LAST   43 TO   44:      3      4*          COUNT*  $$/DAPAO

 0069  REF  10  LAST 1400    20,2463  3 5015 0  1/ACCS   CA      EBANK6         ***** EBANK SET BUT NOT RESTORED *****
 0070  REF  89  LAST 1401    20,2464  54 003 0           TS      EBANK

 0071  REF  16  LAST 1369    20,2465  0 4645 1           TC      MAKECADR       SAVE RETURN SO THAT BUF2 MAY BE USED
 0072  REF   1               20,2466  54 117 1           TS      ACCRETRN

R0073  DETERMINE MASS OF THE LEM.
 0074  REF  59  LAST 1445    20,2467  3 0111 0           CA      DAPBOOLS       IS CSM DOCKED
 0075  REF  11  LAST 1444    20,2470  7 4737 1           MASK    CSMDOCKD
 0076  REF   1               20,2471  54 157 0           TS      DOCKTEMP       STORE RECORD OF STATE IN TEMP (MPAC +3).
 0077  REF 528  LAST 1474    20,2472  10 000 0           CCS     A
 0078  REF   5  LAST  316    20,2473  4 1327 1           CS      CSMMASS          DOCKED:  LEMMASS = MASS - CSMMASS
 0079  REF  14  LAST  855    20,2474  6 1243 0           AD      MASS             LEM ALONE: LEMMASS = MASS
 0080  REF  11  LAST  316    20,2475  55'326 0           TS      LEMMASS

R0081  ON THE BASIS OF APSFLAG:
R0082      SET THE P-AXIS RATE COMMAND LIMIT FOR 2-JET/4-JET CONTROL
R0083      SET MPAC, WHICH INDICATES THE PROPER SET OF COEFFICIENTS FOR THE LEM-ALONE F(MASS) CALCULATIONS
R0085      ENSURE THAT THE LEM MASS VALUE IS WITHIN THE ACCEPTABLE RANGE

 00855                       20,2476  0 0004 0           INHINT
 0086    REF  24  LAST 1445   20,2477  30 106 0            CAE     FLGWRD10        DETERMINE WHETHER STAGED.
 0087    REF  16  LAST 1445   20,2500  7 4737 1            MASK    APSFLBIT
 0088                         20,2501  0 0006 1            EXTEND
 0089    REF   1              20,2502  1 2526 0            BZF     DPSFLITE

 0090    REF  41  LAST 1466   20,2503  4 4733 0            CS      POSMAX          ASCENT (OR ON LUNAR SURFACE)
 0091    REF   3  LAST 1428   20,2504  55'475 1            TS      -2JETLIM        ALWAYS 2 JETS FOR P-AXIS RATE COMMAND
 0092    REF   7  LAST 1476   20,2505  3 5741 0            CAF     OCT14           INITIALIZE INDEX AT 12.
 0093    REF 882  LAST 1394   20,2506  54 154 0            TS      MPAC
 0094    REF  12  LAST 1478   20,2507  4 1326 0            CS      LEMMASS         CHECK IF MASS TOO HIGH.  CATCH STAGING.
 0095    REF   3  LAST  214   20,2510  6 1400 1            AD      HIASCENT
 0096                         20,2511  0 0006 1            EXTEND
 0097    REF   1              20,2512  6 2517 0            BZMF    MASSFIX
 0098    REF  13  LAST 1479   20,2513  4 1326 0            CS      LEMMASS         CHECK IF MASS TOO LOW.  THIS LIMITS THE
 0099    REF   1              20,2514  6 2001 1            AD      LOASCENT          DECREMENTING BY MASSMON.
 0100                         20,2515  0 0006 1            EXTEND
 0101    REF   1              20,2516  6 2544 0            BZMF    F(MASS)

 0102    REF  14  LAST 1479   20,2517  27'326 0  MASSFIX   ADS     LEMMASS         STORE THE VIOLATED LIMIT AS LEMMASS.
 0103                         20,2520  22 007 0            ZL                        ALSO CORRECT TOTAL MASS, ZEROING THE
 0104    REF   2  LAST 1478   20,2521  10 157 0            CCS     DOCKTEMP          LOW-ORDER WORD.
 0105    REF   6  LAST 1478   20,2522  31'327 0            CAE     CSMMASS             DOCKED:   MASS = LEMMASS + CSMMASS
 0106    REF  15  LAST 1479   20,2523  6 1326 1            AD      LEMMASS             LEM ALONE:  MASS = LEMMASS
 0107    REF  15  LAST 1478   20,2524  53'244 0            DXCH    MASS
 0108    REF   2  LAST 1479   20,2525  1 2544 1            TCF     F(MASS)

 0109    REF  53  LAST 1468   20,2526  4 4742 0  DPSFLITE  CS      BIT10           FOUR JETS FOR P-AXIS RATE COMMAND ERRORS
 0110    REF   4  LAST 1479   20,2527  55'475 1            TS      -2JETLIM          EXCEEDING 1.4 DEG/SEC  (SCALED AT 45)
 0111    REF  33  LAST 1432   20,2530  3 6245 1            CAF     SIX             INITIALIZE INDEX AT 6.
 0112    REF 883  LAST 1479   20,2531  54 154 0            TS      MPAC
 0113    REF  16  LAST 1479   20,2532  4 1326 0            CS      LEMMASS         CHECK IF MASS TOO HIGH.  SHOULD NEVER
 0114    REF   1              20,2533  6 2002 1            AD      HIDESCNT          OCCUR EXCEPT PERHAPS BEFORE THE PAD
 0115                         20,2534  0 0006 1            EXTEND                    LOAD IS DONE.
 0116    REF   2  LAST 1479   20,2535  6 2517 0            BZMF    MASSFIX
 0117    REF  17  LAST 1479   20,2536  4 1326 0            CS      LEMMASS         CHECK IF MASS TOO LOW.  THIS LIMITS THE
 0118    REF   1              20,2537  6 2003 0            AD      LODESCNT          DECREMENTING BY MASSMON.
 0119    REF   4  LAST 1479   20,2540  6 1400 1            AD      HIASCENT
 0120                         20,2541  0 0006 1            EXTEND
 0121    REF   3  LAST 1479   20,2542  6 2544 0            BZMF    F(MASS)
 0122    REF   3  LAST 1479   20,2543  1 2517 1            TCF     MASSFIX
R0123    COMPUTATION OF FUNCTIONS OF MASS

 0124                         20,2544  0 0003 1  F(MASS)   RELINT
 0125    REF   3  LAST 1479   20,2545  10 157 0            CCS     DOCKTEMP
 0126    REF   1              20,2546  1 3111 1            TCF     DOCKED          DOCKED: USE SEPERATE COMPUTATION.
 0127    REF 106  LAST 1470   20,2547  3 4752 0            CA      TWO
 0128    REF 884  LAST 1479   20,2550  54 155 1  STCTR     TS      MPAC +1         J=2,1,0 FOR 1JACCR,1JACCQ,1JACC

 0129    REF 107  LAST 1479   20,2551  4 4752 1            CS      TWO
 0130    REF 885  LAST 1479   20,2552  26 154 0            ADS     MPAC            JX=10,8,6 OR 4,2,0 TO INDEX COEFS.
 0131    REF  18   LAST 1479    20,2553   31'326 1  STCTR1   CAE     LEMMASS
 D1311   REF 886   LAST 1479    20,2554   50 154 1           INOEX   MPAC
 0132    REF   1                20,2555   6 3C64 0           AD      INERCCNC
 0133    REF 887   LAST 1480    20,2556   54 156 1           TS      MPAC +2              MASS + C
 0134                           20,2557   C 0006 1           EXTENO
 0135    REF 888   LAST 1480    20,2560   5 0154 1           INOEX   MPAC
 0136    REF   1                20,2561   3 3046 0           CCA     INERCONA
 D137                           20,2562   C 0006 1           EXTENO
 0138    REF 889   LAST 1480    20,2563   10 156 1           DV      MPAC +2
 0139    REF 890   LAST 1480    2D,2564   50 154 1           INOEX   MPAC
 0140    REF   1                20,2565   6 3063 1           AD      INERCCNB
 0141    REF 891   LAST 1480    20,2566   50 155 D           INOEX   MPAC +1              1JACC(J)=A(JX)/(MASS+C(JX) + B(JX))
 0142    REF   7   LAST 1415    20,2567   55'530 1           TS      1JACC                1JACC(-1)=L,PVT-CG  SCALEO AT 8 FEET

 0143    REF 892   LAST 1480    20,257D   10 155 1           CCS     MPAC +1
 0144    REF   1                20,2571   1 2550 1           TCF     STCTR
 0145    REF   1                20,2572   1 2574 1           TCF     CCMMECS
 0146    REF   1                20,2573   1 2673 0           TCF     LRESC

R0147      COEFFQ AND COEFFR ARE CCMFUTEO IN THIS SECTION. THEY ARE USED TO RESOLVE Q-R COMPONENTS INTO NON-ORTHOGONAL
R0149    U AND V COMPONENTS (SEE ROT-TOUV SECTION).

 0150                           20,2574   22 007 0  COMMEQS  ZL
 015D1   REF   2   LAST 1463    20,2575   4 1532 0           CS      1JACCR
 0151    REF   2   LAST 1463    20,2576   6 1531 1           AO      1JACCQ
 D152                           20,2577   0 0D06 1           EXTENO
 0153    REF   1                20,2600   6 2624 0           BZMF    BIGIQ
 D154                           20,2601   0 0D06 1           EXTEND                       EPSILON IS A MEASURE OF COUPLING ANO IS
 0155    REF   3   LAST 1480    20,2602   11'531 0           DV      1JACCQ               DEFINEO=1-IQ/IR FOR IR GREATER THAN IQ.
 0156    REF   1                20,2603   54 155 1           TS      EPSILON              THE COMPUTEC EXPRESSION IS EQUIVALENT
 0157    REF   1                20,2604   6 3110 1           AD      -EPSMAX
 0158                           20,2605   C 0006 1           EXTENO
 0159    REF   1                20,2606   6 2611 0           BZMF    GCCOEPSI
 0160    REF   2   LAST 1480    20,2607   4 3110 0           CS      -EPSMAX
 D161    REF   2   LAST 1480    20,2610   54 155 1           TS      EPSILON              EPSILON IS LIMITED TO A MAX. DF .42265
 0162    REF   3   LAST 1480    20,2611   3 0155 0  GOODEPS1 CA      EPSILON
 0163                           20,2612   0 00D6 1           EXTENO
 0164    REF   1                20,2613   7 3104 0           MP      0.35356
 0165    REF   1                20,2614   6 3106 0           AO      .7071
 0166    REF   2   LAST 1449    20,2615   55'627 1           TS      COEFFR               IN THIS CASE WHERE IR IS GRFATER THAN
 0167    REF  42   LAST 1479    20,2616   4 4733 0           CS      PCSMAX               IC, COEFFQ=-.7D7(1+.5EPSILON)(1-EPSILON)
 0168    REF   4   LAST 1480    20,2617   6 0155 0           AO      EPSILON              AND COEFFR=.707(1+.5EPSILON)
 0169                           20,2620   0 0D06 1           EXTEND
 0170    REF   3   LAST 1480    20,2621   7 1627 1           MP      COEFFR
 0171    REF   3   LAST 1449    20,2622   55'626 D           TS      COEFFQ
 D172    REF   1                20,2623   1 2647 1           TCF     JACCUV
 0173                           20,2624   0 0006 1  BIGIQ    EXTENO                       EPSILON IS DEFINEO AS 1-IR/IQ FOR IQ
 0174    REF   3   LAST 1480    20,2625   11'532 0           DV      1JACCR               GRFATER THAN IR. -EPSILON IS COMPUTEO
 0175    REF   1                20,2626   54 155 1           TS      -EPSILCN             RATHER THAN EPSILCN FCR CONVENIENCE
 0176    REF   2   LAST 1480    20,2627   4 0155 1           CS      -EPSILON
 0177    REF    3  LAST 1480    20,2630   6 3110 1                AD      -EPSMAX
 0178                           20,2631   0 0006 1                EXTEND
 0179    REF    1               20,2632   6 2635 0                BZMF    GOODEPS2
 0180    REF    4  LAST 1481    20,2633   3 3110 1                CA      -EPSMAX
 0181    REF    3  LAST 1480    20,2634  54 155 1                 TS      -EPSILON          EPSILON IS LIMITED TO A MAX. OF .42265
 0182    REF    4  LAST 1481    20,2635   3 0155 0    GOODEPS2    CA      -EPSILON
 0183                           20,2636   0 0006 1                EXTEND
 0184    REF    2  LAST 1480    20,2637   7 3104 0                MP      0.35356
 0185    REF    1               20,2640   6 3107 1                AD      -.7071
 0186    REF    4  LAST 1480    20,2641  55'626 0                 TS      COEFFQ            IN THIS CASE WHERE IQ IS GREATER THAN
 0187    REF    5  LAST 1481    20,2642   4 0155 1                CS      -EPSILON          IR, COEFFQ=-.707(1+.5EPSILON) AND
 0188    REF   12  LAST 1461    20,2643   6 4735 1                AD      NEGMAX            COEFFR=.707(1+.5EPSILON)(1-EPSILON)
 0189                           20,2644   0 0006 1                EXTEND
 0190    REF    5  LAST 1481    20,2645   7 1626 0                MP      COEFFQ
 0191    REF    4  LAST 1480    20,2646  55'627 1                 TS      COEFFR
 0192    REF    6  LAST 1481    20,2647   4 1626 0    JACCUV      CS      COEFFQ
 0193                           20,2650   0 0006 1                EXTEND
 0194    REF    4  LAST 1480    20,2651   7 1531 0                MP      1JACCQ            1JACCQ IS SCALED AT PI/4
 0195    REF    1               20,2652  55'533 1                 TS      1JACCU            1JACCU USED AS TEMPORARY STORAGE
 0196    REF    5  LAST 1481    20,2653   3 1627 0                CA      COEFFR
 0197                           20,2654   0 0006 1                EXTEND
 0198    REF    4  LAST 1480    20,2655   7 1532 0                MP      1JACCR
 0199    REF    2  LAST 1481    20,2656   6 1533 0                AD      1JACCU
 0200                           20,2657   0 0006 1                EXTEND
 0201    REF   89  LAST 1474    20,2660   7 4736 0                MP      BIT14             SCALING CHANGED FROM PI/4 TO PI/2
 0202    REF    3  LAST 1481    20,2661  55'533 1                 TS      1JACCU            SCALED AT PI/2 RADIANS/SEC(2)
 0204    REF  893  LAST 1480    20,2662  10 154 0                 CCS     MPAC              COMPUTE L,PVT-CG IF IN DESCENT
 0205    REF  309  LAST 1478    20,2663   3 4755 1                CAF     ZERO              ZERO SWITCHES AND GO TO 1/ACCONT IN
 0206    REF    5  LAST 1472    20,2664  55'502 0                 TS      ALLOWGTS            ASCENT
 0207    REF    1               20,2665   1 3234 0                TCF     1/ACCONT -1

 0208    REF  108  LAST 1479    20,2666   4 4752 1                CS      TWO
 0209    REF  894  LAST 1481    20,2667  54 154 0                 TS      MPAC
 0210    REF  174  LAST 1470    20,2670   4 4753 0                CS      ONE
 0211    REF  895  LAST 1481    20,2671  54 155 1                 TS      MPAC +1
 0212    REF    1               20,2672   1 2553 1                TCF     STCTR1
R0213    THIS SECTION COMPUTES THE RATE OF CHANGE OF ACCELERATION DUE TO THE ROTATION OF THE GIMBALS.  THE EQUATION IMPLE
R0215    MENTED IN BOTH THE Y-X PLANE AND THE Z-X PLANE IS -- D(ALPHA)/DT = TL/I*D(DELTA)/DT, WHERE
R0217          T = ENGINE THRUST FORCE
R0218          L = PIVOT TO CG DISTANCE OF ENGINE
R0219          I = MOMENT OF INERTIA

 0220    REF    6  LAST  856    20,2673  31'245 0    LRESC       CAE     ABDELV            SCALED AT 2(13) CM/SEC(2)
 0221                           20,2674   0 0006 1                EXTEND
 0222    REF   16  LAST 1479    20,2675   7 1243 1                MP      MASS              SCALED AT B+16 KGS
 0223    REF    1               20,2676   0 3002 0                TC      DVOVSUB           GET QUOTIENT WITH OVERFLOW PROTECTION
 0224    REF    1               20,2677    03105 0                ADRES   GFACTM

R0225    MASS IS DIVIDED BY ACCELERATION OF GRAVITY IN ORDER TO MATCH THE UNITS OF IXX,IYY,IZZ, WHICH ARE SLUG-FT(2).
R0227    THE RATIO OF ACCELERATION FROM PIPAS TO ACCELERATION OF GRAVITY IS THE SAME IN METRIC OR ENGINEERING UNITS, SO
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L         AOSTASK AND AOSJOB                                                                  USER'S PAGE NO.   6      E6 S4

R0229     THAT IS UNCONVERTED.  2.20462 CONVERTS KG. TO LB.  NOW T IS IN A SCALED AT 2(14).

 0231                             20,2700  0 0006 1               EXTEND
 0232     REF   1                 20,2701  7 1527 1               MP      L,PVT-CG          SCALED AT 8 FEET.
 0233                             20,2702  0 0004 0               INHINT
 0234     REF 896  LAST 1481      20,2703  54 154 0               TS      MPAC
 0235                             20,2704  0 0006 1               EXTEND
 0236     REF   5  LAST 1481      20,2705  7 1532 0               MP      1JACCR
 0237     REF   2  LAST 1481      20,2706  0 3002 0               TC      DVOVSUB           GET QUOTIENT WITH OVERFLOW PROTECTION
 0238     REF   1                 20,2707   02000 0               ADRES   TORKJET1

 0239     REF   2  LAST 1468      20,2710  55'511 1               TS      ACCDOTR           SCALED AT PI/2(7)
 0240     REF 897  LAST 1482      20,2711  3 0154 1               CA      MPAC
 0241                             20,2712  0 0006 1               EXTEND
 0242     REF   5  LAST 1481      20,2713  7 1531 0               MP      1JACCQ
 0243     REF   3  LAST 1482      20,2714  0 3002 0               TC      DVOVSUB           GET QUOTIENT WITH OVERFLOW PROTECTION
 0244     REF   2  LAST 1482      20,2715   02000 0               ADRES   TORKJET1

 0245     REF   6  LAST 1471      20,2716  55'507 0  SRSCONT      TS      ACCDOTQ           SCALED AT PI/2(7)
 0246                             20,2717  0 0006 1               EXTEND
 0247     REF   1                 20,2720  7 3103 1               MP      DGBF              .3ACCDOTQ SCALED AT PI/2(8)
 0248     REF   4  LAST 1465      20,2721  55'504 0               TS      KQ
 0249     REF   3  LAST 1482      20,2722  31'511 0               CAE     ACCDOTR           .3ACCDOTR AT PI/2(8)
 0250                             20,2723  0 0006 1               EXTEND
 0251     REF   2  LAST 1482      20,2724  7 3103 1               MP      DGBF
 0252     REF   1                 20,2725  55'506 1               TS      KRDAP
 0253                             20,2726  0 0006 1               EXTEND                    NOW COMPUTE QACCDOT, RACCDOT, THE SIGNED
 0254     REF  75  LAST 1475      20,2727  00 012 1               READ    CHAN12 -          JERK TERMS.  STORE CHANNEL 12. WITH GIM
 0255     REF 898  LAST 1482      20,2730  54 155 1               TS      MPAC +1           BAL DRIVE BITS 9 THROUGH 12.  SET LOOP
 0256     REF  55  LAST 1464      20,2731  3 4752 0               CAF     BIT2              INDEX TO COMPUTE RACCDOT, THEN QACCDOT.
 0257     REF   1                 20,2732  1 2734 1               TCF     LOOP3
 0258     REF 310  LAST 1481      20,2733  3 4755 1               CAF     ZERO              ACCDOTQ AND ACCDOTR ARE NOT NEGATIVE,
 0259     REF 899  LAST 1482      20,2734  54 154 0  LOOP3        TS      MPAC              BECAUSE THEY ARE MAGNITUDES
 0260     REF 900  LAST 1482      20,2735  3 0155 0               CA      MPAC +1
 0261     REF 901  LAST 1482      20,2736  50 154 1               INDEX   MPAC              MASK CHANNEL IMAGE FOR ANY GIMBAL MOTION
 0262     REF   1                 20,2737  7 3077 0               MASK    GIMBLBTS
 0263                             20,2740  0 0006 1               EXTEND
 0264     REF   1                 20,2741  1 2755 0               BZF     ZACCDOT           IF NONE, Q(R)ACCDOT IS ZERO.
 0265     REF 902  LAST 1482      20,2742  3 0155 0               CA      MPAC +1
 0266     REF 903  LAST 1482      20,2743  50 154 1               INDEX   MPAC              GIMBAL IS MOVING.  IS ROTATION POSITIVE.
 0267     REF   2  LAST 1482      20,2744  7 3100 1               MASK    GIMBLBTS +1
 0268                             20,2745  0 0006 1               EXTEND
 0269     REF   1                 20,2746  1 2752 1               BZF     FRSTZERO          IF NOT POSITIVE, BRANCH
 0270     REF 904  LAST 1482      20,2747  50 154 1               INDEX   MPAC              POSITIVE ROTATION, NEGATIVE Q(R)ACCDOT.
 0271     REF   7  LAST 1482      20,2750  4 1507 0               CS      ACCDOTQ
 0272     REF   1                 20,2751  1 2756 0               TCF     STACCDOT
 0273     REF 905  LAST 1482      20,2752  50 154 1  FRSTZERO     INDEX   MPAC              NEGATIVE ROTATION, POSITIVE Q(R)ACCDOT.
 0274     REF   8  LAST 1482      20,2753  3 1507 1               CA      ACCDOTQ
 0275     REF   2  LAST 1482      20,2754  1 2756 0               TCF     STACCDOT
 0276     REF 311  LAST 1482      20,2755  3 4755 1  ZACCDOT      CAF     ZERO
 0277    REF 906  LAST 1482   20,2756  5C 154 1  STACCDOT INDEX   MPAC
 0278    REF   6  LAST 1475   20,2757  55'510 0           TS      DACCDOT             STORE Q(R)ACCDOT.
 0279    REF 907  LAST 1483   20,2760  10 154 0           CCS     MPAC
 0280    REF   2  LAST 1482   20,2761  1 2733 0           TCF     LOOP3 -1            NOW DO QACCDOT.
 0281    REF  60  LAST 1478   20,2762  4 0111 1           CS      DAPBOOLS            IS GIMBAL USABLE?
 0282    REF   6  LAST 1444   20,2763  7 4736 0           MASK    USEQRJTS
 0283                         20,2764  0 0006 1           EXTEND
 0284    REF   1              20,2765  1 3712 1           BZF     DOWNGTS             NO. BE SURE THE GIMBAL SWITCHES ARE DOWN
 0285    REF   5  LAST 1405   20,2766  4 1263 0           CS      T5ADR               YES.  IS THE DAP RUNNING?
 0286    REF   1              20,2767  6 3772 0           AD      PAXISADR
 0287                         20,2770  0 0006 1           EXTEND
 0288                         20,2771  1 2773 1           BZF      +2
 0289    REF   2  LAST 1483   20,2772  1 3712 1           TCF     DOWNGTS             NO. BE SURE THE GIMBAL SWITCHES ARE DOWN
 0290    REF   6  LAST 1464   20,2773  11'632 0           CCS     INGTS               YES.  IS GTS IN CONTROL?
 0291    REF   1              20,2774  1 2777 0           TCF     DOCKTEST            YES.  PROCEED WITH 1/ACCS.
 0292    REF  63  LAST 1472   20,2775  0 4674 0           TC      IBNKCALL            NO.  NULL OFFSET AND FIND ALLOWGTS
 0293    REF   2  LAST 1442   20,2776   43327 0           CADR    TIMEGMBL

 0294    REF   4  LAST 1479   20,2777  10 157 0  DOCKTEST CCS     DOCKTEMP            BYPASS 1/ACCONT WHEN DOCKED.
 0295    REF   1              20,3000  1 3675 1           TCF     1/ACCRET
 0296    REF   2  LAST 1481   20,3001  1 3235 1           TCF     1/ACCONT
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P0297   SUBROUTINE:  DVOVSUB

R0298   AUTHOR:  C. WORK, MOD 0 12 JUNE 68

R0299   PURPOSE:  THIS SUBROUTINE PROVIDES A SINGLE-PRECISION MACHINE LANGUAGE DIVISION OPERATION WHICH RETURNS
R0301             (1) THE QUOTIENT, IF THE DIVISION WAS NORMAL.
R0302             (2) NEGMAX, IF THE QUOTIENT WAS IMPROPER AND NEGATIVE.
R0303             (3) POSMAX, IF THE QUOTIENT WAS IMPROPER AND POSITIVE OR IF THERE WAS A ZERO DIVISOR.
R0305             THE CALLING PROGRAM IS PRESUMED TO BE A JOB IN THE F BANK WHICH CONTAINS DVOVSUB. E BANK MUST BE 6.
R0307             THE DIVISOR FOR THIS ROUTINE MAY BE IN EITHER FIXED OR ERASABLE STORAGE.  SIGN AGREEMENT IS
R0309             ASSUMED BETWEEN THE TWO HALVES OF THE DIVIDEND. (THIS IS CERTAIN IF THE A AND L REGISTERS ARE THE RE-
R0311             SULT OF A MULTIPLICATION OPERATION.)
R0312   CALL SEQUENCE:
A0313                                        L         TC      DVOVSUB
A0314                                        L +1      ADRES   (DIVISOR)
A0315                                        L +2      RETURN HERE, WITH RESULT IN A,L

R0316   INPUT:  DIVIDEND IN A,L (SIGN AGREEMENT ASSUMED), DIVISOR IN LOCATION DESIGNATED BY "ADRES".
R0318           DIVISOR MAY BE IN THE DVOVSUB FBANK,FIXED-FIXED FBANK,EBANK 6, OR UNSWITCHED ERASABLE.

R0320   OUTPUT:  QUOTIENT AND REMAINDER, OR POSMAX (NEGMAX), WHICHEVER IS APPROPRIATE.

R0322   DEBRIS:  SCRATCHX,SCRATCHY,SCRATCHZ,A,L  (NOTE:  SCRATCHX,Y,Z ARE EQUATED TO MPAC +4,+5,AND +6.)

R0324   ABORTS OR ALARMS:  NONE

R0325   EXITS:  TO THE CALL POINT + 2.

R0326   SUBROUTINES CALLED:  NONE.

 0327   REF   1               20,3002  54 161 0  DVOVSUB   TS      SCRATCHY        SAVE UPPER HALF OF DIVIDEND
 0328   REF   1               20,3003  54 160 1            TS      SCRATCHX
 0329   REF 428  LAST 1476    20,3004  50 002 0            INDEX   Q               OBTAIN ADDRESS OF DIVISOR.
 0330                         20,3005  3 0000 1            CA      0
 0331   REF 429  LAST 1484    20,3006  24 002 0            INCR    Q               STEP Q FOR PROPER RETURN SEQUENCE.
 0332   REF 529  LAST 1478    20,3007  50 000 1            INDEX   A
 0333                         20,3010  3 0000 1            CA      0               PICK UP THE DIVISOR.
 0334                         20,3011  0 0006 1            EXTEND                  RETURN POSMAX FOR A ZERO DIVISOR.
 0335   REF   1               20,3012  1 3041 0            BZF     MAXPLUS

 0336   REF   1               20,3013  54 162 0            TS      SCRATCHZ        STORE DIVISOR.

 0337   REF 530  LAST 1484    20,3014  10 000 0            CCS     A               GET ABS(DIVISOR) IN THE A REGISTER.
 0338   REF  70  LAST 1475    20,3015  6 4753 1            AD      BIT1
 0339   REF   1               20,3016  1 3020 1            TCF     ZEROPLUS
 0340   REF  71  LAST 1484    20,3017  6 4753 1            AD      BIT1

 0341   REF   2  LAST 1484    20,3020  56 161 1  ZEROPLUS  XCH     SCRATCHY        STORE ABS(DIVISOR).  PICK UP TOP HALF OF
 0342                         20,3021  0 0006 1            EXTEND                  DIVIDEND.
 0343   REF   1               20,3022  6 3024 1            BZMF    GOODNEG         GET  -ABS(DIVIDEND)
 0344    REF 531  LAST 1484   20,3023  4 0000 0               CS      A

 0345    REF   3  LAST 1484   20,3024  6 0161 1  GOODNEG  AD      SCRATCHY         ABS(DIVISOR) - ABS(DIVIDEND)
 0346                         20,3025  0 0006 1           EXTEND
 0347    REF   1              20,3026  6 3033 1           BZMF    MAKEMAX          BRANCH IF DIVISION IS NOT PROPER.

 0348    REF   2  LAST 1484   20,3027  3 0160 0           CA      SCRATCHX         RE-ESTABLISH THE DIVIDEND.
 0349                         20,3030  0 0006 1           EXTEND
 0350    REF   2  LAST 1484   20,3031  10 162 0           DV      SCRATCHZ         QUOTIENT IN THE A, REMAINDER IN L.
 0351    REF 430  LAST 1484   20,3032  0 0002 0           TC      Q                RETURN TO CALLER.

 0352    REF   3  LAST 1485   20,3033  10 160 1  MAKEMAX  CCS     SCRATCHX         DETERMINE THE SIGN OF THE QUOTIENT.
 0353    REF   3  LAST 1485   20,3034  10 162 0           CCS     SCRATCHZ         SCRATCHX AND SCRATCHZ ARE NON-ZERO.
 0354    REF   2  LAST 1484   20,3035  1 3041 0           TCF     MAXPLUS
 0355    REF   4  LAST 1485   20,3036  10 162 0           CCS     SCRATCHZ
 0356    REF  13  LAST 1481   20,3037  3 4735 1           CAF     NEGMAX           +,- OR -,+
 0357    REF 431  LAST 1485   20,3040  0 0002 0           TC      Q
 0358    REF  43  LAST 1480   20,3041  3 4733 1  MAXPLUS  CAF     POSMAX           -,- OR +,+
 0359    REF 432  LAST 1485   20,3042  0 0002 0           TC      Q

R0360    COEFFICIENTS FOR THE JET ACCELERATION CURVE FITS
R0361    THE CURVE FITS ARE OF THE FORM -

R0362              1JACC = A/(MASS + C) + B

R0363    A IS SCALED AT PI/4 RAD/SEC**2 B+16KG, B IS SCALED AT PI/4 RAD/SEC**2, AND C IS SCALED AT B +16 KG.

R0365    THE CURVE FIT FOR L,PVT-CG IS OF THE SAME FORM, EXCEPT THAT A IS SCALED AT 8 FT B+16 KG, B IS SCALED AT 8 FT,
R0367    AND C IS SCALED AT B+16 KG.


 0368                         20,3043   01240 0           2DEC    +.0410511917     L        A   DESCENT
 0368                         20,3044   22513 0

 0369                         20,3045   00141 0  INERCONA 2DEC    +.0059347674     1JACCP   A   DESCENT
 0369                         20,3046   07416 0
 0370                         20,3047   00030 1           2DEC    +.0014979264     1JACCQ   A   DESCENT
 0370                         20,3050   21261 1
 0371                         20,3051   00021 1           2DEC    +.0010451889     1JACCR   A   DESCENT
 0371                         20,3052   03766 0

 0372                         20,3053   00153 0           2DEC    +.0065443852     1JACCP   A   ASCENT
 0372                         20,3054   07111 1
 0373                         20,3055   00072 1           2DEC    +.0035784354     1JACCQ   A   ASCENT
 0373                         20,3056   24103 0
 0374                         20,3057   00135 0           2DEC    +.0056946631     1JACCR   A   ASCENT
 0374                         20,3060   11511 1

 0375                         20,3061   04754 0           DEC     +.155044         L        B   DESCENT
 0376                         20,3062   77142 0           DEC     -.025233         L        C   DESCENT
 0377                        20,3063  00061 0  INERCONB DEC    +.002989       1JACCP  B  DESCENT
 0378                        20,3064  00217 0  INERCONC DEC    +.008721       1JACCP  C  DESCENT
 0379                        20,3065  00464 1           DEC    +.018791       1JACCQ  B  DESCENT
 0380                        20,3066  75642 0           DEC    -.068163       1JACCQ  C  DESCENT
 0381                        20,3067  00536 1           DEC    +.021345       1JACCR  B  DESCENT
 0382                        20,3070  75705 1           DEC    -.066027       1JACCR  C  DESCENT

 0383                        20,3071  00001 0           DEC    +.000032       1JACCP  B  ASCENT
 0384                        20,3072  77616 0           DEC    -.006923       1JACCP  C  ASCENT
 0385                        20,3073  05154 1           DEC    +.162862       1JACCQ  B  ASCENT
 0386                        20,3074  00052 0           DEC    +.002588       1JACCQ  C  ASCENT
 0387                        20,3075  00231 1           DEC    +.009312       1JACCR  B  ASCENT
 0388                        20,3076  77174 0           DEC    -.023608       1JACCR  C  ASCENT


 0389                        20,3077  01400 1  GIMBLBTS OCTAL  01400
 0390                        20,3100  01000 0           OCTAL  01000
 0391                        20,3101  06000 1           OCTAL  06000
 0392                        20,3102  04000 0           OCTAL  04000
 0393                        20,3103  23146 0  DGEF     DEC    0.6             .3 SCALED AT 1/2
 0394                        20,3104  13241 1  0.35356  DEC    0.35356        .70711 SCALED AT 2
 0395                        20,3105  00337 0  GFACTM   OCT    337            979.24/2.20462 AT 8+15
 0396                        20,3106  26501 1  .7071    DEC    .70711
 0397                        20,3107  51276 0  -.7071   DEC    -.70711
 0398                        20,3110  62362 1  -EPSMAX  DEC    -.42265
P0399    CSM-DOCKED INERTIA COMPUTATIONS

 0400    REF 175  LAST 1481  20,3111  3 4753 1  DOCKED  CA     ONE            COEFTR = 1 FOR INERTIA COEFFICIENTS
 0401    REF   1             20,3112  54 160 1 SPSLOOP1 TS     COEFCTR               = 7 FOR CG COEFFICIENTS
 0402    REF 176  LAST 1486  20,3113  3 4753 1          CA     ONE            MASSCTR = 1 FOR CSM
 0403    REF   1             20,3114  54 161 0          TS     MASSCTR                = 0 FOR LEM

 0404    REF   2  LAST 1486  20,3115  50 160 0          INDEX  COEFCTR
 0405    REF   1             20,3116  3 3216 1          CA     COEFF -1       COEFF -1 = C
 0406                        20,3117  0 0006 1          EXTEND
 0407    REF  19  LAST 1480  20,3120  7 1326 0          MP     LEMMASS
 0408                        20,3121  0 0006 1          EXTEND
 0409    REF   7  LAST 1479  20,3122  7 1327 1          MP     CSMMASS        LET X = CSMMASS AND Y = LEMMASS

 0410    REF   3  LAST 1486  20,3123  50 160 0          INDEX  COEFCTR
 0411    REF   2  LAST 1486  20,3124  6 3217 0          AD     COEFF          COEFF = F
 0412    REF 908  LAST 1483  20,3125  54 154 0          TS     MPAC           MPAC = C X Y + F
 0413                        20,3126  1 3132 0          TCF    +4

 0414    REF   2  LAST 1486  20,3127  54 161 0 SPSLOOP2 TS     MASSCTR        LOOP TWICE THROUGH HERE TO OBTAIN
 0415                        20,3130  0 0006 1          EXTEND                MPAC = MPAC + (A X +D)X + (B Y +E)Y
 0416    REF   4  LAST 1486  20,3131  26 160 1          DIM    COEFCTR                          LOOP #1      LOOP #2
 0417    REF   5  LAST 1486  20,3132  50 160 0          INDEX  COEFCTR
 0418    REF   3  LAST 1486  20,3133  3 3221 0          CA     COEFF +2       COEFF +2 = A OR B
 0419                        20,3134  0 0006 1          EXTEND
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L         AOSTASK  ANO AOSJOB                                                          USER'S PAGE NO.  11        E6 S4

 0420   REF   3  LAST 1486   20,3135  5 0161 1            INOEX  MASSCTR
 0421   REF  20  LAST 1486   20,3136  7 1326 0            MP     LEMMASS
 0422   REF   6  LAST 1486   20,3137  50 160 0            INOEX  COEFCTR
 0423   REF   4  LAST 1486   20,3140  6 3223 1            AO     COEFF +4          COEFF +4 = E OR D
 0424                        20,3141  0 0006 1            EXTEND
 0425   REF   4  LAST 1487   20,3142  5 0161 1            INOEX  MASSCTR
 0426   REF  21  LAST 1487   20,3143  7 1326 0            MP     LEMMASS
 0427   REF 909  LAST 1486   20,3144  26 154 0            AOS    MPAC

 0428   REF   5  LAST 1487   20,3145  10 161 0            CCS    MASSCTR
 0429   REF   1              20,3146  1 3127 1            TCF    SPSLOOP2
 0430   REF   7  LAST 1487   20,3147  10 160 1            CCS    COEFCTR            IF COEFCTR IS PCS , EXIT FRCM LOOP WITH
 0431                        20,3150  1 3157 0            TCF    +7                 CG X DELOOT = MPAC X 4 PI RAO-CM/SEC
 0432                        20,3151   00000 1  TORQCONS 2DEC   0.51443 B-14        CORRESPONCS TO 500 L8-FT
 0432                        20,3152   20354 1
 0433   REF 910  LAST 1487   20,3153  3 0154 1            CA     MPAC
 0434   REF 911  LAST 1487   20,3154  54 155 1            TS     MPAC +1            INERTIA = (MPAC +1) X 2(38) KG-CM(2)
 0435   REF  25  LAST 1473   20,3155  3 4757 0            CA     SEVEN
 0436   REF   1              20,3156  1 3112 1            TCF    SPSLOOP1

 0437   REF   1              20,3157  3 3216 1            CA     1JACCCON           1JACC=1JACCCON/MASS
 0438                        20,3160  22 007 0            ZL
 0439   REF   4  LAST 1482   20,3161  0 3002 0            TC     DVCVSU8
 0440   REF  17  LAST 1481   20,3162   01243 0            ADRES  MASS
 0441   REF   8  LAST 1480   20,3163  55'530 1            TS     1JACC              SCALEO AT PI/4

 0442   REF  44  LAST 1485   20,3164  3 4733 1            CA     POSMAX             SET INVERSE JET ACCELERATIONS TO POSMAX,
 0443   REF   2  LAST 1427   20,3165  55'550 1            TS     1/ANETP            WHICH CORRESPONOS TO ACCEL. OF 1.4 0/SS.
 0444   REF   3  LAST 1456   20,3166  55'570 0            TS     1/ANET2 +1
 0445   REF   4  LAST 1487   20,3167  55'571 1            TS     1/ANET2 +2
 0446   REF   5  LAST 1487   20,3170  55'610 0            TS     1/ANET2 +170
 0447   REF   6  LAST 1487   20,3171  55'611 1            TS     1/ANET2 +180
 0448                        20,3172  0 0006 1            EXTEND
 0449   REF   1              20,3173  3 3152 1            DCA    TORQCONS
 0450                        20,3174  0 0006 1            EXTENO
 0451   REF 912  LAST 1487   20,3175  10 155 1            OV     MPAC +1
 0452                        20,3176  0 0004 0            INHINT
 0453   REF   6  LAST 1482   20,3177  55'531 0            TS     1JACCQ             SCALEO AT PI/4
 0454   REF   6  LAST 1482   20,3200  55'532 0            TS     1JACCR

 0455   REF   2  LAST 1481   20,3201  3 3107 1            CA     -.7071
 0456   REF   7  LAST 1481   20,3202  55'626 0            TS     COEFFQ             COEFFQ ANO COEFFR ARE CHOSEN TO MAKE U-
 0457   REF   2  LAST 1480   20,3203  3 3106 0            CA     .7071              AND V-AXES ORTHOGONAL FOR OOCKEO CASE
 0458   REF   6  LAST 1481   20,3204  55'627 1            TS     COEFFR
 0459   REF  18  LAST 1487   20,3205  3 1243 0            CA     MASS               SCALEO AT 2(16) KG
 0460                        20,3206  0 0006 1            EXTENO
 0461   REF 913  LAST 1487   20,3207  7 0154 0            MP     MPAC               SCALEO AT 4 PI RAD-CM/SEC
 0462                        20,3210  0 0006 1            EXTENO
 0463   REF   7  LAST 1481   20,3211  7 1245 1            MP     ABCELV             SCALED AT 2(13) CM/SEC(2)
 0464   REF   5  LAST 1487   20,3212  0 3002 0            TC     OVCVSUB            GET QUOTIENT WITH OVERFLOW PROTECTION
 0465   REF 914  LAST 1487   20,3213   00155 0             ACRES   MPAC +1

 0466   REF   4  LAST 1482   20,3214   55511 1             TS      ACCDOTR
 0467   REF   1              20,3215   1 2716 1            TCF     SPSCONT          CONTINUE K, KSO CALCULATIONS

 0468                        20,3216   00167 1  1JACCCON   OCT     00167            SCALED AT PI/4X2(16) RAD/SEC(2)-KG
A0469                                                                                               2      2
A0470                                            COEFFICIENTS FOR CURVE FIT OF THE FORM Z=A X +B Y +C X Y +D X +E Y +F

 0471                        20,3217   06176 1  COEFF      DEC     .19518           C  COEFFICIENT OF INERTIA
 0472                        20,3220   77650 1             DEC     -.00529          F               ''
 0473                        20,3221   72260 0             DEC     -.17670          B               ''
 0474                        20,3222   76637 1             DEC     -.03709          A               ''
 0475                        20,3223   02167 0             DEC     .06974           E               ''
 0476                        20,3224   00645 0             DEC     .02569           D               ''

 0477                        20,3225   06335 1             DEC     .20096           C   COEFFICIENT OF CG
 0478                        20,3226   04256 1             DEC     .13564           F         ''
 0479                        20,3227   30163 0             DEC     .75704           B         ''
 0480                        20,3230   64072 0             DEC     -.37142          A         ''
 0481                        20,3231   53632 0             DEC     -.63117          E         ''
 0482                        20,3232   15133 1             DEC     .41179           D         ''

R0483   ASSIGNMENT OF TEMPORARIES FOR 1/ACCS (EXCLUDING 1/ACCONT)

A0484                                           MPAC, MPAC +1, MPAC +2 USED EXPLICITLY
 0485   REF 915  LAST 1488      0160            COEFCTR  EQUALS MPAC +4
 0486   REF 916  LAST 1488      0161            MASSCTR  EQUALS MPAC +5
 0487   REF 917  LAST 1488      0160            SCRATCHX EQUALS MPAC +4         SCRATCH AREA FOR DVOVSUB ROUTINE.
 0488   REF   4  LAST 1485      0161            SCRATCHY EQUALS SCRATCHX +1
 0489   REF   5  LAST 1488      0162            SCRATCHZ EQUALS SCRATCHX +2

 0490   REF 918  LAST 1488      0157            DOCKTEMP EQUALS MPAC +3         RECORD OF CSMDOCKED BIT OF DAPBOOLS
 0491   REF 919  LAST 1488      0155            EPSILON  EQUALS MPAC +1
 0492   REF   5  LAST 1480      0155            -EPSILON EQUALS EPSILON
 0493                        20,3233   71777 0  -.1875     DEC     -.18750
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P0494
 0495                              20,3234                            BANK    20
 0496   REF   6  LAST 1478         20,2000                            SFTLDC  DAPS3
 0497                              20,3234                            BANK

 0498   REF  28  LAST 1478        -E6,1536                            EBANK=  ADSC

 0499   PEF   4 LAST 1478 TO 1489:     361    365*                    COUNT*  $$/DAPAD

 0500   REF   7  LAST 1483         20,3234  55'632 0  -1              TS      INGTS           ZERO  INGTS IN ASCENT
 0501   REF   6  LAST 1400         20,3235  3 1343 1  1/ACCDNT  CA      OB              INITIALIZE OBVAL1,2,3
 0502                              20,3236  0 0006 1            EXTEND
 0503   REF  60  LAST 1474         20,3237  7 4737 1            MP      81T13
 0504   REF 308  LAST 1475         20,3240  54 001 1            TS      L               0.25 DB
 0505   REF 532  LAST 1485         20,3241  6 0000 1            AD      A
 0506   REF   1                    20,3242  54 115 0            TS      DBVAL3          0.50 DB
 0507   REF   1                    20,3243  4 1343 0            CS      DBVAL1
 0508   REF 309  LAST 1489         20,3244  6 0001 0            AD      L
 0509   REF   1                    20,3245  54 114 1            TS      DBVAL2          -.75 DB

 0510                              20,3246  0 0004 0  GETADSUV  INHINT
 0511   REF  11  LAST 1478         20,3247  31'540 1            CAE     ADSR            COMPUTE ADSU AND ADSV BY ROTATING
 0512   REF 310  LAST 1489         20,3250  54 001 1            TS      L                     ADSQ AND ADSR.
 0513   REF  29  LAST 1489         20,3251  31'536 0            CAE     ADSQ
 0514   REF  64  LAST 1483         20,3252  0 4674 0            TC      IBNKCALL
 0515   REF   4  LAST 1444         20,3253   37200 1            CADR    ROT-TOUV
 0516   REF   1                    20,3254  53'543 0            DXCH    ADSU

 0517                              20,3255  0 0003 1            RELINT
 0518   REF  61  LAST 1483         20,3256  3 0111 0            CA      DAPBOOLS
 0519   REF   6  LAST 1445         20,3257  7 4744 0            MASK    DRIFTBIT        ZERO DURING ULLAGE AND POWERED FLIGHT.
 0520   REF 533  LAST 1489         20,3260  10 000 0            CCS     A               IF DRIFTING FLIGHT,
 0521   REF 177  LAST 1486         20,3261  3 4753 1            CA      ONE                   SET DRIFTER TO 1
 0522   REF   1                    20,3262  54 116 0            TS      DRIFTER         SAVE TO TEST FOR DRIFTING FLIGHT LATER
 0523   REF   6  LAST 1481         20,3263  6 1502 1            AD      ALLOWGTS        NON-ZERO IF DRIFT OR GTS NEAR
 0524   REF 534  LAST 1489         20,3264  10 000 0            CCS     A
 0525   REF   1                    20,3265  3 3767 1            CA      FLATVAL         DRIFTING FLIGHT, STORE .8 IN FLAT
 0526   REF   1                    20,3266  54 151 0            TS      FLATEMP         IN POWERED FLIGHT, STORE ZERO IN FLAT
 0527                              20,3267  0 0006 1            EXTEND
 0528   REF   1                    20,3270  1 3274 1            BZF     DOPAXIS         IF POWERED AND NO GTS, START P AXIS,
 0529   REF   2  LAST 1489         20,3271  10 116 0            CCS     DRIFTER         OTHERWISE SET ZONE3LIM
 0530   REF   1                    20,3272  3 3766 0            CA      ZONE3MAX        17.5 MS , SCALED AT 4 SECONDS.
 0531   REF   1                    20,3273  54 152 0            TS      Z3TEM

 0532   REF   9  LAST 1497         20,3274  3 1530 0  DOPAXIS   CA      1JACC           1JACC AT PI/4 = 2JACC AT PI/2 =
A0533                                                                                   ANET AT PI/2 = ANET/ACOAST AT 2(6).
 0534   REF  37  LAST 1468         20,3275  6 4743 0            AD      BIT9            1 + ANET/ACOAST AT 2(6)
 0535   REF   1                    20,3276  54 157 0            TS      FUNTEM

 0536   REF  10  LAST 1489         20,3277  3 1530 0            CA      1JACC
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0537  REF   1             20,3300  0 3704 1            TC      INVERT
0538                      20,3301  0 0004 0            INHINT                   P AXIS DATA MUST BE CONSISTENT
0539  REF   3  LAST 1487  20,3302  55'550 1            TS      1/ANETP          SCALED AT 2(7)/PI.
0540  REF   4  LAST 1490  20,3303  55'551 0            TS      1/ANETP +1

0541  REF  38  LAST 1489  20,3304  4 4743 1            CS      BIT9             -1 AT 2(6)
0542                      20,3305  0 0006 1            EXTEND
0543  REF   5  LAST 1490  20,3306  7 1550 1            MP      1/ANETP          -1/ANET AT 2(13)/PI
0544                      20,3307  0 0006 1            EXTEND
0545  REF   2  LAST 1489  20,3310  10 157 0            DV      FUNTEM           -1/(ANET + ANET**2/ACOAST) AT 2(7)/PI
0546  REF   1             20,3311  55'556 1            TS      PACCFUN
0547  REF   2  LAST 1490  20,3312  55'557 0            TS      PACCFUN +1

0548  REF   1             20,3313  3 4733 1            CA      1/.03            NO AOS FOR P AXIS, ACCAST = AMIN
0549  REF   1             20,3314  55'552 0            TS      1/ACCSTP
0550  REF   2  LAST 1490  20,3315  55'553 1            TS      1/ACCSTP +1
0551                      20,3316  0 0003 1            RELINT


0552                      20,3317  22 007 0            ZL
0553  REF   3  LAST 1489  20,3320  10 116 0            CCS     DRIFTER
0554  REF   2  LAST 1489  20,3321  53'543 0            DXCH    AOSU             ZERO AOSU,V IF IN DRIFT, JUST TO BE SURE

0555  REF 312  LAST 1482  20,3322  3 4755 1  UAXIS     CA      ZERO             DO U AXIS COMPUTATIONS
0556  REF   1             20,3323  54 154 0            TS      UV               ZERO FOR U AXIS, ONE FOR V AXIS.

0557  REF   1             20,3324  54 163 1  BOTHAXES  TS      SIGNAOS          CODING COMMON TO U,V AXES
0558  REF   2  LAST 1490  20,3325  50 154 1            INDEX   UV
0559  REF   3  LAST 1490  20,3326  11'542 1            CCS     AOSU             PICK UP ABS(AOSU OR AOSV)
0560  REF 178  LAST 1489  20,3327  6 4753 1            AD      ONE              RESTORE TO PROPER VALUE
0561                      20,3330  1 3333 0            TCF     +3               AND LEAVE SIGNAOS AT ZERO
0562  REF 179  LAST 1490  20,3331  6 4753 1            AD      ONE              NEGATIVE, RESTORE TO PROPER VALUE
0563  REF   2  LAST 1490  20,3332  24 163 0            INCR    SIGNAOS          AND SET SIGNAOS TO ONE TO SHOW AOS NEG
0564  REF   1             20,3333  54 162 0            TS      ABSAOS           SAVE ABS(AOS)
0565  REF   3  LAST 1490  20,3334  4 0163 1            CS      SIGNAOS
0566  REF   1             20,3335  54 164 0            TS      -SIGNAOS         USED AS AN INDEX

0567  REF   2  LAST 1489  20,3336  3 1343 1            CA      DBVAL1           SET DB1, DB2 TO DBVAL1 (= DB)
0568  REF   1             20,3337  54 143 0            TS      DBB1
0569  REF   1             20,3340  54 144 1            TS      DBB2

0570  REF   2  LAST 1490  20,3341  3 0162 1            CA      ABSAOS           TEST MAGNITUDE OF ABS(AOS)
0571  REF   1             20,3342  6 3770 1            AD      -.03R/S2
0572                      20,3343  0 0006 1            EXTEND
0573  REF   1             20,3344  6 3436 0            BZMF    NOTMUCH          ABS(AOS) LESS THAN AMIN
0574  REF   2  LAST 1489  20,3345  10 151 0  BIGAOS    CCS     FLATEMP          ABS(AOS) GREATER THAN AMIN
0575  REF   1             20,3346  1 3376 1            TCF     SKIPDB1          I DRIFT OR GTS, DO NOT COMPUTE DB

0576  REF   3  LAST 1490  20,3347  3 1343 1            CA      DBVAL1
0577  REF   2  LAST 1490  20,3350  50 164 1            INDEX   -SIGNAOS
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L          ACSTASK AND AOSJOB                                                              USER'S PAGE NO.  15       E6 S4

 0578    REF    2  LAST 1490    20,3351  26 144 1            ADS     DB2               DB2(1) = 2 DB
 0579    REF    4  LAST 1490    20,3352  50 163 0            INDEX   SIGNAOS
 0580    REF    1               20,3353  54 145 0            TS      DB4               DB4(3) = I DB
 0581    REF    1               20,3354   3 3233 0           CA      -.1875            -.1875 PI/2 RAD/SEC(2) SCALED AT PI/2
 0582    REF    3  LAST 1490    20,3355   6 0162 1           AD      ABSAOS            ABSAOS IS SCALED AT PI/2
 0583                           20,3356   0 0006 1           EXTEND
 0584                           20,3357   6 3362 0           BZMF    +3
 0585    REF    2  LAST 1489    20,3360   4 0115 0           CS      DBVAL3            -.5 DB
 0586    REF    1               20,3361   1 3371 0           TCF     DBONE
 0587    REF    4  LAST 1491    20,3362   4 0162 0           CS      ABSACS
 0588                           20,3363   6 0000 1           DOUBLE
 0589                           20,3364   6 0000 1           DOUBLE
 0590    REF   90  LAST 1481    20,3365   6 4736 1           AD      BIT14
 0591                           20,3366   6 0000 1           DOUBLE                    1-8 ABSAOS. (8 IS 16/PI SCALED AT 2/PI)
 0592                           20,3367   0 0006 1           EXTEND
 0593    REF    7  LAST 1489    20,3370   7 1343 0           MP      DB
 0594    REF    5  LAST 1491    20,3371  50 163 0  DBONE     INDEX   SIGNAOS           DB1(2)=(1-8 ABSAOS) DB.  IF ABSAOS IS
 0595    REF    2  LAST 1490    20,3372  54 143 0            TS      DB1               GREATER THAN .1875 THEN DB1(2)=-.5 DB
 0596    REF    2  LAST 1489    20,3373   3 0114 0           CA      DBVAL2
 0597    REF    3  LAST 1490    20,3374  50 164 1            INDEX   -SIGNAOS
 0598    REF    1               20,3375  54 146 0            TS      DB3               DB3(4) = -.75 DB

 0599    REF    5  LAST 1491    20,3376   3 0162 1  SKIPDB1   CA      ABSAOS            ABS(AOS) GREATER THAN AMIN, SO IT IS
 0600                           20,3377   0 0006 1           EXTEND
 0601    REF   43  LAST 1471    20,3400   7 4740 1           MP      BIT12
 0602    REF    6  LAST 1491    20,3401   6 0162 1           AD      ABSACS            (9/8) ABSAOS.
 0603    REF    2  LAST 1490    20,3402   0 3704 1           TC      INVERT            ALL RIGHT TO DIVIDE
 0604    REF    4  LAST 1491    20,3403  50 164 1            INDEX   -SIGNAOS
 0605    REF    1               20,3404  54 130 1            TS      1/ACCSTT +1       1/ACOASTPOS(NEG) = 1/ABS(AOS)
 0606    REF    2  LAST 1490    20,3405   3 4733 1           CA      1/.03
 0607    REF    6  LAST 1491    20,3406  50 163 0            INDEX   SIGNAOS
 0608    REF    2  LAST 1491    20,3407  54 127 1            TS      1/ACCSTT          1/ACOASTNEG(POS) = 1/AMIN

 0609    REF    7  LAST 1491    20,3410   3 0162 1           CA      ABSAOS
 0610    REF    4  LAST 1481    20,3411   6 1533 0           AD      1JACCU
 0611    REF    5  LAST 1491    20,3412   6 1533 0           AD      1JACCU            2 JACC + ABS(ACS)
 0612    REF   39  LAST 1490    20,3413   6 4743 0           AD      BIT9              MAXIMUM VALUE IN COMPUTATIONS
 0613    REF  535  LAST 1489    20,3414  54 000 0            TS      A                 TEST FOR OVERFLOW
 0614    REF    1               20,3415   1 3462 0           TCF     SKIPDB2           NO OVERFLOW,  DO NORMAL COMPUTATION

 0615    REF    8  LAST 1491    20,3416   3 0162 1           CA      ABSACS            RESCALE TO PI TO PREVENT OVERFLOW
 0616                           20,3417   0 0006 1           EXTEND
 0617    REF   91  LAST 1491    20,3420   7 4736 0           MP      BIT14
 0618    REF    6  LAST 1491    20,3421   6 1533 0           AD      1JACCU            1 JACC AT PI/2 = 2JACC AT PI
 0619    REF    1               20,3422  54 157 0            TS      ANET              ANETPOS(NEG) MAX SCALED AT PI  =
A0620                                                                                  ANETPOS(NEG) MAX/ACOASTNEG(POS) AT 2(7)
 0621    REF   44  LAST 1435    20,3423   6 4744 1           AD      BIT8              1 + ANETPOS/ACOASTNEG AT 2(7)
 0622    REF    2  LAST 1491    20,3424  56 157 1            XCH     ANET              SAVE IN ANET, WHILE PICKING UP ANET
 0623    REF    3  LAST 1491    20,3425   0 3704 1           TC      INVERT
 0624                           20,3426   0 0006 1           EXTEND
 0625   REF  92  LAST 1491   20,3427  7 4736 0            MP      BIT14           SCALE 1/ANET AT 2(7)/PI
 0626   REF   1              20,3430  54 160 1            TS      1/ANET

 0627   REF   1              20,3431  3 3435 0            CA      ACCHERE         SET UP RETURN FROM COMPUTATION ROUTINE
 0628   REF   1              20,3432  54 161 0            TS      ARET
 0629   REF  45  LAST 1491   20,3433  4 4744 0            CS      BIT8            -1 AT 2(7)
 0630   REF   1              20,3434  1 3737 0            TCF     DOACCFUN        FINISH ACCFUN COMPUTATION

 0631   REF   1              20,3435  1 3467 0  ACCHERE   TCF     ACCTHERE


 0632   REF 311  LAST 1489   20,3436  54 001 1  NOTMUCH   TS      L               ABS(AOS) LESS THAN AMIN, SAVE IN L
 0633   REF   3  LAST 1491   20,3437  3 4733 1            CA      1/.03           ACOASTROS,NEG = AMIN
 0634   REF   3  LAST 1491   20,3440  54 127 1            TS      1/ACCSTT
 0635   REF   4  LAST 1492   20,3441  54 130 1            TS      1/ACCSTT +1

 0636   REF   3  LAST 1490   20,3442  10 151 0            CCS     FLATEMP
 0637   REF   2  LAST 1491   20,3443  1 3462 0            TCF     SKIPDB2         DO NOT COMPUTE DB IF DRIFT OR GTS

 0638   REF   1              20,3444  3 3771 0            CA      .023R/S2        .0228 RAD/SEC(2)
 0639   REF 312  LAST 1492   20,3445  6 0001 0            AD      L               L=ABS(AOS)-AMIN=ABS(AOS)-.0245RAD/SEC(2)
 0640                        20,3446  0 0006 1            EXTEND                  RESULT IS ABS(AOS)-.0017 RAD/SEC(2)
 0641   REF   1              20,3447  6 3457 1            BZMF    NOAOS           ABS(AOS) LESS THAN .0017 RAD/SEC(2)
 0642   REF   3  LAST 1491   20,3450  3 0115 1  SOMEAOS   CA      DBVAL3          .0017 RAD/SEC(2) LT ABS(AOS) LT AMIN
 0643   REF   5  LAST 1491   20,3451  50 164 1            INDEX   -SIGNAOS
 0644   REF   2  LAST 1491   20,3452  54 146 0            TS      DBB3            DB3(4) = DB/2
 0645   REF 536  LAST 1491   20,3453  6 0000 1            AD      A
 0646   REF   7  LAST 1491   20,3454  50 163 0            INDEX   SIGNAOS
 0647   REF   2  LAST 1491   20,3455  54 145 0            TS      DBB4            DB4(3) = DB
 0648   REF   3  LAST 1492   20,3456  1 3462 0            TCF     SKIPDB2

 0649   REF   4  LAST 1490   20,3457  3 1343 1  NOAOS     CA      DBVAL1
 0650   REF   3  LAST 1492   20,3460  54 146 0            TS      DBB3            DB3,4 = DB
 0651   REF   3  LAST 1492   20,3461  54 145 0            TS      DBB4

 0652   REF   9  LAST 1491   20,3462  3 0162 1  SKIPDB2   CA      ABSAOS          ANETPOS(NEG) MAX = 2 JACC + ABS(AOS)
 0653   REF   7  LAST 1491   20,3463  6 1533 0            AD      1JACCU
 0654   REF   8  LAST 1492   20,3464  6 1533 0            AD      1JACCU
 0655   REF   3  LAST 1491   20,3465  54 157 0            TS      ANET            CANNOT OVERFLOW HERE
 0656   REF   1              20,3466  0 3730 0  CL1/NET+  TC      DO1/NET+        COMPUTE 1/ANET, ACCFUN

 0657   REF   6  LAST 1492   20,3467  50 164 1  ACCTHERE  INDEX   -SIGNAOS
 0658   REF   1              20,3470  54 134 0            TS      75TEM  +2       STORE ACCFUN IN TEMPORARY BUFFER
 0659   REF   2  LAST 1492   20,3471  3 0160 0            CA      1/ANET
 0660   REF   7  LAST 1492   20,3472  50 164 1            INDEX   -SIGNAOS
 0661   REF   1              20,3473  54 126 0            TS      1/ATEM2 +2      STORE 1/ANET IN TEMPORARY BUFFER

 0662   REF  10  LAST 1492   20,3474  3 0162 1            CA      ABSAOS          SEE IF OVERFLOW IN MIN CASE
 0663   REF   9  LAST 1492   20,3475  6 1533 0            AD      1JACCU
 0664   REF  40  LAST 1491   20,3476  6 4743 0            AD      BIT9            MAXIMUM POSSIBLE VALUE
 0665    REF 537  LAST 1492   20,3477  54 000 0              TS      A                 OVERFLOW POSSIBLE BUT REMOTE
 0666                         20,3500  1 3502 1              TCF      +2
 0667    REF  45  LAST 1487   20,3501  3 4733 1              CA      POSMAX            IF OVERFLOW, TRUNCATE TO PI/2
 0668    REF   2  LAST 1490   20,3502  6 3770 1              AD      -.03R/S2          RESTORE TO CORRECT VALUE
 0669    REF   4  LAST 1492   20,3503  54 157 0              TS      ANET
 0670    REF   2  LAST 1492   20,3504  0 3730 0              TC      DO1/NET+          COMPUTE 1/ANET, ACCFUN

 0671    REF   8  LAST 1492   20,3505  50 164 1              INDEX   -SIGNAOS          STORE MIN VALUES JUST AS MAX VALUES
 0672    REF   2  LAST 1492   20,3506  54 132 0              TS      Z5TEM
 0673    REF   3  LAST 1492   20,3507  3 0160 0              CA      1/ANET
 0674    REF   9  LAST 1493   20,3510  50 164 1              INDEX   -SIGNAOS
 0675    REF   2  LAST 1492   20,3511  54 124 1              TS      1/ATEM2


 0676    REF  11  LAST 1492   20,3512  4 0162 0              CS      ABSAOS            NOW DO NEG(POS) CASES
 0677    REF  10  LAST 1492   20,3513  6 1533 0              AD      1JACCU
 0678    REF  11  LAST 1493   20,3514  6 1533 0              AD      1JACCU            ANETNEG(POS) MAX
 0679    REF   1              20,3515  0 3716 1              TC      1/ANET-           COMPUTE 1/ANET, ACCFUN, AND ACCSW
 0680    REF   8  LAST 1492   20,3516  50 163 0              INDEX   SIGNAOS           STORE NEG(POS) VALUES JUST AS POS(NEG)
 0681    REF   1              20,3517  54 133 1              TS      Z1TEM +2
 0682    REF 313  LAST 1492   20,3520  54 001 1              TS      L                 SAVE IN L FOR POSSIBLE FUTURE USE
 0683    REF   4  LAST 1493   20,3521  3 0160 0              CA      1/ANET
 0684    REF   9  LAST 1493   20,3522  50 163 0              INDEX   SIGNAOS
 0685    REF   1              20,3523  54 125 0              TS      1/ATEM1 +2
 0686    REF  12  LAST 1493   20,3524  4 0162 0              CS      ABSAOS
 0687    REF  12  LAST 1493   20,3525  6 1533 0              AD      1JACCU            1/ANETNEG(POS) MIN
 0688    REF   5  LAST 1493   20,3526  54 157 0              TS      ANET
 0689    REF   3  LAST 1493   20,3527  6 3770 1              AD      -.03R/S2          TEST FOR AMIN
 0690                         20,3530  0 0006 1              EXTEND                    IF ANET LESS THAN AMIN, STORE MAX JET
 0691    REF   1              20,3531  6 3747 0              BZMF    FIXMIN            VALUES FOR MIN JETS AND SET ACCSW

 0692    REF   1              20,3532  0 3724 0              TC      1/NETMIN          OTHERWISE DO MIN JET COMPUTATIONS
 0693    REF  10  LAST 1493   20,3533  50 163 0    STMIN-    INDEX   SIGNAOS           STORE VALUES
 0694    REF   2  LAST 1493   20,3534  54 131 0              TS      Z1TEM
 0695    REF   5  LAST 1493   20,3535  3 0160 0              CA      1/ANET
 0696    REF  11  LAST 1493   20,3536  50 163 0              INDEX   SIGNAOS
 0697    REF   2  LAST 1493   20,3537  54 123 0              TS      1/ATEM1


 0698    REF   3  LAST 1490   20,3540  50 154 1              INDEX   UV
 0699    REF   1              20,3541  3 3775 1              CA      +UMASK
 0700    REF   9  LAST 1450   20,3542  7 1257 1              MASK    CH5MASK           TEST FOR +U (+V) JET FAILURES
 0701                         20,3543  0 0006 1              EXTEND
 0702    REF   1              20,3544  1 3551 1              BZF     FAIL-
 0703    REF   3  LAST 1493   20,3545  3 0124 0              CA      1/ATEM2           REPLACE FUNCTION VALUES DEPENDING ON THE
 0704    REF   4  LAST 1493   20,3546  54 126 0              TS      1/ATEM2 +2        FAILED JET PAIR WITH CORRESPONDING ONE-
 0705    REF   3  LAST 1493   20,3547  3 0132 1              CA      Z5TEM             JET (OR AMIN) FUNCTION VALUES
 0706    REF   4  LAST 1493   20,3550  54 134 0              TS      Z5TEM +2
 0707    REF   4  LAST 1493   20,3551  50 154 1    FAIL-     INDEX   UV
 0708    REF   1              20,3552  3 3773 1              CA      -UMASK
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0709   REF  10  LAST 1493   20,3553  7 1257 1            MASK    CH5MASK          TEST FOR -U (-V) JET FAILURES
0710                        20,3554  0 0006 1            EXTEND
0711   REF   1              20,3555  1 3562 1            BZF     OBFUN
0712   REF   3  LAST 1493   20,3556  3 0123 1            CA      1/ATEM1          REPLACE FUNCTION VALUES DEPENDING ON THE
0713   REF   4  LAST 1494   20,3557  54 125 0            TS      1/ATEM1 +2       FAILED JET PAIR WITH CORRESPONDING ONE-
0714   REF   3  LAST 1493   20,3560  3 0131 1            CA      Z1TEM            JET (OR AMIN) FUNCTION VALUES
0715   REF   4  LAST 1494   20,3561  54 133 1            TS      Z1TEM +2


0716   REF   4  LAST 1492   20,3562  4 0146 0  DBFUN     CS      DBB3             COMPUTE AXISDIST
0717   REF   3  LAST 1491   20,3563  6 0143 1            AD      OBB1
0718   REF   4  LAST 1492   20,3564  6 0151 1            AD      FLATEMP
0719   REF   1              20,3565  54 147 1            TS      AXDSTEM
0720   REF   4  LAST 1492   20,3566  4 0145 0            CS      DBB4
0721   REF   3  LAST 1491   20,3567  6 0144 0            AD      OBB2
0722   REF   5  LAST 1494   20,3570  6 0151 1            AD      FLATEMP
0723   REF   2  LAST 1494   20,3571  54 150 1            TS      AXOSTEM  +1

0724                        20,3572  0 0004 0            INHINT
0725   REF   5  LAST 1493   20,3573  10 154 0            CCS     UV               TEST FOR U OR V AXIS
0726   REF   1              20,3574  1 3616 1            TCF     STORV            V AXIS   STORE V VALUES

0727   REF   1              20,3575  3 0122 0            CA      ACCSW            U AXIS   STORE U VALUES
0728   REF   3  LAST 1456   20,3576  55'546 0            TS      ACCSWU

0729   REF   1              20,3577  3 4320 1            CA      NINE             TRANSFER 10 WORDS VIA GENTRAN
0730   REF   3  LAST 1371   20,3600  0 5545 0            TC      GENTRAN +1
0731   REF   5  LAST 1494   20,3601   00123 1            ADRES   1/ATEM1          TEMPORARY BUFFER
0732   REF  12  LAST 1461   20,3602   01566 0            ADRES   1/ANET1          THE REAL PLACE

0733                        20,3603  0 0003 1            RELINT
0734   REF   4  LAST 1494   20,3604  52 144 1            DXCH    OBB1             SAVE U OBS FOR LATER STORING
0735   REF   1              20,3605  52 136 1            DXCH    UOB1
0736   REF   5  LAST 1494   20,3606  52 146 0            DXCH    OBB4
0737   REF   1              20,3607  52 140 0            DXCH    UOB4

0738   REF   3  LAST 1494   20,3610  52 150 1            DXCH    AXOSTEM
0739   REF   1              20,3611  52 142 1            DXCH    UAXDIST

0740   REF 180  LAST 1490   20,3612  3 4753 1            CA      ONE              NOW DO V AXIS
0741   REF   6  LAST 1494   20,3613  54 154 0            TS      UV
0742   REF 313  LAST 1490   20,3614  3 4755 1            CA      ZERO
0743   REF   1              20,3615  1 3324 0            TCF     BOTHAXES         AND DO IT AGAIN


0744   REF   2  LAST 1494   20,3616  3 0122 0  STORV     CA      ACCSW            STORE V AXIS VALUES
0745   REF   1              20,3617  55'547 1            TS      ACCSWV
0746   REF   2  LAST 1494   20,3620  3 4320 1            CA      NINE
0747   REF   4  LAST 1494   20,3621  0 5545 0            TC      GENTRAN  +1
0748   REF   6  LAST 1494   20,3622   00123 1            ADRES   1/ATEM1          TEMPORARY BUFFER
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L        AOSTASK AND AOSJOB                                                   USER'S PAGE NO. 19      F6 S4

 0749   REF  13  LAST 1494   20,3623   01606 0             ADRES  1/ANET1 +16D   THE REAL PLACE

A0750                                                                        NOW STORE DEADBANDS FOR ALL AXES
 0751   REF   6  LAST 1494   20,3624   52 152 0            DXCH   FLATEMP        FLAT AND ZONE3LIM
 0752   REF   3  LAST 1458   20,3625   53'555 1            DXCH   FLAT

 0753   REF   5  LAST 1492   20,3626   3 1343 1            CA     DBVAL1         COMPUTE P AXIS DEADBANDS
 0754   REF   1              20,3627   55'560 1            TS     PDB1
 0755   REF   1              20,3630   55'561 0            TS     PDB2
 0756   REF   4  LAST 1495   20,3631   6 1554 1            AD     FLAT
 0757   REF   1              20,3632   55'563 1            TS     PDB3
 0758   REF   1              20,3633   55'562 0            TS     PDB4
 0759   REF 314  LAST 1494   20,3634   3 4755 1            CA     ZERO
 0760   REF   1              20,3635   55'564 0            TS     PAXDIST
 0761   REF   2  LAST 1495   20,3636   55'565 1            TS     PAXDIST  +1

 0762   REF   5  LAST 1495   20,3637   11'554 0            CCS    FLAT
 0763   REF   1              20,3640   1 3656 0            TCF    DRFDB          DRIFT OR GTS - COMPUTE DBS

 0764   REF   2  LAST 1494   20,3641   52 136 1            DXCH   UDB1           STORE U DEADBANDS
 0765   REF   5  LAST 1461   20,3642   53'601 0            DXCH   FIREDB         CANNOT USE GENTRAN BECAUSE OF RELINT
 0766   REF   2  LAST 1494   20,3643   52 140 0            DXCH   UDB4
 0767   REF   2  LAST 1455   20,3644   53'603 1            DXCH   COASTDB
 0768   REF   2  LAST 1494   20,3645   52 142 1            DXCH   UAXDIST
 0769   REF   3  LAST 1458   20,3646   53'605 1            DXCH   AXISDIST
 0770   REF   5  LAST 1494   20,3647   52 144 1            DXCH   DBB1           STORE V AXIS DEADBANDS
 0771   REF   6  LAST 1495   20,3650   53'621 1            DXCH   FIREDB +16D    COULD USE GENTRAN IF DESIRED
 0772   REF   6  LAST 1494   20,3651   52 146 0            DXCH   DBB4
 0773   REF   3  LAST 1495   20,3652   53'623 0            DXCH   COASTDB +16D
 0774   REF   4  LAST 1494   20,3653   52 150 1            DXCH   AXDSTEM
 0775   REF   4  LAST 1495   20,3654   53'625 0            DXCH   AXISDIST +16D

 0776   REF   2  LAST 1483   20,3655   1 3676 1            TCF    1/ACCRET +1    ALL DONE
 0777   REF   6  LAST 1495   20,3656   3 1343 1  DRFDB     CA     DBVAL1         DRIFT DEADBANDS
 0778   REF   7  LAST 1495   20,3657   55'600 1            TS     FIREDB
 0779   REF   8  LAST 1495   20,3660   55'601 0            TS     FIREDB +1
 0780   REF   9  LAST 1495   20,3661   55'620 0            TS     FIREDB +16D
 0781   REF  10  LAST 1495   20,3662   55'621 1            TS     FIREDB +17D
 0782   REF   6  LAST 1495   20,3663   6 1554 1            AD     FLAT
 0783   REF   4  LAST 1495   20,3664   55'602 0            TS     COASTDB
 0784   REF   5  LAST 1495   20,3665   55'603 1            TS     COASTDB +1
 0785   REF   6  LAST 1495   20,3666   55'622 1            TS     COASTDB +16D
 0786   REF   7  LAST 1495   20,3667   55'623 0            TS     COASTDB +17D
 0787   REF 315  LAST 1495   20,3670   3 4755 1            CA     ZERO
 0788   REF   5  LAST 1495   20,3671   55'604 0            TS     AXISDIST
 0789   REF   6  LAST 1495   20,3672   55'605 1            TS     AXISDIST +1
 0790   REF   7  LAST 1495   20,3673   55'624 1            TS     AXISDIST +16D
 0791   REF   8  LAST 1495   20,3674   55'625 0            TS     AXISDIST +17D

 0792                        20,3675   0 0004 0  1/ACCRET  INHINT
 0793   REF  62  LAST 1489   20,3676  4 0111 1            CS       DAPBOOLS        SET BIT TO INDICATE DATA GOOD.
 0794   REF   3  LAST 1403   20,3677  7 4751 1            MASK     ACCSOKAY
 0795   REF  63  LAST 1496   20,3700 26 111 1             ADS      DAPBOOLS
 0796                        20,3701  0 0003 1            RELINT
 0797   REF   2  LAST 1478   20,3702  3 0117 0            CA       ACCRETRN
 0798   REF  21  LAST 1362   20,3703  0 4640 1            TC       BANKJUMP        RETURN TO CALLER

 0799   REF   1              20,3704 54 165 1   INVERT    TS       HOLD            ROUTINE TO INVERT   -INPUT AT PI/2
 0800   REF  41  LAST 1492   20,3705  3 4743 0            CA       BIT9            1 AT 2(6)
 0801                        20,3706 22 007 0             ZL                       ZERO L FOR ACCURACY AND TO PREVENT OVFLO
 0802                        20,3707  0 0006 1            EXTEND
 0803   REF   2  LAST 1496   20,3710 10 165 1             DV       HOLD
 0804   REF 433  LAST 1485   20,3711  0 0002 0            TC       Q               RESULT AT 2(7)/PI


 0805   REF 316  LAST 1495   20,3712  3 4755 1  DOWNGTS   CAF      ZERO            ZERO SWITCHES WHEN USEQRJTS BIT IS UP
 0806   REF   7  LAST 1489   20,3713 55'502 0             TS       ALLOWGTS          OR DAP IS OFF.
 0807   REF   8  LAST 1489   20,3714 55'632 0             TS       INGTS
 0808   REF   2  LAST 1483   20,3715  1 2777 0            TCF      DOCKTEST

 0809                        20,3716 22 007 0   1/ANET-   ZL
 0810   REF   3  LAST 1494   20,3717 22 122 0             LXCH     ACCSW           ZERO ACCSW
 0811   REF   6  LAST 1493   20,3720 54 157 0             TS       ANET            SAVE ANET
 0812   REF   4  LAST 1493   20,3721  6 3770 1            AD       -.03R/S2        TEST FOR MIN VALUE
 0813                        20,3722  0 0006 1            EXTEND
 0814   REF   1              20,3723  6 3744 0            BZMF     NETNEG          ANET LESS THAN AMIN, SO FAKE IT
 0815   REF   7  LAST 1496   20,3724  3 0157 1  1/NETMIN  CA       ANET
 0816                        20,3725  0 0006 1            EXTEND
 0817   REF  10  LAST 1493   20,3726  5 0164 1            INDEX    -SIGNADS
 0818   REF   5  LAST 1492   20,3727  7 0130 1            MP       1/ACOSTT +1     ANETNEG(POS)/ACOASTPOS(NEG) AT 2(6)

A0819                                                                    THE FOLLOWING CODING IS VALID FOR BOTH POS OR NEG
A0820                                                                                VALUES OF ADS

 0821   REF  42  LAST 1496   20,3730  6 4743 0  DO1/NET+  AD       BIT9            1 + ANET/ACOAST AT 2(6)
 0822   REF   8  LAST 1496   20,3731 56 157 1             XCH      ANET            SAVE AND PICK UP ANET
 0823                        20,3732  0 0006 1            EXTEND
 0824   REF   2  LAST 1492   20,3733 22 161 1             QXCH     ARET            SAVE RETURN
 0825   REF   4  LAST 1491   20,3734  0 3704 1            TC       INVERT
 0826   REF   6  LAST 1493   20,3735 54 160 1             TS       1/ANET          1/ANET AT 2(7)/PI
 0827   REF  43  LAST 1496   20,3736  4 4743 1            CS       BIT9            -1 AT 2(6)
 0828                        20,3737  0 0006 1  DOACCFUN  EXTEND
 0829   REF   7  LAST 1496   20,3740  7 0160 1            MP       1/ANET          -1/ANET AT 2(13)/PI
 0830                        20,3741  0 0006 1            EXTEND
 0831   REF   9  LAST 1496   20,3742 10 157 0             DV       ANET            ACCFUN AT 2(7)/PI
 0832   REF   3  LAST 1496   20,3743  0 0161 1            TC       ARET            RETURN

 0833   REF   5  LAST 1496   20,3744  4 3770 0  NETNEG    CS       -.03R/S2        ANET LESS THAN AMIN - SET EQUAL TO AMIN
 0834   REF  10  LAST 1496   20,3745 54 157 0             TS       ANET
 0835   REF   2  LAST 1493   20,3746  1 3725 0            TCF      1/NETMIN +1     CONTINUE AS IF NOTHING HAPPENED
 0836    REF  12  LAST 1493   20,3747  10 163 1  FIXMIN   CCS     SIGNACS
 0837    REF 109  LAST 1481   20,3750  3 4752 0           CA      TWO                  IF AOS NEG, ACCSW = +1
 0838    REF  15  LAST 1464   20,3751  6 7752 0           AD      NEGONE               IF AOS POS, ACCSW = -1
 0839    REF   4  LAST 1496   20,3752  54 122 1           TS      ACCSW
 0840    REF   7  LAST 1494   20,3753  6 0154 1           AD      UV                   IF ACCSW = +1, TEST FOR +U (+V) JET FAIL
 0841    REF 538  LAST 1493   20,3754  50 000 1           INDEX   A                    IF ACCSW = -1, TEST FOR -U (-V) JET FAIL
 0842    REF   2  LAST 1493   20,3755  3 3774 0           CA      -UMASK +1
 0843    REF  11  LAST 1494   20,3756  7 1257 1           MASK    CH5MASK
 0844                         20,3757  0 0006 1           EXTEND
 0845                         20,3760  1 3764 0           BZF     +4
 0846    REF   6  LAST 1496   20,3761  4 3770 0           CS      -.03R/S2             JET FAILURE - CANNOT USE 2-JET VALUES
 0847    REF  11  LAST 1496   20,3762  54 157 0           TS      ANET                 ANET = AMIN
 0848    REF   1              20,3763  1 3532 1           TCF     STMIN- -1            CALCULATE FUNCTIONS USING AMIN
 0849    REF 314  LAST 1493   20,3764  3 0001 0           CA      L                    L HAS ACCFUN
 0850    REF   2  LAST 1497   20,3765  1 3533 0           TCF     STMIN-               STORE MAX VALUES FOR MIN JETS


A0851                                            ERASABLE ASSIGNMENTS FOR 1/ACCONT

 0852    REF   5  LAST  135   E6,1550            1/ANETP  EQUALS BLOCKTOP +2
 0853    REF   6  LAST 1497   E6,1552            1/ACOSTP EQUALS BLOCKTOP +4
 0854    REF   7  LAST 1497   E6,1556            PACCFUN  EQUALS BLOCKTOP +8D
 0855    REF   8  LAST 1497   E6,1560            PDB1     EQUALS BLOCKTOP +10D
 0856    REF   9  LAST 1497   E6,1561            PDB2     EQUALS BLOCKTOP +11D
 0857    REF  10  LAST 1497   E6,1562            PDB4     EQUALS BLOCKTOP +12D
 0858    REF  11  LAST 1497   E6,1563            PDB3     EQUALS BLOCKTOP +13D
 0859    REF  12  LAST 1497   E6,1564            PAXDIST  EQUALS BLOCKTOP +14D

 0860    REF  71  LAST 1256      0122            ACCSW    EQUALS VBUF                  EXECUTIVE TEMPORARIES
A0861                                                                                  CANNOT DO  CCS    NEWJOB DURING 1/ACCS
 0862    REF   5  LAST 1497      0123            1/ATEM1  EQUALS ACCSW +1              TEMP BUFFER FOR U AND V AXES
 0863    REF   7  LAST 1494      0124            1/ATEM2  EQUALS 1/ATEM1 +1
 0864    REF   8  LAST 1497      0127            1/ACOSTT EQUALS 1/ATEM1 +4
 0865    REF   9  LAST 1497      0131            Z1TEM    EQUALS 1/ATEM1 +6
 0866    REF  10  LAST 1497      0132            Z5TEM    EQUALS 1/ATEM1 +7

 0867    REF  11  LAST 1497      0135            UDB1     EQUALS 1/ATEM1 +10D          U AXIS DEADBAND BUFFER
 0868    REF  12  LAST 1497      0136            UDB2     EQUALS 1/ATEM1 +11D
 0869    REF  13  LAST 1497      0137            UDB4     EQUALS 1/ATEM1 +12D
 0870    REF  14  LAST 1497      0140            UDB3     EQUALS 1/ATEM1 +13D
 0871    REF  15  LAST 1497      0141            UAXDIST  EQUALS 1/ATEM1 +14D

 0872    REF  16  LAST 1497      0143            DB1      EQUALS 1/ATEM1 +16D          TEMP DEADBAND BUFFER, ALSO V AXIS
 0873    REF  17  LAST 1497      0144            DB2      EQUALS 1/ATEM1 +17D
 0874    REF  18  LAST 1497      0145            DB4      EQUALS 1/ATEM1 +18D
 0875    REF  19  LAST 1497      0146            DB3      EQUALS 1/ATEM1 +19D
 0876    REF  20  LAST 1497      0147            AXDSTEM  EQUALS 1/ATEM1 +20D

 0877    REF  21  LAST 1497      0151            FLATEMP  EQUALS 1/ATEM1 +22D
 0878    REF  22  LAST 1497      0152            Z3TEM    EQUALS 1/ATEM1 +23D          MUST FOLLOW FLATEMP
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L        AOSTASK AND AOSJOB                                                                 USER'S PAGE NO.  22       E6 S4

 0879   REF    8  LAST 1491      1343               DBVAL1    EQUALS DB
 0880   REF    5  LAST  609      0114               DBVAL2    EQUALS INTB15+
 0881   REF    6  LAST 1498      0115               DBVAL3    EQUALS INTB15+ +1

 0882   REF    7  LAST 1498      0116               DRIFTER   EQUALS INTB15+ +2

 0883   REF  920  LAST 1488      0154               UV        EQUALS MPAC
 0884   REF  921  LAST 1498      0157               ANET      EQUALS MPAC +3
 0885   REF  922  LAST 1498      0157               FLATEM    EQUALS MPAC +3
 0886   REF  923  LAST 1498      0160               1/ANET    EQUALS MPAC +4
 0887   REF  924  LAST 1498      0161               ARET      EQUALS MPAC +5
 0888   REF  925  LAST 1498      0162               ABSAOS    EQUALS MPAC +6
 0889   REF  926  LAST 1498      0163               SIGNAOS   EQUALS MPAC +7
 0890   REF  927  LAST 1498      0164               -SIGNAOS  EQUALS MPAC +8D
 0891   REF  928  LAST 1498      0165               HOLD      EQUALS MPAC +9D
 0892   REF   63  LAST 1393      0117               ACCRETRN  EQUALS FIXLOC -1


 0893                          20,3766    00110 1   ZONE3MAX DEC      .004375         17.5 MS (35 MS FOR 1 JET) AT 4 SECONDS
 0894                          20,3767    00443 1   FLATVAL  DEC      .01778          .8 AT PI/4 RAD
 0895                          20,3770    77377 1   -.03R/S2 OCT      77377            -PI/2(7) AT PI/2

 0896                          20,3771    00356 1   .023R/S2 OCT      00356           .0228 RAD/SEC(2) AT PI/2
 0897   REF   46  LAST 1493      4733               1/.03     EQUALS POSMAX            2(7)/PI AT 2(7)/PI

 0898   REF    2  LAST 1405    20,3772    02213 0   PAXISADR GENADR  PAXIS


A0899                                                                                 THE FOLLOWING 4 CONSTANTS ARE JET
A0900                                                                                 FAILURE MASKS AND ARE INDEXED
 0901                          20,3773    00110 1   -UMASK   OCT      00110           -U
 0902                          20,3774    00022 1            OCT      00022           -V
 0903                          20,3775    00204 1   +UMASK   OCT      00204           +U
 0904                          20,3776    00041 1            OCT      00041           +V
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R0001    PROGRAM NAME:  SPSRCS

R0002    AUTHOR:  EDGAR M. OSHIKA (AC ELECTRONICS)

R00021   MODIFIED:  TO RETURN TO ALL AXES VIA Q BY P.S.WEISSMAN, OCT 7, 1968

R00022   MODIFIED TO IMPROVE BENDING STABILITY BY G.KALAN,FEB.14,1969
R0003    FUNCTIONAL DESCRIPTION:

R0004    THIS PROGRAM CONTROLS THE FIRING OF ALL RCS JETS IN THE DOCKED CONFIGURATION ACCORDING TO THE FOLLOWING PHASE
R0006    PLANE LOGIC.

R0007    1. JET SENSE TEST (SPSRCS)

R0008    IF JETS ARE FIRING NEGATIVELY,SET OLDSENSE NEGATIVE AND CONTINUE
R0009    IF JETS ARE FIRING POSITIVELY,SET OLDSENSE POSITIVE AND CONTINUE
R0010    IF JETS ARE NOT FIRING,SET OLDSENSE TO ZERO AND GO TO OUTER RATE LIMIT  TEST

R0012    2. RATE DEAD BAND TEST

R0013    IF JETS ARE FIRING NEGATIVELY AND RATE IS GREATER THAN TARGET RATE,LEAVE
R0014    JETS ON AND GO TO INHIBITION LOGIC. OTHERWISE,CONTINUE.
R0015    IF JETS ARE FIRING POSITIVELY AND RATE IS   LESS  THAN TARGET RATE,LEAVE
R0016    JETS ON AND GO TO INHIBITION LOGIC. OTHERWISE,CONTINUE.

R0017    3. OUTER RATE LIMIT TEST (SPSSTART)

R0018    IF MAGNITUDE OF EDOT IS GREATER THAN 1.73 DEG/SEC SET JET FIRING TIME
R0019     TO REDUCE RATE AND GO TO INHIBITION LOGIC. OTHERWISE,CONTINUE.

R0020    4. COAST ZONE TEST

R0021    IF STATE (E,EDOT) IS BELOW LINE  E + 4 X EDOT > -1.4 DEG  AND EDOT IS LESS THAN 1.30 DEG/SEC SET JET TIME POSI-
R0023    TIVE AND CONTINUE. OTHERWISE,SET JET FIRING TIME TO ZERO AND CONTINUE.
R0024    IF STATE IS ABOVE LINE  E + 4X EDOT > +1.4 DEG AND EDOT IS GREATER THAN -1.30 DEG/SEC, SET JET TIME NEGATIVE
R0026    AND CONTINUE. OTHERWISE,SET JET FIRING TIME TO ZERO AND CONTINUE.

R0027    5. INHIBITION LOGIC

R0028    IF OLDSENSE IS NON-ZERO:
R0029          A) RETURN IF JET TIME HAS SAME SIGN AS OLDSENSE
R0030          B) SET INHIBITION COUNTER*AND RETURN IF JET TIME IS ZERO
R0031          C) SET INHIBITION COUNTER,*SET JET TIME TO ZERO AND RETURN IF SIGN
R0032             OF JET TIME IS OPPOSITE TO THAT OF OLDSENSE

R0033    IF OLDSENSE IS ZERO:
R0034          A) RETURN IF INHIBITION COUNTER IS NOT POSITIVE
R0035          B) SET JET TIME TO ZERO AND RETURN IF INHIBITION COUNTER IS POSITIVE
R0037    *NOTE: INHIBITION COUNTERS CAN BE SET TO 4 OR 10 FOR THE P,AND UV AXES,
R0038    RESPECTIVELY,IN SPSRCS. THEY ARE DECREMENTED BY ONE AT THE BEGINNING OF
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R0039     EACH DAP PASS.

R0040     THE MINIMUM PULSE WIDTH OF THIS CONTROLLER IS DETERMINED BY THE REPETITION  RATE AT WHICH THIS ROUTINE IS CALLED
R0042     AND IS NOMINALLY 100 MS FOR ALL AXES IN DRIFTING FLIGHT.   DURING POWERED FLIGHT THE MINIMUM IS 100 MS FOR THE
R0044     P AXIS AND 200 MS FOR THE CONTROL OF THE U AND V AXES.

R0045     CALLING SEQUENCE:

R0046                INHINT
R0047                         TC      IBNKCALL
R0048                         CADR    SPSRCS


R0049     EXIT:

R0050                TC       Q
R0051     ALARM/ABORT MODE:    NONE

R0052     SUBROUTINES CALLED:    NONE

R0053     INPUT:        E,EDOT
R0054                   TJP, TJV, TJU                  TJ MUST NOT BE NEGATIVE ZERO

R0055     OUTPUT:       TJP, TJV, TJU
R0056


 0057                           21,3655                          BANK    21
 0058     REF    4  LAST 1478   21,2000                          SETLOC  DAPS4
 0059                           21,3655                          BANK

 0060     REF    1                                               COUNT*  $$/DAPBU

 0061     REF   14  LAST 1450   E6,1525                          EBANK=  TJU
 0062                           21,3655   00632 0  RATELIM2 OCT     00632          1.125 DEG/SEC
 0063     REF   30  LAST 1389   21,3656  3 4736 1  POSTHRST CA      HALF

 0064     REF   33  LAST 1456   21,3657  51'505 0           NDX     AXISCTR
 0065     REF   15  LAST 1500   21,3660  55'525 0           TS      TJU
 0066     REF    1              21,3661  11'744 0           CCS     OLDSENSE
 0067     REF    1              21,3662  1 3702 0           TCF     POSCHECK       JETS FIRING POSITIVELY
 0068     REF    1              21,3663  1 3705 1           TCF     CTRCHECK       JETS OFF. CHECK INHIBITION CTR
 0069     REF   34  LAST 1500   21,3664  51'505 0  NEGCHECK INDEX   AXISCTR        JETS FIRING NEGATIVELY
 0070     REF   16  LAST 1500   21,3665  4 1525 0           CS      TJU
 0071     REF  539  LAST 1497   21,3666  10 000 0           CCS     A
 0072     REF  434  LAST 1496   21,3667  0 0002 0           TC      Q              RETURN
 0073                           21,3670  1 3672 0           TCF     +2
 0074                           21,3671  1 3672 0           TCF     +1             JETS COMMANDED OFF.SET CTR AND RETURN
 0075     REF   35  LAST 1500   21,3672  51'505 0  SETCTR   INDEX   AXISCTR        JET FIRING REVERSAL COMMANDED. SET CTR,
 0076     REF    1              21,3673  3 3714 0           CA      UTIME          SET JET TIME TO ZERO,AND RETURN
 0077    REF  36   LAST 1500    21,3674   51'505 0              INDEX    AXISCTR
 0078    REF   3   LAST 1420    21,3675   55'767 1              TS       UJETCTR
 0079    REF 317   LAST 1496    21,3676   3 4755 1  ZARTJ       CA       ZERO
 0080    REF  37   LAST 1501    21,3677   51'505 0              INDEX    AXISCTR
 0081    REF  17   LAST 1500    21,3700   55'525 0              TS       TJU
 0082    REF 435   LAST 1500    21,3701   0 0002 0              TC       Q
 0083    REF  38   LAST 1501    21,3702   51'505 0  POSCHECK    INDEX    AXISCTR
 0084    REF  18   LAST 1501    21,3703   3 1525 1              CA       TJU
 0085    REF   1                21,3704   1 3666 0              TCF      NEGCHECK +2
 0086    REF  39   LAST 1501    21,3705   51'505 0  CTRCHECK    INDEX    AXISCTR          CHECK JET INHIBITION COUNTER
 0087    REF   4   LAST 1501    21,3706   11'767 1              CCS      UJETCTR
 0088                           21,3707   1 3711 1              TCF      +2
 0089    REF 436   LAST 1501    21,3710   0 0002 0              TC       Q                CTR IS NOT POSITIVE. RETURN
 0090    REF   1                21,3711   1 3676 1              TCF      ZARTJ            CTR IS POSITIVE.INHIBIT FIRINGS
 0091    REF 437   LAST 1501    21,3712   0 0002 0              TC       Q                CTR IS NOT POSITIVE.RETURN
 0092                           21,3713    00004 0              OCT      00004
 0093                           21,3714    00012 1  UTIME       OCT      00012
 0094                           21,3715    00012 1              OCT      00012
 0095    REF   3   LAST  134    E6,1744             OLDSENSE    EQUALS   DAPTREG1
 0096    REF 181   LAST 1494    21,3716   4 4753 0  NEGFIRE     CS       ONE              JETS FIRING NEGATIVELY
 0097    REF   2   LAST 1500    21,3717   55'744 0              TS       OLDSENSE
 0098    REF  18   LAST 1461    21,3720   3 1427 1              CA       EDOT
 0099                           21,3721   1 3725 0              TCF      +4
 0100    REF 182   LAST 1501    21,3722   3 4753 1  PLUSFIRE    CA       ONE
 0101    REF   3   LAST 1501    21,3723   55'744 0              TS       OLDSENSE
 0102    REF  19   LAST 1501    21,3724   4 1427 0              CS       EDOT             RATE DEAD BAND TEST
 0103    REF 540   LAST 1500    21,3725   22 000 1              LXCH     A
 0104    REF  64   LAST 1496    21,3726   4 0111 1              CS       DAPBOOLS         IF DRIFTBIT = 1, USE ZERO TARGET RATE
 0105    REF   7   LAST 1489    21,3727   7 4744 0              MASK     DRIFTBIT         IF DRIFTBIT = 0, USE 0.10 RATE TARGET
 0106    REF 541   LAST 1501    21,3730   10 000 0              CCS      A
 0107    REF   1                21,3731   3 4767 0              CA       RATEDB1
 0108    REF 315   LAST 1497    21,3732   6 0001 0              AD       L
 0109                           21,3733   0 0006 1              EXTEND
 0110    REF   1                21,3734   6 3744 0              BZMF     SRSSTART
 0111    REF   1                21,3735   1 3661 1              TCF      POSTHRST +3

 0112    REF  40   LAST 1501    21,3736   51'505 0  SPSRCS      INDEX    AXISCTR          JET SENSE TEST
 0113    REF  19   LAST 1501    21,3737   11'525 0              CCS      TJU
 0114    REF   1                21,3740   1 3722 1              TCF      PLUSFIRE         JETS FIRING POSITIVELY
 0115                           21,3741   1 3743 0              TCF      +2
 0116    REF   1                21,3742   1 3716 0              TCF      NEGFIRE          JETS FIRING NEGATIVELY
 0117    REF   4   LAST 1501    21,3743   55'744 0              TS       OLDSENSE         JETS OFF
 0118    REF  20   LAST 1501    21,3744   3 1427 1  SRSSTART    CA       EDOT             OUTER RATE LIMIT TEST
 0119                           21,3745   0 0006 1              EXTEND
 0120    REF   1                21,3746   7 4766 0              MP       RATELIM1
 0121    REF 542   LAST 1501    21,3747   10 000 0              CCS      A
 0122    REF   1                21,3750   1 3767 0              TCF      NEGTHRST         OUTER RATE LIMIT EXCEEDED
 0123                           21,3751   1 3753 1              TCF      +2
 0124    REF   2   LAST 1501    21,3752   1 3656 0              TCF      POSTHRST         OUTER RATE LIMIT EXCEEDED
 0125    REF  21   LAST 1501    21,3753   3 1427 1              CA       EDOT             COAST ZONE TEST
 0126    REF  17  LAST 1461     21,3754  6 1751 0                AD       E
 0127                           21,3755  0 0006 1                EXTEND
 0128    REF   2  LAST  215     21,3756  7 1411 0                MP       DKDB               PAC LOADED DEADBAND. FRESHSTART: 1.4 DEG
 0129                           21,3757  0 0006 1                EXTEND
 0130    REF   1                21,3760  1 3775 0                BZF      TJZERO

 0131                           21,3761  0 0006 1                EXTEND
 0132                           21,3762  6 3771 0                BZMF     +7
 0133    REF  22  LAST 1501     21,3763  3 1427 1                CA       EDOT
 0134    REF   1                21,3764  6 3655 1                AD       RATELIM2
 0135                           21,3765  0 0006 1                EXTEND
 0136    REF   2  LAST 1502     21,3766  6 3775 1                BZMF     TJZERO
 0137    REF  31  LAST 1500     21,3767  4 4736 0     NEGTHRST   CS       HALF
 0138    REF   3  LAST 1501     21,3770  1 3657 1                TCF      POSTHRST +1
 0139    REF   2  LAST 1502     21,3771  4 3655 0      +7        CS       RATELIM2
 0140    REF  23  LAST 1502     21,3772  6 1427 1                AD       EDOT
 0141                           21,3773  0 0006 1                EXTEND
 0142    REF   4  LAST 1502     21,3774  6 3656 1                BZMF     POSTHRST
 0143    REF 318  LAST 1501     21,3775  3 4755 1     TJZERO     CA       ZERO
 0144    REF   5  LAST 1502     21,3776  1 3657 1                TCF      POSTHRST +1

 0145    REF   5  LAST 1419        4766               RATELIM1 =          CALLCODE           = 00032, CORRESPONDING TO 1.73 DEG/SEC
 0146    REF   1                   4767               RATEDB1  =          TBUILDFX            = 00045, CORRESPONDS TO 0.101 DEG/SEC


*** END OF LMDAP   .025 ***
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H    REFERENCES        SYMBOL      DEF    H    REFERENCES        SYMBOL      DEF    H    REFERENCES

.00375A8  17,3771   1461  1 1457      -.1875    20,3233   1488  1 1491      -TJMIN    17,3775   1461  1 1459
.023R/S2  20,3771   1498  1 1492      -.7071    20,3107   1486  2 1481 1487 -TPER     E4,1542 =  116  6  308  723
.0375AT4  17,3764   1461  1 1459      -AYO      E3,1713    112  1 1141      -UMASK    20,3773   1498  2 1493 1497
.1AT2     17,3763   1461  1 1459      -AZ       11,2357    816              -UP       00,2620   1057  1 1056
.1AT4     17,3762   1461  1 1457      -AZBIT       4746 =  816  1  815      -XMIN     16,3062   1423  1 1423
.166...   23,3537   1249  1 1245      -BIT10    06,3004    183  1  179      -XTRANS   17,2201   1435  1 1435
.30       12,3761   1239  1 1211      -BIT12       7744 =  532  1  532      -0.30/S   01,2344    298  1  296
.5SEC        4774   1090  3  520 1327 -BIT14       7741   1092  2 1415      -0.60/S   01,2343    298  1  296
.5SEC817  33,2176    603  1  603      -CCSPR    01,3133   1107  1 1109      -1/12     13,3734   1240  1 1230
.7071     20,3106   1486  2 1480 1487 -COMMAX   07,3736   1323  2 1305 1306 -1/2+2    00,2444   1053  1 1073
===================================== -COMMAX-  07,3737   1323  2 1305 1306 -1/8         7744   1092  3  532 1460
(AT)A     27,2016     39  1  833      -COSB     E5,1644 =  124  1  124      -1CHK     43,3320   1279  5 1280 1285
(TBUP)A   27,2020     39  1  833      -DEC103   31,3706    821  1  820      -100MS    16,3621   1433  2 1462
(TGO)A    32,3737    830  1  831      -DELGMB   E6,1674 =  137 19  137  913 -100MST6  16,3735   1463  3 1462
(1/OV)A   27,2012     39  1  833      -DTSCALR  17,2054    566  1  566      -136MST6  16,3576   1432  2 1429 1432
===================================== -EL       11,2371    816              -150DEGS  06,2513    172  1  171
+AZ       11,2364    816              -ELBIT       4753 =  816  1  816      -15CMS    17,3137   1448  1 1445
+AZBIT       4747 =  816  1  816      -ELR      05,3372    225  1  220      -160MST6  16,3533   1431  1 1431
+DECSGN   40,2303    403  1  402      -ENDERAS     7746   1092  1  999      -2JETLIM  E6,1475    131  4  131 1479
+DEC99    31,3710    822  1  820      -ENDVAC      6254   1003  2  999 1017 -2SEC     10,3571   1374  1 1361
+DOWN     00,2610   1057  1 1056      -EPSILON     0155 = 1488  5 1480 1481 -3DEG     17,3760   1461  1 1454
+EL       11,2376    816              -EPSMAX   20,3110   1486  4 1480 1481 -45DEGSR     7743 =  536  1  535
+ELBIT       4752 =  816  1  816      -FOURDEG  16,3534   1431  1 1431      -50DEGSR  25,2242    536  1  536
+LIMIT    42,3337    425  1  425      -FOURDT   27,2534    767  1  766      -50SC     04,3016   1179  1 1168
+MGA      E4,1652 =  118  5  316  694 -GYROMIN  07,3511   1315  2 1315 1318 -70DEGS   06,2512    172  1  171
+ON       40,2413    404  3  404  445 -LOKONFG  23,2040    272              -80DEGSR  25,2243    536  1  536
+QMIN     17,2304   1437  1 1436      -MAXADRS     4350 = 1278  1 1283      =====================================
+RMIN     17,2314   1437  1 1437      -MDOT     33,2031     44  1  873      /AF/CNST  31,2356    792  1  788
+TJMINT6  17,3136   1447  4 1438 1446 -MUDTMUN  33,2035     44  1  876      /AFC/     E7,1463 =  142  6  142  814
+UMASK    20,3775   1498  1 1493      -MUDT1    33,2033     44              /BUF+     00,2721   1061  2 1060
+XMIN     16,3064   1423  1 1423      -OCT10       6225   1002  1 1002      /BUF-     00,2715   1060  2 1060
+XORULGE  17,2200   1435  2 1434 1435 -OCT630   16,2315   1415  1 1414      /LAND/    E4,1732 =  121 11  120  876
+150MST6  16,3616   1433  1 1429      -CN       40,2433    405  2  404  445 /MPAC+    00,2767   1062  2 1062
===================================== -PHASE1      0751    100  6  216 1293 /MPAC-    00,2763   1062  2 1062
*ENTER    36,3050    740  1  740      -PHASE2      0753    100  8  215  867 /NORM     00,2732   1061  1 1061
*NBSM*    23,3675   1255  6  554  962 -PHASE3      0755    101  4  216  860 /NORM2    00,2725   1061  1 1061
*PROCEED  36,3045    740  1  740      -PHASE4      0757    101  9  216 1375 /R/MAG    E4,1700 =  120  6  120  848
*SMNB*    23,3673   1255  7  491  961 -PHASE5      0761    101  2  216  854 =====================================
===================================== -PHASE6      0763    101  5  216 1387 ?            6001 =  743
-.0112A8  17,3761   1461  1 1456      -QMIN     17,2310   1437  1 1436      ?GUIDSUB  31,2415    794  1  781
-.025AT2  17,3765   1461  1 1459      -RATE08   E6,1476 =  131  7  131 1439 =====================================
-.025AT4  17,3766   1461  1 1457      -RMIN     17,2316   1437  1 1437      A            0000 =   92 542  160 1501
-.03R/S2  20,3770   1498  6 1490 1497 -RRLIMIT  25,2326    539  2  540      A-PCHK    13,3156   1209  4 1206 1218
-.05AT2   17,3767   1461  1 1456      -SIGNACS     0164 = 1498 10 1490 1496 AAPFG     E5,1452 =  122  1  122
-.15AT2   17,3770   1461  1 1456      -TJMAX    17,3773   1461  2 1457 1458 AAPFG*    E5,1462 =  122  1  122

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969                PAGE 1504

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES

ABCLOAC  41,2622      428     1  411       ACCSW        0122  = 1497     5 1494 1497 AOTIME    35,3146      672     1  672
ABOELV       1245  =  105     7  105 1487 ACCSWU    E6,1546  =  135     3  135 1494 AOURBFM1  04,3640     1386     2 1382 1383
A8DVCONV E7,1513  =  149     5  149  855 ACCSWV    E6,1547  =  135     1 1494      AOUR8UFF  04,3473     1383     1 1381
A8LOAO   41,2726      429     1  411       ACCTHERE  20,3467     1492     1 1492      ADURTEMR  04,3472     1383     1 1382
A8ORT        5634  = 1376                  ACCWO     E5,1512  =  129     2  388  389 AOVAN     01,3215     1110     2 1104 1279
ABORTALM 21,2121      829     2  829       ACC4-2FL     0307  =   87     2  826  831 AOVANCE   34,3016      647     2  627  632
A8ORTCN  21,3066      900     1  900       ACC4OR2X     4741  =   87     2  296 1435 AFCCALC1  31,3151      804     1  811
A8ORTS   32,2000  =    34     2  B26  829 ACOT+C12  16,3742     146B     2 1420 1472 AFCCALC2  31,3161      804
ABORTS1  C5,2000  =    29     1  824       ACENTRAL  E6,1743  =  133     5 1465 1467 AFCCALC3  31,3175      B05     1  805
A8ORTYZ  16,2771     1422     1 1432       ACMOO8IT     4737  =   68                  AFCCLENO  31,3203      805     1  805
ABORT2       5644     1375     1 1375       ACMOOFLG     0040  =   68     3  500  502 AFCSPOT   32,3514      B14     2  814
A8OUTONE 15,2046      252     2  251  954 ACOS=0    00,3637     1078     4 1078 1080 AFOUMR    31,2151      78B
ABRFG    E5,1416  =   122     2  122  821 ACOSABRT  00,3723     1080                  AFTERTJ   17,2756     1445     3 1438 1444
ABRFG*   E5,1426  =   122     2  122  821 ACOSOVF   00,3721     1080     1 1078      AFTRFLTR  30,3204      907     1  906
A8RTABLE 36,2114      727     1  830       ACOSSHR   00,3714     1080     1 107B      AFTRGUIO  31,2376      793     1  B05
A8RTICN  36,2535      734     1  727       ACCSST    00,3625     1078     1 1078      AGAINMM   04,2073      230     1  230
A8RTJACR 05,3416      824     1  824       ACOSST2   00,3642     1078     2 1078      AGSBUFF   E4,1600  =  118    14  11B  276
ABRTJASK 05,3417      824     1  B24       ACOSZERO  00,3731     1080     1 1078      AGSBUFFE  E4,1615  =  118
ABS      00,3226     1070     4  818 1069 ACOS3     00,3652     1079     1 1080      AGSCISPK  32,2022      209
ABSAOS       0162  = 149B    12 1490 1493 ACTCENT   E3,1755      112     2  316  675 AGSENO    32,2122      210     2  210
A8SEDOTP E6,1736  =   132     2 1427 1428 ACTIVE    23,2425      699     4  632  699 AGSINIT   32,2005      208     1  276
A8STJ    E6,1736  =   132     9 1428 1447 AOOGRAV   15,2730      961     1  961      AGSK      E4,1420      114     6  198  210
ABTCONIC 12,3752     1195     3 1180 1193 AODITIN   21,3562     1475     1 1474      AGSLIST   05,2407  =  195
A8TFLGS  13,2000  =    30     1 1376       AOOPOS    30,2002      615     1  615      AGSRNO1   32,2203      211     2  211
ABTKLEAN 05,2653      216     1  B25       AOORESS      6106      998                  AGSRNO2   32,2211      211     2  211
ABTRDOT  E5,1566  =   123     2  123  B27 AOORWO       0116       96    B3  916 1259 AGSUROAT     0001  =  237
A8TTG8IT     4745  =    81                  AOG       E5,1416  =  B21     1  804      AGSVCALC  32,2036      209     1  209
ABTTGFLG     0217  =    81     2  231  827 ADG2TTF   E5,1426  =  B21     1  802      AGSWORO      1321      107     4  210  232
ABVAL    00,3201     1069                  AOIAX     E3,1463      111     1  331      AHEAO5       6436     1010     1 1010
ABVALABS 00,3176     1069     1 1007       AOIAY     E3,1464      111     1  331      AIG       E7,1457      141     9  201  8B6
ABVEL    E7,1471  =   149     B  149  B82 AOIAZ     E3,1465      111     1  332      AIGBANK   26,3332      591     2  5B5  590
A8VEL*       0130  =   123     3  881       AORPCHN2     5366     1291     1 1291      AIMER     30,2671      B42     1  B42
ACAON83  36,3767      75B     1  753       ADRRURT   17,3272     1450     1 1450      AINGOTN   37,2217      378     1  378
ACAON85  36,2057  =   758     1  749       ADRS+1    43,3652     1284                  AINLA     E5,1434  =  129    33  129
ACCOOTQ  E6,1507      133     8  133 1482 AORSCAN   27,2214      746     1  746      AK        E6,1760      138    24  138 1411
ACCOOTR  E6,1511  =   133     4 1468 14B8 ADRSCHK   43,3621     1283     2 1283      AK1       E6,1761  =  138     1 1410
ACCEPTUP 04,3266     1330     2 1331       AORSOIF1  E6,1745  =  134    12 1453 1461 AK2       E6,1762  =  138     1 1410
ACCEPTWD 41,2027      40B     2  408       AORSOIF2  E6,1743  =  134    11 1453 1460 ALARM        5567     1373    51  166 1450
ACCFCTZ1 E6,1574  =   135     1 145B       AORS1     43,3271     1278     1  292      ALARM/T8  35,2430      636     1  626
ACCFCTZ5 E6,1575  =   135     1 1456       AOR40400     5732     1376     1 1375      ALARMIT   27,2526      766     1  766
ACCHERE  20,3435     1492     1 1492       AOR77770     5731     1376     1 1376      ALARMMGA  30,3747      919     1  908
ACCOKFLG     0317  =    88                  ACSRAX    E3,1466      111     1  331      ALARM1       5722     1376     1 1080
ACCOMP   11,2524     1223     1 1231       AOSRAY    E3,1467      111     1  331      ALARM2       5571     1373     2 127B 1375
ACCRETRN     0117  = 1498     2 147B 1496 ACSRAZ    E3,1470      111     1  331      ALCGKK    37,2627      387
ACCSOKAY     4751  =    88     3  221 1456 AOSUM     43,3610     12B3     2 1283      ALOK      E5,1532  =  129     3  3B7  3B8

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS          J DEFINED BY JCKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF H      REFERENCES     SYMBOL       DEF H      REFERENCES     SYMBOL       DEF H      REFERENCES

ALFOK    E4,1422 =  118   1  387       ALSIGNAG    7547   1037   5  878 1063  AOTCOOE     0734 =  100  12  198  956
ALFLT    37,2577    387   1  386       ALSK     37,3103    391   1  388       AOTEL    E7,1412    140   1  247
ALFLT3   37,2644    387   1  387       ALT         1123 =  104   6  104 1130  AOTMARK  07,2000    245   3  937  955
ALGCRTHM 21,3142   1465                ALT8ITS  E7,1741 =  153   5  153  892  AOTMARK1 07,2000 =   29   2  245  252
ALIGNCCA 37,2311    380   3  380       ALTCALC  22,2131    355   1  354       AOTMARK2 04,2000 =   28   2  250  977
ALIGNOPT 15,3314    969   1  969       ALTCONV  33,2025     42   1  871       AOTSTALL 07,3703   1321   3  945 1322
ALILP    37,2667    388   1  398       ALTOSPLY 20,2227   1406   1 1405       APOPERI  23,2000 =   32   1  697
ALINEX   26,2067    341                ALTERYZ  16,3002   1422   1 1422       APSES8IT    4747 =   79
ALINEZ   26,2113    342   1  341       ALTIM    E5,1530 =  129   2  386       APSESW      0202 =   79   2 1192 1193
ALINTIME 43,2442    277   1  263       ALTIMS   E5,1531 =  129   2  386  387  APSFLAG     0230 =   82   3  768  786
ALK      E5,1446 =  129   6  129  388  ALTM        0060 =   93   1  892       APSFL8IT    4737 =   82  16  215 1479
ALKCG    37,2632    387                ALTOUT   21,2231    892   1  891       APSIOES  12,3704   1194   1  697
ALKCG2   37,2635    387   1  387       ALTRATE  E7,1711 =  153   5  153  892  APSTGO   27,2671    770   1  769
ALKLP    37,2676    388   1  398       ALTROUT  21,2160    891                APSVEX   33,2000     39   3  753  855
ALLCOAST 20,2205   1401   4  232  756  ALTSAVE  E7,1712 =  153  14  153  893  ARATE    22,2771    366   3  366
ALLOC/OC 41,3034    431   2  428  430  ALTSCALE    0272 =   86                ARCCOS   00,3612   1078   1 1007
ALLJETS  17,3257   1450   2 1450       ALTSC8IT    4743 =   86   1  877       ARCOMP   21,2167    891
ALLOOP   37,2536    386   2  385  386  ALTSYST  16,3435   1429   2 1429       ARCONV   21,2000     42   1  891
ALLOWGTS F6,1502 =  135   7 1404 1496  ALXXXZ   37,3076    391   1  385       ARCONV1  33,2027     42   1  672
ALLREAC  25,3103    557   1  558       ALX1S    E5,1444 =  129   4  385  391  ARCSIN   00,3610   1078   1 1007
ALLSET   35,3417    679   1  679       AM       E6,1734    136   3  354  366  ARCTAN   13,2506   1131   5  482 1128
ALL1S    26,3703    598   1  597       AMEMCRY  E4,1400 =  114                ARCTANXX 13,2534   1131   2 1131
ALL3OEC  42,3573    439   1  438       AMG      E7,1460    141   2  576  585  ARCTRGSP 30,3613    917   3  915
ALL48ITS 11,2401    816   2  815       AMOVEO   11,3636   1236   1 1235       ARCTRIG  23,3322   1243   9  302 1246
ALM/ENO  43,2116    265  23  263  299  ANET        0157 = 1498  11 1491 1497  ARET        0161 = 1498   3 1492 1496
ALMCAOR     1363 =  108  14  108 1376  ANGLTIME 22,3001    366   1  366       ARG+        7270   1030   1 1030
ALMCYCLE    4145    450  14  409  450  ANGTERM  E4,1664 =  120   3  120  806  ARGHI    00,3417   1074   2 1075
ALMNCADR    5724   1376                ANGX     E5,1500 =  129   2  389  390  ARGLO    00,3470   1075   1 1075
ALMXIT   35,2045    626   2  646       ANGY     E5,1476 =  129   1  390       ARGZERO     7310   1030   1 1030
ALMXITA  35,2043    626   1  643       ANGZ     E5,1472 =  129   1  390       ARGZERO2    7305   1030   1 1030
ALOAO    41,2755    430   1  411       ANG1CHEK 27,3273    844   1  843       ARG90       5067   1096   1 1096
ALOAOEO  13,3147   1209   2 1208 1209  ANTEN8IT    4740 =   85  12  325  601  AROUT1SF 40,2740    422   1  419
ALPHA       0010 = 1195   4 1168 1170  ANTENFLG    0267 =   85                ARTHINSF 40,3132    436   1  434
ALPHAM   E4,1467 =  115  14  115 1229  ACG      E7,1461    141   7  201  866  ARTIN1SF 40,3145    436   1  434
ALPHAQ   E6,1424 =  130   6  197 1478  AOR8SFLG    0125 =   74                ARTOA    21,2001     42   1  892
ALPHAR   E6,1425 =  130   5 1401 1478  AOR8SYST    4747 =   74   2 1428 1429  ARTCA2   21,2002     42   1  892
ALPHAS8  E4,1600 =  119   4  119  316  ACR8TFLG    0310 =   87   1  737       ARTOUTSF 40,2733    422   2  419  420
ALPHATRY 21,3344   1471                ACR8TRAN    4742 =   87   2 1435 1437  ARUPT       0010 =   92  13  155 1450
ALPHAV   E4,1431 =  115  35  115 1238  AOSQ     E6,1536    134  29  134 1489  ASCALE   13,3730   1240   1 1225
ALRM503  24,3000    514   1  513       AOSQTEPM E6,1544    134   7  134 1419  ASCENT   30,2315    838   3  833  837
ALRM514  24,2307    503   1  501       AOSR     E6,1540 =  134  11  734 1489  ASCFILT  34,2000 =   34   1  836
ALRM525  24,2664    511   1  509       AOSRTERM E6,1545 =  134   6 1401 1419  ASCSAVE  E5,1574 =  848   2  848
ALRM526  24,2305    503   1  500       ACSU     E6,1542 =  134   3 1489 1490  ASCSPOT  23,2505    862
ALRM527  24,3001    514                AOSV     E6,1543 =  134                ASCTERM  30,2730    843   3  843  845
ALRM530  24,3116    515   1  515       ACTAZ    E7,1404    140   5  156  953  ASCTERM1 30,2740    843   1  844

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS            J DEFINED BY JOKER OR ERASE ANYWHERE      MO MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES      SYMBOL      DEF     H       REFERENCES

ASCTERM2 30,2754       843    1  839        ATTFL8IT     4753  =   77    3  970  974 AXISGEN2 23,3500      1247    1 1248
ASCTERM3 30,2755       843    3  843        ATTPRIO      1306  =  106    2  371 1323 AXISGEN3 23,3523      1248    1 1248
ASCTERM4 30,2756       843    1  836        ATTSCALE 42,2053      284    1  284      AXO      E3,1715       112    1 1141
ASEGXT   E5,1573  =    129                  ATTSTEER 17,2710  = 1444    1 1436      AXT      01,2345      1081    1 1006
ASENT    30,2000  =     34    3   39  849   ATY      E4,1754  =  121    5  121  845 AZ          1344       108    4  108  951
ASENT1   27,2000  =     33    4   38  849   AUG2     07,3570     1317    1 1316      AZ8IAS   E6,1773       138    2  139  808
ASENT2   07,2000  =     29    1  844        AUG3     07,3541     1316    1 1317      AZEACH   11,2402       816    2  816
ASENT3   05,2000  =     29    1  845        AURLKON1 23,2034      272    1  272      AZEL     14,3745       951    1  951
ASENT4   14,2000  =     31    1  845        AURLCKCN 23,2000      272    1  270      AZIOUMMY E7,1645  =    151    1  151
ASENT5   30,2000  =     34                  ALTOMANV 26,2172      478                AZIMUTH  E5,1400  =    128    5  128  389
ASENT6   33,2000  =     34    1  859        AUTCM8IT     4752  =   86   (6  184  610)AZINCR   E7,1556  =    151    4  151  800
ASENT7   23,2000  =     32                  AUTOMOOE     0301  =   86                AZINCR1  E7,1445  =    142    6  142  816
ASENT8   34,2000  =     34    3  834  847   AUTRATE1     4753  =   88                AZO      E3,1711       112    1 1140
ASINEX   00,3707      1079    1 1078        AUTRATE2     4752  =   88                A2CNTRAL E6,1745  =    133   13 1465 1467
ASKIFNRM 10,2531      1351    1 1350        AUTR1FLG     0321  =   88                =====================================
ASTAR    15,3052       964    1  964        AUTR2FLG     0320  =   88                8*RN8*8* 36,2137       727    1  751
ASTN8IT      4740  =    77    1  732        AUXFLAG      0147  =   76                8ACKHANO 17,2561      1441    1 1441
ASTNCLOK 32,3206       783                  AUXFL8IT     4752  =   76    3  856  857 8ACKP    16,2316      1415    1 1463
ASTNDEX      4362  =   784    1  783        AVECTR       0024  = 1142    7 1137 1139 8AOOES   25,2634       550    1  550
ASTNFLAG     0154  =    77    4  731  754   AVEGEXIT     1251  =  105    6  105  753 8AOENO   07,3653      1320    2  569 1319
ASTNRET  32,3212       783    1  740        AVEGF8IT     4747  =   78    6  188  853 8ADRAD   25,3220       559    5  559  562
ASTNRETN 36,3034       740    1  739        AVEGFLAG     0163  =   78    3  230  715 8AOROOT  31,3615       819
ASTOK    26,3431       592    1  510        AVEGOUT  37,3515      854    1  853      8ACR2    12,3674      1193    2 1192
ASTRENO  27,3170       774    1  774        AVEIT    07,2276      254    1  251      8AOX     12,2302      1171    3 1169
ASTROMSK 10,3520      1364    1 1360        AVEMO8IT     4753  =   81                8AILOUT      5624      1374    3  459 1413
AT       E4,1662  =    120    7  120  842   AVEMIOSW     0225  =   81    3  322 1215 8AILOUT1     5706      1375    7  245 1369
AT/RCS   30,2000        39    1  839        AVERAGEG 33,2267      856                8ALLANGS 26,2272       481    4  342  524
ATAN=90  13,2541      1131    1 1131        AVERTRN  22,3707      859    1  859      BALLEXIT     1337       107    2  481  482
ATDECAY  36,2012        39    1  834        AVESTAR  07,2241      253    2  253  254 8ANKCALL     4616       992  314  209 1478
ATIGINC  E7,1400       140    3  389  668   AVETOMID 13,3463     1214    1  859      8ANKJUMP     4640       992   21  272 1496
ATMAG    34,3372       836    2  743  830   AVFLAG       0050  =   69    6  634  771 8ANKMASK     4350  =   1093    3 1004 1017
ATMAGAO  32,3744       830    1  828        AVFLAGA  35,2354      634    4  626  668 8ANKRUPT     0016  =     92   13  157 1413
ATMAGAOR 26,3144       743    1  734        AVFLAGP  35,2361      634    4  626  668 8ANKSET      0165        99   14  994 1364
ATOPCSM  13,2660      1203    5   37 1236   AVFL8IT      4747  =   69                BASEOTP  F4,1537  =    116    2  706  707
ATOPLEM  13,2733      1205    4   37 1236   AVGENO   22,3661      858    1  854      BASEOTV  F4,1517  =    116    2  706  707
ATOPOTH  13,2660  =     37    1  713        AVGEXIT      1251  =  105    7  733  860 8ASETEMP     1060  =    235    2  234
ATOPTHIS 13,2733  =     37                  AVOUTCAO 37,3533      854    1  854      8ASETHP  E4,1567  =    116    2  706
ATP      E4,1760  =    121    4  121  845   AX*SR*T  23,3677     1255    2  606 1254 8ASETHV  E4,1504  =    116    2  706
ATR      E4,1756  =    121    3  121  842   AXC      01,2352     1081    1 1006      BASETIME E4,1513  =    116    3  706  707
ATTACHEO 43,3163       299    1  263        AXDSTEM      0147  = 1497    4 1494 1495 BAWLANGS 26,2000  =     33    2  341  481
ATTACHIT 43,3174       299    1  299        AXISCTR  E6,1505  =  133   40  133 1501 88           0006  =   1292    5 1291 1298
ATTCAOR      1304      106    6  106 1323   AXISOIFF 17,3755     1461    2 1441 1453 88ANK        0006  =     92   47  155 1373
ATTCHK   15,3536       974    1  960        AXISOIST E6,1604  =  135    8 1455 1495 88SERVOL     5733      1376    1 1375
ATTCK2   42,2035       284    2  283  284   AXISGEN  23,3443     1247    4  937  965 8COU     E6,1675       136   13  136 1323
ATTFLAG      0150  =    77    1  973        AXISGEN1 23,3451     1247    1 1247      BDOV         7606      1038    2 1005 1038

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS                J DEFINED BY JOKER OR ERASE ANYWHERE      MC MULTIPLY DEFINED
80 BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT                    XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-C91      17:53 DEC. 19,1969             PAGE 1507

SYMBOL TABLE LISTING, INCLUDING DEFINITICN, HEALTH, PAGE OF DEF, # OF REFS, PAGF OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H      REFERENCES        SYMBOL      DEF     H      REFERENCES        SYMBOL      DEF     H      REFERENCES

BOOT      26,2010     53   1 1137          BITS5+11  10,3525   1364   3 1356 1363 BLNKSUB1  40,3550    460   2  460
BOSU         7065   1023   1 1005          BITS5,B   25,3402    562   2  562      BLNKWAIT  36,3351    751   1  752
BOTOK     27,2461    766                   BITS6&I5  06,3003    183   1  182      BLCAO     41,2766    430   1  411
BEE17     C4,2773   1179   1 1190          BITS7+4   10,3524   1364   2 1350      BLOCKTOP  E6,1546    135  12  135 1497
BEE19     C4,3005 = 1179   1 1187          BITS7&B   06,2777    183   2  166  178 BNKCHK    43,3743   1285
BEE22     04,3011 = 1179   1 1170          BITSB/7   21,3075    900   1  90C      BNKOPTN   43,3342   1279
BEGOES    25,2604    549   3  514  545     BITSB,9   16,3623   1433   1 1426      BOOLSMSK  20,2114    296   3  294  295
BEGDES29  24,3357    604   2  603  6C4     BITS9+7   43,3065    289   1  289      BOOLSTRT  05,3061    220   1  214
BELOW1    10,2247   1293   1 1294          BITS9,11     5014 = 1425   1 1424      BOOP      37,2755    389   1  389
BELOW2    10,2264   1293   2 1293          BIT1         4753   1089  71   67 1484 BORTENT      5574   1373   2 1374 1375
BELOW3    10,2300   1293   1 1293          BIT1H     32,3526    814   1  813      BOTHABRT     5711   1375   1 1376
BELOW4    1C,2303   1293   2 1293          BIT10        4742   1089  53   66 1479 BOTHAXES  20,3324   1490   1 1494
BESTI     E5,1755 =  125  13  125  957     BIT10+15     6021    520   I  520      BOTHJOBS  10,2666   1353   1 1353
BESTJ     E5,1756 =  125   5  125  935     BIT11        4741   1089  33   43 1468 BOTHLITS  25,3624    617   1  617
BETAM     E4,1471 =  115   6  115 1238     BIT11+1   25,2403    541   1  541      BOTHPAO   22,3377    717   1  717
BETAS8    E4,1602 =  119   3  119  316     BIT12        4740   1089  43   65 1491 BOTHSGN   40,2377    404   1  404
BETAV     E4,1437 =  115  11  115 1225     BIT12,14     7715 =  556   1  555      BOTHSHIP  22,3336    716   1  717
BGIM      16,3741   1468   1 1468          BIT13        4737   1089  60   40 1489 BOV(B)    01,2460   1084   1 1006
BGIM23    16,2203   1405   1 1405          BIT13-14     4355 = 1093   6  283 1402 BPL       01,2504   1085   1 1085
BHIZ      01,2453   1084                   BIT14        4736   1089  92   65 1492 BPL/BMN   01,2475   1085   1 1006
BIASCALE  22,3167    369   1  369          BIT14+7   26,2256    479               BRANCH       6726   1019  10  878 1085
BIASFACT  32,3531    814   1  795          BIT14CCM  10,2276   1293   1 1293      BRATE     E6,1724 =  136   3  366  369
BIASHI    CD,2566   1055   1 1074          BIT15        4735   1089  55   65 1474 BRNCHCON  40,2600    407   1  407
BIASLD    00,2270   1048   1 1075          BIT15+6      7737   1092   1 1352      BRNCHCTR  12,2267   1171   1 1172
BIASRDCT  40,2667    421   1  421          BIT15/14  41,3264    441   2  441  443 BRSPOT1   31,2545    797
BIASTEMP  E6,1710 =  136                   BIT2         4752   1089  55   66 1482 BRSPOT2   31,2652    799
BIBIBIAS  37,3416    852   1  244          BIT3         4751   1089  42   66 1423 BRSPOT3   31,3024    802
BIGADS    20,3345   1490                   BIT3H     34,3445    837   1  836      BRSPOT4   31,3210    805
BIGIQ     20,2624   1480   1 1480          BIT4         4750   1089  58   66 1454 BRUPT        0017 =   92   4  824 1450
BIGTIME   12,3447   1190   1 1189          BIT4H     30,3015    850               BSUBO     26,2016     53   1 1137
BINCON       4363    465   4  445 1093     BIT5         4747   1089  52   66 1465 BUF          0130     96 169   97 1391
BINROUNO  40,3142    436   3  434  436     BIT6         4746   1089  67   66 1458 BUF+      00,2422   1052   3 1051 1054
BIN3         6250 =  569   2  560          BIT7         4745   1089  44   66 1434 BUF-      00,2416   1051   3 1051 1054
BITSET       5020 =  900   1  900          BIT7+9PV  23,2316    524   1  524      BUFNEG    00,2531   1054   1 1051
BITSOFF   41,2713    429   1  429          BITB         4744   1089  45   66 1492 BUFNORM   00,2500   1054   1 1054
BITSOFF1  41,2717    429   1  429          BITB,9    17,3140   1448               BUFPOS    00,2516   1054   2 1051 1054
BITSOFF2  41,2724    429   2  429          BIT9         4743   1089  43   66 1496 BUFZERO   00,2363   1051   1 1054
BITS15+7  10,3523   1364   1 1351          BLANKCHK  1C,3133   1358               BUF2         0133     97  29  245 1374
BITS2-10     5011   1091   1   37          BLANKCCN  40,2614    407   2  407  420 BURNBABY  36,2130    727   3  749  833
BITS3&4      5741 = 1323   2 1302 13C3     BLANKDEX     4752 =  740   1  729      BUSYMASK  10,3530   1364
BITS4+10  10,3526   1364   1 1363          BLANKDSP  41,3531    457   2  457      BUTTONS   05,2701    217
BITS4&5      4763   1090   4  167  429     BLANKET      5464   1346   9  272 1365 BVECTOR   E7,1524 =  147  24  147 1144
BITS4&6      4771 = 1323   5  213 1302     BLANKRET     0114 =   96               BVECTR       0032 = 1142   5 1138
BITS4-5   C7,3735   1323   1 1308          BLANKSUB     4255    460   2  443 1358 BVSU         7041   1022   1 1005
BITS4-7   33,3111    876   1  870          BLNKBBNK     4302    460   1  460      BYLMATT   15,3530    974   2  970  971

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED         = DEFINED BY EQUALS           J DEFINED BY JOKER OR ERASE ANYWHERE       MO MULTIPLY DEFINED
BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT             XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H      REFERENCES      SYMBCL      CEF    F      REFERENCES      SYMBOL      DEF    H      REFERENCES

8ZE/GCTD 01,2470   1085    1 1006      CALCXY   26,3623    597    1  595      CDUS        0036 =   92    4  198  531
81+5UFF  43,2363    273    3  273      CALC28IT    4752 =   70                CDUSCMD     0054 =   92
812-1       4356 =  465                CALC38IT    4751 =   70                CDUSPOT     0765    101   33  101 1253
812T14      7725 = 1093    1 1008      CALL        6643   1017    1 1085      CDUSPOTX    0771 =  101    3  867  905
814+82   25,2645    550    1  550      CALL/ITA 01,2510   1085    1 1006      CDUSPOTY    0765 =  101    3  867  905
82/A2    13,2502   1130    1 1132      CALLACCS 20,2134   1399    1 1400      CDUSPOTZ    0767 =  101    3  867  905
82F8     15,3162    966    1  966      CALLCODE    4766   1090    5  281 1502 CDUT        0035 =   92   12  189  611
82XSC    13,2500   1130    1 1130      CALLDGCH 26,3643    597    4  520  598 CDUTCMD     0053 =   92    2  540  900
83T084   01,2577   1088    2 1087 1CEE CALLGM8L    4747 = 1404    3 1420 1475 CDUTEMPX    1154    104    3  865  886
85OFF       5563   1372   14  273  719 CALLQERR 17,2124   1434    1 1433      CDUTEMPY    1155    104    3  865  886
85T088   C1,2466   1084                CALLRECT 11,3370   1231    4 1231      CDUTEMPZ    1156    104    2  865  867
====================================== CALLRPRT 13,2452   1129    1 1129      CDUTIMEF E5,1436 =  12P
C*MM*N1  23,3655   1254    2 1254 1255 CALLRTRP 13,2362   1127    1 1127      CDUTIMEI E5,1434 =  128
C*MM*N2  23,3657   1254    1 1254      CALLT-35 36,2213    728    1  728      CDUTODCM 22,2410    359    3  353  485
C*MM*N3  23,3670   1254    2 1254 1255 CALOOP   14,3332    942    1  942      CDUTRIG  23,3541   1251   11  491  975
CA+ECE   07,3131   1306    1  172      CALOOP1  14,3360    942    2  942      CDUTRIGS 23,3551   1251    3 1251 1254
CADRFLSH    0372    100    6  197 1362 CALSAM   15,2536    957                CDUWXFR  30,3432    913    1  913
CADRMARK    0373    100                CALSAM1  15,2535    957    1  956      CDUX        0032 =   92   29  190 1430
CADRMASK 10,3531   1364    1 1355      CAL53A   14,3321    942    1  925      CDUXCMD     0050 =   92    5  176 1411
CADRSTOR    1041    102   13  224 1360 CAM      E6,1732 =  136    4  136  355 CDUXO    E6,1634    135   26  135 1442
CADRTA8  C1,2001 =  240    1 1298      CANTROO  04,2065    229    1  229      CDUY        0033 =   92   14  255 1443
CAGESU8  06,2735    182    1  166      CANV37   04,2132    230    1  230      CDUYCMO     0051 =   92    2  176 1410
CAGESU81 06,2743    182    1  176      CATLOG   14,2346     51   12  933  956 CDUYO    E6,1635 =  135    8  371 1443
CAGESU82 C6,2746    182    1  168      CCALL       6631   1017    1 1005      CDUZ        0034 =   92   17  171 1443
CAGETEST 07,3632   1319    7 1303 1316 CCSHOLE     5675   1375   23  378 1458 CDUZCMO     0052 =   92    2  177 1410
CAGETSTJ 07,3644   1319    5 1302 1311 CCSL        7666   1040    1 1093      CDUZO    E6,1636 =  135    7  371 1443
CAGETSTQ 07,3637   1319    3 1309 1310 CD*TR*G  23,3545   1251    1  482      CDUZOLIM 30,3764    920    1  908
CALCDIR  E5,1460 =  128                CD*TR*GS 23,3557   1252    3 1251 1254 CEARTH      0016 =  931    3  930  934
CALCGA   23,3355   1245    4  376  968 CDELF/2     0016 = 1260                CENTANG  E7,1620    143    6  200  664
CALCGA1  23,3415   1245    1 1246      CDES8IT     4735 =   85    2  595      CG       E5,1574 =  123   16  123  848
CALCGRAV 33,2667    873    2  862  874 CDESFLAG    0264 =   85    2  272  514 CGCALC   31,3225    805    2  793  805
CALCGRV1 33,2724    873    1  873      CCHMVR   34,3133    652    2  632  642 CGOTO       6706   1018    1 1005
CALCGTA  23,3251   1241    4  939  965 CDRVE    06,2012    158                CHAN     E5,1443 =  12P
CALCMAN2    0053 =   70    2  366  367 CCU*NBSM 23,3663   1254    5  707  976 CHANBITS 41,2700    429    1  429
CALCMAN3    0052 =   70    1  366      CDU*SMN8 23,3650   1254    3  522  952 CHANDSP  41,2506    418    1  417
CALCN83  36,3466    753    1  758      CDUANG   E5,1543 =  128                CHANGEV8 07,2610    261    1  261
CALCN85  36,3402    752    1  726      CDUDANG  E5,1440 =  128                CHANG1      5122   1097    5  264 1284
CALCPERR 16,3452   1430    2 1405 1430 CDUFLAG  E5,1461 =  128                CHANG2      5126   1097    1  997
CALCPHI  22,2701    364    1  364      CDUINC   10,3661   1390                CHANJ08  01,2707   1102    4 1097 1109
CALCRGVG 31,2753    801    2  793  794 CDUIND   E3,1474 =  111   21  168 1316 CHANLDAD 41,3204    433    1  433
CALCRVG  33,2735    873    1  856      CDULIMIT E5,1443 =  128                CHAN12      0012 =   93   75  167 1482
CALCSMSC 10,2030   1257    7  932  975 CCULOGIC 10,3577   1389   15  250 1252 CHAN13      0013 =   93   24  214 1449
CALCTFF  27,3471   1269    1  723      CDUNDX   E5,1536 =  128                CHAN14      0014 =   93   23  176 1411
CALCTHET 27,2255    760                CDUREADF E5,1441 =  128                CHAN30      0030 =   93    8  163 1402
CALCTPEK 27,3466   1269    1  723      CDUREADI E5,1442 =  128                CHAN31      0031 =   93   21  283 1436

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS          J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H      REFERENCES   SYMBOL      DEF    H      REFERENCES   SYMBOL      DEF    H      REFERENCES

CHAN32       0032 =   93   3  160  857 CHKSDA    14,3315    941   1  941      CMOONFLG     0173 =   79   9   37 1204
CHAN33       0033 =   93  23  169  889 CHKSDATA  14,3250    941   2  940  946 CMPONENT  30,2612    841   1  840
CHAN5        0005 =   93   6  214 1442 CHKSRCH   26,3444    593   1  597      CMPX1     E5,1445 =  129   2  388
CHAN6        0006 =   93   3  214 1405 CHKSUPR   43,3673   1284   1 1284      CNGL      22,2400    359
CHAR         0117 =   96   5  400  402 CHKTEMX   37,3636    866   1  866      CNTABTAO  21,2101    824   1  824
CHARALRM  40,3470    450  18  400  452 CHKVISFZ  16,2740   1421   1 1420      CNTCHK    07,2235    253
CHARIN    40,2077    400   1 1330      CHNL12       0066 = 1468   3 1468      CNTONDEX     4762 =  739   5  727  742
CHARIN2   40,2112    400   2  400      CHRPRIO      4355    465   7  160 1384 CNTRCHK   43,3513   1281
CHECKALT  30,2763    844   1  843      CH31TEMP  E6,1443    131   2 1424 1438 CNTRCON      4771 = 1278   1 1281
CHECKB       7753   1294   1 1291      CH5MASK      1257    105  11  192 1497 CNTRLODP  43,3514   1281   1 1282
CHECKCTR  12,2644   1177   2 1171 1189 CH6MASK      1260    105   6  193 1432 COAALIGN  37,2301    380   1  378
CHECKG    37,2332    380   2  377  378 CIRCL     34,2372    641   3  640      COARFINE  14,3352    942
CHECKG1   37,2335    380   1  381      CIRCULAR  12,3670   1193   1 1192      COARS     07,3001   1304   1 1304
CHECKIN   17,2300   1437   1 1436      CKIMUSE      5244   1115               COARSE    14,3557    947   5  942  968
CHECKMAX  22,2117    354   1  354      CKMDMORE  43,3765 = 1380               COARSERR  07,3101   1306   2 1305
CHECKMM      5321   1286   6  266  826 CKMID2    13,3627   1217   1 1235      COARSRET  15,2161    925   1  943
CHECKNJ   43,3357   1279   3 1279 1284 CKMOOCAO  43,2436    276   3  266  275 COARSTOL  07,3107   1306   1 1306
CHECKP    16,3054   1423   1 1423      CKSTALL   32,2105    210   1  210      COARSTYP  15,2171    926   1  925
CHECKRR   43,2720    282   1  282      CK4V32    04,3464   1383   3 1382      COARS1    07,3006   1304   1 1304
CHECKTAB  04,2072    229   1  229      CLEANDSP  10,2457   1349   2  729  740 COARS2    07,3031   1305   2 1305 1306
CHECKUP   16,2041   1403   1 1403      CLEANEND  10,3234   1359   1 1357      COASCODE  07,2137    248   1  247
CHECKYAW  07,2666    845   2  844      CLEAR     40,2467    406   1  401      COAST08   E6,1602 =  135   7 1455 1495
CHEKAXIS  27,2137    486   1  486      CLEARMRK     5474   1346   2  227 1346 COASTSET  36,3612    756   1  755
CHEKBITS  16,2000   1402   2 1403 1413 CLEAR1    40,2522    406   1  406      COASTTJ   17,3455   1455   4 1455 1461
CHEKMORE  16,2016   1402   1 1412      CLCAO     41,3003    430   1  411      COATRIM   15,3237    968   1  965
CHEKSTIK  17,2354   1438   1 1436      CLCCKCON  10,3544   1365   1 1350      COB          0040 = 1142   4 1137 1138
CHEXERR   32,2537    577   1  576      CLOCPLAY  10,2474   1350   2  739  740 CODE         0124 =   96  15  401  457
CHKBIT10  17,2237   1436               CLOG2/32  30,3067    851   1  851      CODE1TO6  07,2123    247   1  247
CHKBMAG   30,2541    841   1  841      CLOKJOB   36,2743    739   1  738      CODE500   32,3256    784   1  784
CHKCORS   07,3064   1305   1 1306      CLOKTASK  36,2723    738   4  244  738 CODE7     07,2107    247   2  247
CHKDATA1  20,2014    295   1  295      CLOSEADR  21,3627   1476   1 1476      COEFCTR      0160 = 1488   7 1486 1487
CHKFAIL1     5603   1373   1 1375      CLOSEOUT  17,3270   1450   4 1446 1476 COEFF     20,3217   1488   4 1486 1487
CHKFAIL2     5610   1373   1 1373      CLPASHI   40,2505    406   1  406      COEFFQ    E6,1626    135   7  135 1487
CHKINGTS  17,2641   1442   1 1442      CLPASS       1014    102  13  224  458 COEFFR    E6,1627 =  135   6 1449 1487
CHKLASTY  21,2642    897   1  897      CLRADMOD     6011    520  10  231  831 COF       E6,1667 =  135  45  354  487
CHKLINUS  26,2205    478   2  478      CLRMDDN   13,2710   1204   2 1205 1232 COFMAXGO  22,2176    355
CHKLIST   05,3537    986               CLROVFLW  13,2510   1131   1 1131      COFSKEW   E6,1724 =  136   9  136  357
CHKMINTJ  17,3656   1459   2 1457 1460 CLRXFLAG  30,2722    843   1  844      COGA      E5,1765 =  126  16  126 1192
CHKNOVAC  01,3640   1297   1 1300      CLR5      40,2525    406   1  406      COGAFBIT     4750 =   80
CHKPOOH   43,2121    265   6  283  471 CLUPCATE  35,3573    683   1  682      COGAFLAG     0203 =   80   3 1180
CHKPRIO   10,2430   1348   1 1347      CLUPLCCK  04,3340   1331   1 1331      COGAMAX      0016 = 1196   4 1187 1191
CHKRTIMR  16,2672   1420   4 1420 1421 CL1/NET+  20,3466   1492               COGAMIN      0010 = 1196   3 1188 1190
CHKSAB    14,3253    941               CMNTOVFL  12,2315   1172   1 1172      COGAOVFL  12,2764   1180   2 1180 1192
CHKSB     14,3255    941   1  941      CMOON        0022 =  931   2  930  931 COGLOLIM  04,3026   1179   1 1191
CHKSD     14,3274    941   1  941      CMOONBIT     4740 =   79   1  215      COGUPLIM  04,3024   1179   2 1188

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITICN, HEALTH, PAGE CF DEF, # DF REFS, PAGE DF FIRST REF, PAGE OF LAST REF.

SYMBOL    DEF     H   REFERENCES        SYMBOL    DEF     H   REFERENCES        SYMBOL    DEF     H   REFERENCES

CDLINEAP C4,3124    1182   1 1182       CCNV3    42,3623     491                CPSI        0323 =   99   5  353 1407
COLREG      1116 =   104   7  104 1236  CONV4    42,3634     491   1  491       CREWMANU 43,3036     288   1  263
CCMADPS  43,3560    1282   2 1284       CCNV5    42,3636     491   1  491       CRITCCN  40,2315     403   1  402
COMFAIL  36,2575     736   2  243  857  CCN1        5405    1291   1 1292       CSI/A    34,2113     637   1  628
CDMFAIL1 36,2614     736   1  739       CON2     10,2312    1294   1 1291       CSI/8    34,2125     638   1  646
CDMFAIL2 36,2627     736   1  739       CON2ADR     5422    1291   1 1291       CSI/81   34,2165     638   3  643  646
CDMFAIL3 36,2616     736   3  725  727  CDPIES   10,2736    1354   1 1347       CSI/82   34,2176     638   1  645
CDMFAIL4 36,2620     736   2  725  726  CDPIES2  10,2737    1354   1 1352       CSI/822  34,2216     639   1  639
CDMFLAG     5511    1367   2  737 1367  COPINDEX    0164 = 1365  23 1348 1362  CSI/823  34,2224     639   1  639
CDMMAND  E3,1471 =   111   6 1301 1306  COPMPAC     0157 = 1364   3 1360 1363  CSI/8230 34,2237     639   1  639
COMMECS  20,2574    1480   1 1480       COPYCYC  33,2423     862   3  856  863  CSI/83   34,2330     640   1  640
CDMMFX   43,3552    1282   2 1284       CCPYCYCL 33,2275     856   1  872       CSI/CDH  35,2000 =   35   3  626  663
COMMINIT 30,2275     834   2  827  834  COPYCYC1 33,2551     871   1  869       CSI/CCH1 34,2000 =   34   1  637
COMMNDUT 12,2747    1180   1 1193       COPYCYC2 33,2632     872                CSI/SDL  34,2737     646   1  645
CDMMON   36,2404     732   1  726       CCPYNCRM 10,2735    1354   1 1351       CSIALRM  E7,1613     143   5  143  646
CDMMONLM 12,3436    1190   1 1190       CDPYPACS 10,2420    1348   1 1357       CSISTEP  34,2732     645   1  645
CDMNEG   07,3110    1306   1 1305       CCPYTOGD 10,2416    1348   1 1358       CSMCONIC 13,3065    1207   3  341  594
COMP        7673    1040   4 1007 1070  CCREINC  01,3034    1105   2 1101 1105  CSMCKFLG    0305 =   87
CCMPCHK  D6,3561     335   1  334       CORFDUNO 01,2637    1101                CSMDOCKO    4737 =   87  11  295 1478
COMPDISP 37,3240     707   1  709       CCRSCHK2 07,3076    1306   2 1305 1306  CSMINT   24,3275     571   1  571
CDMPICK  41,2515     418   1  418       CORSIT   15,3266     968   1  968       CSMMASS     1327     107   7  295 1486
COMPMAT  13,2240     712                COSCDU      D743 =   100   5  100 1253  CSMPREC  13,3042    1207   5   37  728
COMPMATX 27,2072     485   1  487       CCSCOUX     0747 =   100   6  482 1258  CSMSTORE 23,2431     699   1  699
CDMPMFSN 27,2151     486   1  486       COSCOUY     0743 =   100   5  482 1258  CSMVEC   43,3075     291   1  264
CDMPNUM8    1167 =   104  1D  104 1386  CCSCOUZ     0745 =   100   7  482 1257  CSS         0016 =  934   1  934
COMPOS   C7,3043    1305   1 1305       CCSF        0030 = 1197   4 1192 1193  CSSUN    14,2577     931   1  931
CCMPTEST 41,2426     416   6  416  430  COSI     26,2000      52   2 1138       CSS33    14,2756     934   2  933
CDMPTGO  35,2437     655   1  682       COSINE   00,3517    1076   2 1007 1252  CSS40    14,2754     934   1  933
COMPTST1 41,2430     416   1  417       COSMG       0061 = 1405   3  190  191  CSS5     14,2575     931   2  930  931
CDMP12   22,2211     356   1  356       COSPHI/2    0022 = 1240   6 1227 1230  CSTH     E5,1731 =  126   9  126 1193
COMTERM  11,3061    1227   1 1230       CCSPHIE  11,3273    1230   1 1227       CSTH-RHD E5,1735 =  126   4  126 1188
CCMZERC  D7,3120    1306   2 1305 1306  CDSTALIN    0000 =   237   3  237       CSTCDAY  05,2023      52   1  979
CONC+S1  43,3266    1278   1 1282       CCSTH       0020 =   125  18  301 1245  CSUN        0020 =  931   1  931
CONC+S2  43,3267    1278   1 1282       CCSTHET1 E5,1570 =   123   2  123  844  CS359+   35,2422     636
CONICS   12,2000 =    30   3 1167 1183  COSTHET2 E5,1572 =   123   2  123  844  CTHETA      0322 =   99   3  371 1407
CDNICS1  04,2000 =    28   4   45 1180  CCS1/2CG 25,3076     556   1  554       CTLIST      0334 =  985   6  986
CONST    30,2572     841   1  84C       COS15DEG 23,2317     524   1  523       CTRCHECK 21,3705    1501   1 1500
CDNTA8PT 05,3413     824   1  824       CCS60CEG 23,2521 =   598   2  595       CULT8IT     4745 =   71
CDNT8L2  01,3666    1298   2 1300       CCTROLER E6,1630     135   6 1404 1464  CULTED   14,2751     934   4  934
CCNTOES6 26,3567     595   1  597       CCUNT       0143 =    97  12  401  449  CULTFLAG    0065 =   71   4  933  934
CONTOES2 26,3576     595                CCUNT'EM 11,2347     815   1  815       CULTRIX  E5,1706 =  125   1  934
CDNTINU  43,3643    1284   5 1283 1284  COUNTPL  E5,1542 =   128                CUPSOP      1235 =  955   4  262  954
CONTMANU 22,3170     369   1  368       COVCNV   42,3675     492   1  492       CURTAINS    5701    1375   8  937  963
CONTSERV 33,2545     870   5  868  882  CDZY4    E7,1666     144   4  688  691  CUTOFF   14,2416     846   4  741  846
CONUMNOP 41,3114     432   1  432       CPHI        0321 =    99  11  342 1408  CUTCFF1  14,2430     847   1  846

HEALTH KEY: NCRMALLY DEFINEC UNLESS FLAGGED AS FCLLOWS:

UN UNDEFINED           = DEFINED BY EQUALS             J CEFINED BY JCKER CR EPASE ANYWHERE       MC MULTIPLY DEFINED
80 8ACLY DEFINEC      CD DEFINITIGN ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYM8DL TABLE LISTING, INCLUDING OEFINITION, HEALTH, PAGE DF DEF, # DF REFS, PAGE DF FIRST REF, PAGE CF LAST REF.

SYM8DL      DEF     H       REFERENCES       SYMBDL      CEF     H      REFERENCES       SYM8DL      DEF     H      REFERENCES

CUTOFF2  34,3454      847     2  847       DAPS4     21,2000  =   31     4 1464 1500 DDUMCALC 32,3104     782     1  807
CVECTR      0010  = 1142     1 1138       DAPTEMP1  E6,1736     138    29  121 1462 DDUMCRIT 32,3263     784     1  782
CYCLSHFT 43,3522     1282                  DAPTEMP2  E6,1737  =  138    12  132 1463 CDUMGDDD 32,3165     783     1  782
CYL         C022  =   92    23  402 1282  DAPTEMP3  E6,1740  =  138     8  132 1463 DDV         7602    1038     1 1005
CYR         0020  =   92    42  234 1297  DAPTEMP4  E6,1741  =  138     4  132 1439 DDV/8DDV 00,2353    1051     2  819 1038
C1/2        7722     1091     1 1096       DAPTEMP5  E6,1742  =  138     5  132 1417 DDVCALL  0D,3004    1062     1 1062
C1MP     E6,1722  =  136                   DAFTEMP6  E6,1743  =  138    11  132 1462 DEAD     27,2230     746     2  746
C1PP     E6,1720  =  136                   DAPTREG1  E6,1744  =  138     3  133 1501 DE8IT       5522    1367     3  737 1367
C13BANK  17,2000  =   31     1  565       DAPTREG2  E6,1745  =  138     1  134      DEC-12   12,2016    1095
C13FSAV     1266      105     2  565  566  CAPTREG3  E6,1746  =  138     1  134      CEC-6    12,2015    1095
C13QSAV     1265      105     8  987 1449  DAPTREG4  E6,1747  =  138    10  132 1418 CECBRNCH    0777     101    18  401  451
C13SLDDP 17,2030      565     1  566       DAPTREG5  E6,1750  =  138     5  132 1418 DECCNTR  33,2366     857     1  857
C13STALL    6022      566    10  471 1448  DAPTREG6  E6,1751  =  138     7  134 1418 DECDSP   41,2525     418     1  410
C13STAL1 17,2022      565     1  566       DAPT4S    06,3140  =  190     3  161  189 DECDSP3  41,2577     419     2  419
C2MP     E6,1716  =  136                   DAPZRUPT  E6,1756  =  138     4 1404 1451 DECEND   40,2265     402     2  402
C2PP     E6,1714  =  136                   DASAMPL   25,3345     561     1  563      CECDN    40,2322     403     1  402
C2SQM    E6,1712  =  136                   DATAFAIL  25,3444     563     1  560      DECCUNT     0117  =   96    27  412  436
C2SQP    E6,1710  =  136                   CATAGDCD  E7,1733  =  146     5  146  597 CECQTIMR 16,2710    1420     1 1420
C3/2        7742     1092     1 1096       OATADUT   21,2224     892     2  892  893 CECRET      0115  =   96     2  432  433
C33JMP   C6,2763      183     1  170       DATAPL    E5,1472  =  128    13  377  381 DECRDUND 40,3315     446     1  445
C33TEST  06,2374      169     6  166  168  DATGDCHK  26,3654     597     1  597      DECRTIMR 16,2712    1420     1 1420
C5/2        5005     1090     1 1096       DAXMAX    30,3760     920     2  911  920 DECTEM      0122  =   96     3  418
=========================================  CAY/2MAX  30,3762     920     2  911  920 DECTEST  41,2445     417     2  416  417
DACLIMIT 20,2446     1411     3 1411       DAZMAX    30,3760  =  920     1  911      DECTD8IN 40,2232     402     1  402
DACLDOP  20,2410     1411     1 1411       D8           1343     107     8  214 1498 DEC17       4361  =  383     3  375  854
DAD         7000     1020     1 1005       D881         0143  = 1497     5 1490 1495 DEC227   15,2557     957     2  952  956
DALTRATE E7,1716  =  153     3  153  891  D882         0144  = 1497     3 1490 1494 CEC23    42,2033     277     1  277
DAMPING  17,2374     1438     1 1438       DB83         0146  = 1497     4 1491 1494 DEC27       4764  = 1090
DANZIG      6064      997    64  943 1354  D884         0145  = 1497     6 1491 1495 DEC29       4765  = 1090
DAPARUPT E6,1752  =  138     5  138 1450  D8FUN     20,3562    1494     1 1494      DEC45       4772    1090     2 1010 1083
DAPATTER 43,2165      267     1  263       D8DNE     20,3371    1491     1 1491      DEC51    04,3232    1324
DAP8ITS  05,3501      826     1  825       D8SELECT     4750  =   88     1 1399      DEC58    37,2474     383     1  377
DAP8DCLS    0111  =   87    64  214 1501  DBSELFLG     0316  =   88                 DEC585   37,3055     390     1  378
DAP8QRPT E6,1754  =  138     2 1420 1450  CBSLECT2     4747  =   88     1 1399      CEC66    31,2452     795     2  790  795
DAPDATA1 20,2004      294     1  294       D8SL2FLG     0315  =   88                 DEC70    04,2403     235     1  229
DAPDATA2 01,2236      297     3  297       CBVAL1       1343  = 1498     6 1489 1495 DEFUNCT  21,3237    1466     1 1466
DAPDATA3 01,2303      297                  D8VAL2       0114  = 1498     2 1489 1491 DEG.5    15,2467     955     1  953
DAPDATR1    1340      107    10  295  316  D8VAL3       0115  = 1498     3 1489 1492 DEGCDM   40,2717     421     1  420
DAPDAT2  01,2253      297     1  297       DCDU      E6,1634  =  137                 DEGCDN1  40,3130     436     1  435
DAPDISP  43,3156      294     1  263       DCMCL     30,3221     907     1  914      DEGINSF  40,3044     435     2  434
DAPIDLER 16,2024     1403     2  225 1405  DCMTDCDU  22,2654     364     2  367  487 DEGINSF2 40,3055     435
DAPLRUPT E6,1753  =  138                   DCOGA        0014  = 1196     4 1189 1191 DEGOUTSF 40,2615     420     2  419  420
DAPS1    16,2000  =   31     4 1402 1468  DCDMP        7710    1040     2 1040      DEGREE1  14,3403     943     1  942
DAPS2    17,2000  =   31     4 1396 1452  CCCMPTST  41,2441     417     2  416      DEGTA8   40,2727     422     2  421
DAPS3    20,2000  =   31     6   42 1489  DCTSTCYC  41,2454     417     2  433      DEG30    15,2465     955     2  252  953

HEALTH KEY: NDRMALLY DEFINED UNLESS FLAGGED AS FDLLDWS:

UN UNDEFINED          = DEFINEC 8Y ECUALS             J CEFINED 8Y JCKER DR ERASE ANYWHERE      MD MULTIPLY DEFINED
8D BACLY DEFINED    CD DEFINITION ASSDCIATED WITH CONFLICT             XX MISCELLANEDUS TRDU8LE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF     H        REFERENCES     SYMBOL     DEF     H        REFERENCES     SYMBOL     DEF     H        REFERENCES

DEG359    14,3404      943    1  942       DELVCSI   E7,1573      143   16  143  645 DESRET       1112      103   10  103  547
DEG60     15,2471      955                 DELVCTL   E7,1501  =   149    3  753  754 DESRETRN  25,2457      545    1  544
DEL       E6,1744  =   133    3 1466 1468  DELVEET1  E4,1666      117    5  196  639 DESRTRN   25,2463      545    2  545
DELAYEX      5235     1114    1 1113       DELVEET2  E4,1674      117    6  196  654 DETENTCK  16,3071     1424    2 1422 1423
DELAYJCB  00,3736     1369   .14  210  947 CELVEET3  E4,1765      119   15  196  775 DEXDEX       0142  =    98    7 1251 1256
DELAYLDC     1323      107    6  224 1370  DELVIMU   E7,1622      144    7  318  758 DEXI         0143  =    98    1 1255
DELAYNUM     4752  =    37    1 1369       DELVLVC   E7,1433      141   20  141  711 DEX1         0143  =    98    5   98 1256
DELCDUX   E6,1637      135    6  135 1413  DELVMIC   E7,1575  =   143                DEX2         0144  =    98
CELCDUY   E6,1640  =   135    3  137 1413  DELVOV    E4,1622      117    5  318  712 DFRNT     40,3420      448
DELCDUZ   E6,1641  =   135    3  137 1413  DELVREF   E7,1526  =   149    5  149  873 DGBF      20,3103     1486    2 1482
DELCDMP   22,2527      361    3  366  466  DELVRCD   E7,1766  =   153    6  153  813 DGBITS    25,3156      558    2  558  562
DELDCDU   E6,1637  =   137    2  367  371  DELVS     E7,1733  =   153    7  153  895 CGCHECK   25,3425      563    2  560  562
DELDCDU1  E6,1640  =   137    1  371       DELVSAB   E7,1663  =   144    4  144  760 DGCHECK2  25,3346      562    2  563
DELDCDU2  E6,1641  =   137    1  371       DELVSIN   E7,1655  =   144   14  144  760 CGDOD?    32,2743      609
DELDEP    E5,1757  =   126    5  126 1177  DELVSLV   E7,1433  =   141    2  200  622 DGCCDCHK  25,3010      555    1  555
DELDV     E7,1611      143   15  143  645  DELVTEST  27,2252      760                DIDFLAG      0020  =    67
DELEL     E7,1575  =   143    4  669  672  DELVTPF   E4,1747      119    3  200  665 DIDFLBIT     4736  =    67    4  219  900
DELELO       0032  =   663    3  669  672  DELVTPI   E7,1575      143    6  143  665 DIFEQ+0   11,3475     1234    1 1230
DELERLIM  30,3762  =   920    1  913       DELVX        0324  =    99   12  328  866 DIFEQ+1   11,3501     1234    1 1230
DELGMBLP  30,3271      908    1  909       DELVY        0326  =    99   10  331  866 DIFEQ+2   11,3512     1234    1 1230
DELINDEP     0014  =  1197    2 1176 1177  DELVZ        0330  =    99    9  331  866 DIFEQCNT  E3,1500      111   25  111 1236
DELLOOP   00,3741     1369    1 1369       DELX      E5,1642  =   126    6  126 1172 CIFEQCOM  11,3655     1236    2 1234
DELLT4    E7,1451      141    7  196  761  DEP          0036  =  1197    1 1176      DIFEQTAB  11,3306     1230    1 1230
DELM      E5,1550  =   129    5  398       DEPRCRIT  22,3657      822    2  800      DIFEQ0    11,3401     1231    1 1235
DELMAX1   34,2105      637    2  645       DEPREV    E5,1761  =   126    3  126 1176 DIFFALT   E7,1577      143    5  196  653
DELMLP    37,2646      387    1  388       DERCLOOP  31,3544      818    1  819      DIMDBIT      4753  =    71
DELOK     12,2632     1177    1 1176       DERCCF+1     0153  =    98                DIMDFLAG     0073  =    71   23  238 1236
DELPERCR     1274      106    5  369 1430  DERCOF-1     0151  =    98                DINDX        0063  =   138    6 1411
DELQERCR     1275      106    3  371 1443  DERCOF-2     0150  =    98                DIRADRES     6111      998    2 1012
DELQFIX   E5,1520  =   122    2  122  676  DERCOF-3     0147  =    98                CISCVLVC  35,2375      635    2  628  650
DELRERCR     1276      106    3  371 1443  DERCOF-4     0146  =    98                DISGRVER  15,2761      961    1  960
DELRSPL   22,3541  =    37                 DERCOF-5     0145  =    98                DISINDAT  21,2315      893    2  891  892
DELT      E5,1644  =   126    3  126 1170  DERCOF-6     0144  =    98                DISPCHNG  36,2402      732    4  725  731
DELTACSM  E3,1572      112    1  591       CERCOF-7     0143  =    98                DISPCOMN  31,3440      809    1  810
DELTAH    E7,1664  =   152    6  152  678  DERCOF-8     0142  =    98                CISPDEX      1162      104   24  150  825
DELTALEM  E3,1644      112    1  591       DERCOFN      0152  =    98    1  820      DISPEXIT  31,3426      809    5  794  814
DELTAQ    E7,1546  =   147    8  147 1145  DERPTR       0141  =    98    3  818  819 DISPGYRD  15,3276      968    1  965
DELTATM   E7,1426  =   141    2  515       DERTABLL  31,3635      820    1  818      CISPLACE  41,3111      432    2  431  432
DELTATCK  04,3600     1385    1 1385       DESASCNT     0004  =   237    3  237      DISPLAYE  35,3603      684    2  663  664
DELTAX    E5,1664  =   127   12  127 1150  CESCBITS  23,2455      817    1  256      DISPLAYS  10,2000  =    29    3 1346 1374
DELTEE    E7,1611  =   143                 DESCOUNT     1113      103    4  513  550 DISPNDT   36,3016      740    1  739
DELTEED   E7,1605  =   143    4  672       DESGLDS   26,3636      597    1  595      DISPN5X   37,3113      705    2  705
DELTIME   12,2421     1174    3 1170 1189  DESIGBIT     4742  =    85    9  534  871 DISPRATE  20,2257     1407    1 1407
DELTTFAP  E7,1425      140    1  797       DESIGFLG     0271  =    85    1  550      DISPRSET  21,3052      900    3  891  895
DELV         0324       99    9   99  961  DESLOOP   25,2611      550    5  550  598 DISTEM       0122  =    96    3  416

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED        = DEFINED BY EQUALS          J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED   CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF    H       REFERENCES      SYMBOL       DEF    H       REFERENCES      SYMBOL       DEF    H       REFERENCES

DIVIDER   16,2304    1414   2 1414       DNRRDDT      1331  =  107   2  107  318 DDRSTART  05,2726     217   1  217
DKALT     16,3445    1429   1 1430       DNTABLE   05,2441     206   1  986       DDSHIFT   21,3536    1474
OKO8      E6,1411     130   2  215 1502 CNTM8UFF     0340  =  100  22  156  991 DOSKIP    17,3037    1446   1 1445
DKKAOSN   E6,1405     130   1  215      DNTMEXIT  05,3713     988   6  987  991 DOSSHFT   00,2322    1049   1 1049
DKCMEGAN  E6,1404     130   2  215 1417 ONTMFAST  06,2671     180   1  183      ODSTDRE      6365    1008   1  997
DKTRAP    E6,1403     130   2  214 1417 DNTMGCTC     0335  =   99   9   99  991 DOSUBLST  05,3677     988   1  987
DLAND     E5,1634  =  123  11  123  799 ONTM1        0034  =   93   1  988      COSWITCH  11,3434    1232   2 1231 1232
OLANDX    E5,1634  =  123   1  318      DNTM2        0035  =   93   1  989      OOT          7334    1032   1 1005
DLANOY    E5,1636  =  123   1  318      CCACCFUN  20,3737    1496   1 1492      DOTERM    40,3642     462   1  462
DLANDZ    E5,1640  =  123   1  318      ODALARM      5155  = 1376              DOTICK    22,3441     718   1  718
OLAYJC8   00,2000  =   28   1 1369      DCALIGN   15,3104     965              ODTINC       0136      97   7   97 1033
DLDAD        6055     996   1 1005      DOCKED    20,3111    1486   1 1479      DOTIXBR   01,2425    1082
DLOAD*       7736    1092   1 1000      OOCKTEMP     0157  = 1488   4 1478 1483 DOTPER    22,3622     723   1  723
DLOADCOD     7735    1092   1 1012      ODCKTEST  20,2777    1483   2 1483 1496 OOTRET       0137      97   8   97 1072
OLY2         5212    1113   2 1113 1369 DCCM8ASE  37,3144     706   1  709      DOTSU8       7161    1027   3 1033
OMENF8IT     4743  =   74               CDCORS    14,3567     947   1  947      DOTSWFMX  30,3757     920   1  914
DMENFLG      0121  =   74   7  581 1151 DOCSM     23,3236    1151   1 1150      DOT6RUPT  17,2117    1397   1  156
DMDDE        7335    1032   1 1071      DOCSM1    23,3241    1151   1 1150      DDU8LK    40,2575     407   2  406  407
OMP          7106    1025  22  402 1258 CCDAT     07,2074     247   1  247      OOVLDAD      6466    1012   1 1009
DMPNSUB      7321    1031   1  818      DCOELVZ   37,3565     865   1  866      DOVLDAD*     6471    1012   1 1009
DMPNTEMP     0135  =   97   2 1031      DOOES     25,2646     552   1  550      DDW..     11,3714    1238   2 1231 1236
OMPR         7577    1038   1 1005      DCDESEND  25,3073     556   1  556      OOW..1    11,3742    1238   2 1238
OMPSU8       7112    1025  25 1027 1258 DOOLOAD      6463    1012   1 1009      DOWNENT2  10,3555    1366   3 1356 1361
DMPSUB2      7131    1025   1 1030      DDDLOAD*     6147    1000   2 1009 1012 DOWNFLAG     5516    1367 104  210 1358
DMP1         7575    1038   1 1005      DCCNACR   05,3531     986              DOWNGTS   20,3712    1496   2 1483
ONADRDCR  05,3536     986   1  988      DDDNCHAN  05,3577     986              DOWNTELM  05,2000  =   29   3  195  985
ONDUMP    05,3734     991   1  991      CCCNPTR   05,3623     987   1  986      OOWNTORK  E6,1513     133   7  133 1462
DNOUMPI   05,3721     990   2  290  991 DODCWNTM  05,3505     985   2  155  156 DOJ/NFT+  20,3730    1496   2 1492 1493
DNDUMP1   05,3746     991   1  991      DOFSTART  05,2472     213   1  220      OP(-22)   27,3761    1275   1 1270
ONDUMP2   05,3750     991   1  991      DCFSTRT1  05,2477     213   2  219  220 DP-.01    35,3650     686   3  682
DNECADR      0336  =  989  15  985  988 ODINT     13,2036     238   2  238      CPAGREE      7260    1030
ONEDUMP   43,3066     290   2  263  290 DOINT2    13,2060     238   1  238      OPB-14    26,2414     488   2  485  487
DNINDEX      1332  =  107   4  107  563 DOIT      31,2251     790   1  791      DP8IT14   01,3500    1125   1 1125
ONLADMM1  04,2471     237   1  234      DOLEM     26,2460     581   1  581      DPDAT1    20,2037     295   1  295
DNLADPOO     4755  =  237   1  231      DCN8RD    25,2671     552   1  552      DPOAT3    01,2320     298   1  297
DNLRALT      1336  =  107               DONEAOR   37,3651     866   1  866      DPHALF    23,2521  = 1094  12  355  766
ONLRVELX     1333  =  107   4  107  198 DONEYET   21,3426    1472   2 1472      DPINCOM   40,3165     436   1  437
DNLRVELY     1334  =  107   1  107      DOPAXIS   20,3274    1489   1 1489      DPINORM   40,3173     437   1  436
ONLRVELZ     1335  =  107   2  107  196 DOPIF     31,2241     790   1  789      DPINSF    40,3150     436   4  434  437
DNLSTADR     0333  =   99               DOPROC    40,3644     463   2  462  474 DPINSF2   40,3175     437   1  434
ONLSTCOO     0333      99  10   99 1386 DORDTAT   17,2772    1445   2 1445      DPINSF4   40,3202     437   1  434
ONPHASE1  05,3522     985   2  225  991 DORREPOS  25,2140     533   1  189      CPIPAY    E5,1522  =  129   2  387
DNPHASE2  05,3530     986   1  988      DCRRDUT   25,3027     555   2  555      OPIPAZ    E5,1526  =  129   1  387
DNQ          0337  =   99   2  100  989 ODRSAMP   25,2023     494   1  494      CPL1      30,3713     918   1  918
DNRRANGE     1330     107   7  107  611 DORSAMP2  25,2027     494              OPL3      30,3714     918   1  918

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE     MC MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF   H      REFERENCES      SYMBOL       DEF   H      REFERENCES      SYMBOL       DEF   H      REFERENCES

DPL5      30,3715     918    1  918      DSALMOUT     0011  =   93   36  173 1388 DSPMSK       4757  =  448    1  447
DPL7      30,3716     918    1  918      DSEXIT       0114  =   96    3  448  449 DSPOCTIN  40,3446     449    1  447
DPL9      30,3717     918    1  918      DSKYFBIT     4735  =   73    1 1330      DSPOCTWD  41,3410     447    3  410  444
DPMODE    10,3717    1393                DSKYFLAG     0113  =   73                DSPOFF    05,3305     224    1  224
DPDSMAX      4732    1089    3  445 1393 DSLV      40,3432     449    2  448  449 DSPOPTN   15,3413     970    3  970  971
DPOUT     40,2757     422    3  422      DSMAG        0142  =   97    2  448  449 DSPOUT    06,2063     159    2  158
DPPOSMAX  23,2531    1094    9  302  708 DSMSK     40,3434     449    2  448  449 DSPOUTSB  06,2024     159    2  159  162
DPSBURN   E6,1747  =  132                DSPA      41,2367     416    1  410      DSPRNC    40,3251     445    1  445
DPSFLITE  20,2526    1479    1 1479      DSPAB     41,2362     416    1  410      DSPRRLDS  40,2000     301    1  301
DPSTHRSH  32,2000      40    1  760      DSPABC    41,2355     416    1  410      DSPSCAN   06,2032     159    2  159
DPSVEX    33,2001      39    2  749  827 DSPABDRT     4227     459    3  459      DSPSFNDR  41,2564     419    1  419
DPTEST    41,2261     412    4  412  433 DSPALARM  40,3454     449    8  410  434 DSPSIGN   40,3234     445    4  445  446
DPTEST1   41,2303     413    4  413      DSPB      41,2375     416    1  410      DSPTAB       1022     102   48  158 1373
DPZERO    12,2006  = 1239    3  933 1231 DSPC      41,2402     416    1  410      DSPTEMX      1050  =  102    7  102  703
DP0          0036  =  935                DSPCADR   16,2211    1405    1 1405      DSPTEM1      1044     102   32  102  970
DP1          0040  =  935                DSPCNT       0775     101    7  159  224 DSPTEM2      1047     102   12  102  383
DP1/12    15,2465  =  252    1  251      DSPCOM1   41,2373     416    3  416  418 DSPV6N79  07,2626     262    3  257  262
DP1/2     12,2004  = 1130    5 1130 1142 DSPCOM2   41,2407     416    2  416      DSPWDRET     0144  =   97    3  445
DP1/20    33,2765     874    1  873      DSPCOM3   41,2415     416    1  416      DSP2DEC   40,3327     446    1  427
DP1/4     12,3765    1239    3 1193 1239 DSPCOUNT     0776     101   66  160 1330 DSP506B   43,2345     273
DP1/4TH   23,2513    1094    7   37 1145 DSPDCEND  41,2570     419    4  419  426 DSP6B     43,2326     273    1  273
DP1/8     07,2621     261    1  254      DSPDCGET  41,2531     418    1  418      DSQ       00,3174    1069    1 1007
DP1MIN    26,2121     343    1  341      DSPDCPUT  41,2541     418    1  419      DSQSUB    00,3300    1072    5 1069 1077
DP1OUTSF  40,2744     422    1  419      DSPDCWD1  40,3267     445    4  446      DSREL        0141  =   97    4  448  449
DP2(-3)   27,3763    1275    1 1272      DSPDC2NR  40,3322     446    3  425  447 DSRUPTEM     0073  =   95    5  159
DP2(-4)   27,3765    1275    1 1266      DSPDECNR  40,3316     446                DSRUPTSW     1310     106   10  157  223
DP2/3     04,3227    1239    3 1220 1239 DSPDECVN  40,3342     447    4  423  462 DSU          7010    1022    1 1005
DP2OUTSF  40,2751     422    2  419      DSPDECWD  40,3262     445    4  419  424 DT        E7,1715  =  153    7  153  895
DP3OUTSF  40,2753     422    1  419      DSPDELAY  40,3743     705    1  705      DT/DELT   30,3765     920    1  913
DP9/10    04,3014    1179    4 1171 1177 DSPDPDEC  40,3025     427    1  410      DT/TAU    22,3121     368    1  367
DQUARTER  12,3765  = 1239    2 1225      DSPFLG       1067  = 1364    3 1357 1358 DT/2      E4,1475  =  115   11  115 1236
DRDOT     E4,1736  =  120    4  121  841 DSPFMEM   41,3400     444    1  411      DT/2COMP  13,3317    1211    1 1212
DRFDB     20,3656    1495    1 1495      DSPIN     40,3356     448    5  401  449 DT/2MAX   13,3406    1212    2 1211 1212
DRFTBIT      4735  =   68    3  167 1307 DSPIN1    40,3403     448    2  448  449 DT/2MIN   13,3404    1212    1 1212
DRFTSUB2  06,3502     334    1  338      DSPLAY    06,2047     159    1  159      DTDECAY   36,2004      38
DRIFT/DN  17,3447    1455    1 1455      DSPLIST      1042     102    6  224  469 DUMMYAD   04,2144     231    1  235
DRIFTBIT     4744  =   87    7  734 1501 DSPLOCK      1011     101   12  224 1362 DUMMYJOB  01,3207    1110    2  215 1109
DRIFTDFL     0312  =   87    1  737      DSPLV     41,3440     447    1  450      DUMPCNIC  27,3427    1264
DRIFTER      0116  = 1498    3 1489 1490 DSPLYALT     4750  = 1411    2 1406      DUMPLOC      0336  =   99    5  990  991
DRIFTFLG     0036  =   68    3  858  947 DSPLYMSK  20,2113     296    1  295      DUMPRPRA  27,3465    1266
DRIFTI    E5,1504  =  129    1  377      DSPLYTOT  20,2266    1407    1 1407      DUMPTFF1  27,3550    1270
DRIFTO    E5,1502  =  129    1  379      DSPMM     04,2622     461    1  472      DUMPTFF2  27,3645    1271
DRIFTSUB  06,3462     334    3  330      DSPMMJB   40,3577     462    2  461 1286 DUNFVLIM  30,3755     920    1  914
DRIFTT    E5,1442  =  129    1  378      DSPMMJOB  40,3577  = 1286    1 1286      DV/SC        7641    1039    2 1039
DRIVEDN   21,3424    1472    1 1472      DSPMMTEM     0140  =   97    2  462      DVBYCOSM  30,3571     916    4  915

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT           XX MISCELLANEOUS TROUBLE
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SYMBOL     DEF     H         REFERENCES       SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF     H       REFERENCES

DVCNTR    E7,1515  =  149   53  149 1376 E/PROG    04,2000  =   28    2  372  374 ELEACH    11,2403      816    2  816
DVCNTR1   E7,1570  =  859    2  857      E/SWITCH  04,2577     372                ELEPS     35,3646      686    1  669
DVCNTSET  33,2323     856                EARSPH    11,3414    1231    1 1230      ELEV      E4,1656      117   10  196  672
DVECTR        0010 = 1142    1 1138      EARTCNTR  14,2514     930                ELEVEN        4760    1089    4  471 1463
DVLOS     E4,1702  =  118    4  317  677 EARTHGCN  22,3527     719    1  719      ELEX      35,3171      672    1  669
DVMAX1    34,2063     637    1  639      EARTHL    06,3761    1141    2 1134 1136 ELIDUMMY  E7,1644  =  151    2  151  152
DVMAX2    34,2065     637    1  639      EARTHLOC  06,2000  =   29    1 1141      ELINCR    E7,1554  =  151    4  151  800
DVMON     33,2314     856                EARTHMU   27,2022      44    1  775      ELINCR1   E7,1446  =  142    5  799  816
DVMONCON  36,2554     734                EARTHMX   26,3743    1140    2 1134 1136 ELOOPFIN  43,3464     1281    2 1281
DVNORM    00,2505    1054    3 1053      EARTHMXX     0051  = 1142    4 1137 1140 ELRCODE   04,3356     1332    1 1331
DVNORMCT      0137 =   97    6 1051 1062 EARTHPAD  22,3367     717    1  716      ELRCODE1  40,2156      401    1  400
DVOVF     00,2405    1051   11 1053 1064 EARTHR    37,2420     382    1  382      ELVDUMMY  E7,1647  =  151    3  151  152
DVOVSUB   20,3002    1484    5 1481 1487 EARTHR*   37,2447     382    4  377  390 ELVIRA    E7,1444  =  142    5  142  815
DVPREV    E7,1575  =  143    4  643  644 EBANK        0003  =   92   89  214 1478 ENABLFT6  17,2075     1396    1 1396
DVSIGN        0136 =   97   10 1051 1068 EBANKSAV     1067     102    3 1348 1364 END-ALIG  E7,1630  =  150    3  150  154
DVTHRUSH      1250 =  105    7  105  856 EBANKTEM     1071     103    6  213 1364 END-E3    E3,1777  =  113
DVTOTAL   E7,1507  =  149    6  149  856 EBANK3       5007  = 1093    3  225  883 END-E4    E5,1400  =  120
DVXSC         7433   1035    2 1034      EBANK4       4741  = 1093    5  278  885 END-E5    E5,1774  =  129
DWNRPTBB      4062    156    1  155      EBANK5       5014    1091   14  390 1425 END-E6    E6,1774  =  139
DXCOMP    12,2155    1169    1 1169      EBANK6       5015  = 1093   10  214 1478 END-E7    E7,1777  =  154
DXCRIT        0124 =   98    2  818  819 EBANK7       5016    1091   17  389  952 END-E7.0  E7,1745  =  154
DXCRIT+1      0125 =   98                EBUF2        1166  =  104   10  372  373 END-E7.1  E7,1747  =  154
DXERROR   E6,1446     131    9  131 1427 ECC       E5,1751  =  126    3  126 1194 END-E7.2      4000  =  154
DYDOT     E4,1740  =  121    4  121  841 ECDUW     E6,1645  =  137    3  137  920 END-E7.3  E7,1630  =  154
DYERROR   E6,1450  =  131    7  131 1440 ECDUWL    30,3752     920    1  904      END-E7.4  E7,1777  =  154
DYNMDISP  36,3365     752    2  751  752 ECDUWUSR  E6,1645  =  137    3  137  913 END-E7.5  E7,1655  =  154
DZDOT     E4,1742  =  121    3  121  842 EDCP         0023  =   92   14  443 1282 END-IN/M  E7,1672  =  144
DZERROR   E6,1452  =  131    7  131 1440 EDOT      E6,1427  =  134   23  131 1502 END-UE       1377  =  108
D1/1024   04,3010    1179    1 1188      EDCTP     E6,1427  =  131    4 1427 1430 ENDALL    40,2263      402    2  402  403
D1/128    04,2776    1179    3 1172 1183 EDOTQ     E6,1436     131    5  131 1465 ENDALM       4153      450    1  456
D1/16     04,3004    1179    2 1185 1192 EDOTR     E6,1437  =  131    2  131 1433 ENDBALL   26,2352      482
D1/256    04,3012    1179    3 1173 1179 EDOTSQ    E6,1736  =  134    3 1454 1455 ENDBLFF      4303  =  460    1  464
D1/32     04,3006    1179    7 1179 1229 EDRIVEX   E6,1763     138    5  138 1411 ENDBSUB1  40,3577  =  461    1  462
D1/4      04,3002    1179    4   37 1192 EDRIVEY   E6,1764  =  138    1 1410      ENDCHKG   37,2366      381
D1/64     04,3000    1179    5 1168 1194 EDRIVEZ   E6,1765  =  138    1 1410      ENDDAPT4     5270  =  191
D1/8      04,2774    1179    1 1194      EE        13,2504    1130    1 1130      ENDDOT       7210     1027    1 1072
D21       E6,1704  =  136                EGRESS    E5,1772  =  127    6  127 1214 ENDDPDEC  40,3043      427    1  435
D29.9SEC  36,3146     743    2  728      EIGHT        4750  = 1093                ENDDPUSH     6553     1014    1 1014
D6OR9BIT      4752 =   71                EIGHTEEN  33,2437     863    1  862      ENDECVN   40,3356  =  447    1  448
D6OR9FLG      0072 =   71   10  238 1236 EJSCAN    01,3121    1107    2 1104 1107 ENDEXT       5472  = 1364   44  209 1388
======================================== EJ1       01,3172    1109    7 1107 1108 ENDEXTVB     5472  =  265    5  269  275
E         E6,1751  =  134   17 1427 1502 EJ2       01,3202    1109    1 1109      ENDFIND      5160     1099    4 1101 1105
E/BKCALL  04,2562     372                EL           1345  =  108    1  319      ENDHMSS   42,3606  =  440
E/CALL    04,2601     373                ELBIAS       1356  =  108    1  802      ENDIDLE      4207      459    1 1360
E/JOBWAK  04,2615     374                ELCALC    35,2714     669    1  672      ENDIMU    07,3622     1319    3 1303 1308

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SYMBOL          DEF H      REFERENCES    SYMBOL          DEF H      REFERENCES    SYMBOL          DEF H      REFERENCES

ENDINST       4217     459   6  404 1359 ENDSCAL1   40,3112     435   2  436  437 FNTPASO    41,2035     409   3  408  458
ENDINT     13,2631    1203   1  238      ENDSPF     41,3407     444   1  447      ENTRET        0136 =    97   6  404  457
ENOIT      10,3354    1361   1 1358      ENDSPMIN   42,3451     427   1  437      ENTSET     41,3603     457   2  457
ENDJASK    17,3273    1450   1 1450      ENDSPMM    04,2632     461   1  468      EOURPERM   E7,1670 =   152   1  152
ENDJO81    01,3104    1107   1 1099      ENOSPDCT   40,3451     449               EPHEM      15,2000 =    31   1  979
ENOLLJO8   31,3431 =   809               ENDSTATE   11,3606    1235   1 1234      EPHEM1     05,2000 =    29   2   51  981
ENDLRH     34,3617     386               ENDSTEER   36,3652     756               EPSFOUR    35,3652     686   1  675
ENDLRV     33,3620     886   1  886      ENDSUMS    43,3152     293   1 1284      FPSILN1    34,2075     637   1  645
ENDMANUV   26,2200     478               ENOS40.9   27,2725     771               EPSILON       0155 =  1488   5 1480 1488
ENDMANU1   26,2201     478   2  478  479 ENDT(X)    27,3754    1274   1 1274      EPSILONL   E5,1763 =   126   3  126 1189
ENDMARK       5472    1346   2  254 1364 ENDTASK       5236    1115   4  223 1122 EPSILONT   E4,1576     116   2 1170
ENDMARKS   07,2317     254               ENDTEST1   37,2270     379   3  375  390 EPSSMALL   27,2723     771   1  771
ENOMAXDV   00,2624    1057   2 1057 1059 ENDTFF     27,3642    1271   3 1271 1273 EPS1       27,2405     761   2  761  771
ENDMODE    07,3677    1320   2 1320      ENDTNON    06,2266     166   1  166      EPS2       27,2407     762   2  761  771
ENDMONDD   41,3373     443   1  443      ENDTNON2   06,2306     167   1  166      ERAD       04,2000      45   1 1133
ENONMTST   40,2247     402   2  402      ENDTPUSH      6555    1014   2 1014 1071 ERADF8IT      4737 =    67
ENONUM     40,2257     402   1  402      ENDTSLC    00,2212    1046   1 1046      ERACFLAG      0021 =    67   5  659 1133
ENDNVBSY   04,2641     468               ENDVDAT    33,3454 =   882   3  881  884 ERADM      E7,1672 =   146   5  146 1133
ENDNVS81   41,3625     458   1  471      ENDVLCAD      6514    1013   2 1015      ERASCHK    43,3364    1280   1 1279
ENOOFJD8      5155    1099 158  230 1478 ENOVPUSH      6543    1014               ERASCDN1   43,3257    1278   1 1280
ENDDUT     10,3313    1361   2 1362      ENDVXV        7003    1020   4 1020 1037 ERASCON2   43,3260    1278   1 1280
ENOPASTE      4143     443               ENDW       E5,1642 =   122   3  124  127 ERASCDN3   43,3261    1278   1 1280
ENDPIN8F      4512 =   469               ENO20EC    40,3341     446               ERASCON4   43,3262    1278   1 1280
ENDPINS1   40,3737 =   475               END29DDD   32,2772     609   1  609      ERASCON5   43,3270    1278   1 1281
ENDPINS2   41,3750 =   473               ENEMA      05,2763     218   2  826 1375 ERASCDN6      5007 =  1278   3 1280 1281
ENDPOS     33,3646     388   1  888      ENGINDFF   36,3551     755   1  755      ERASER     10,3472    1364   1 1357
ENOPRCHG   01,2766    1103   2 1102 1109 ENGINCF1   36,3561     755   1  232      ERASID        5011 =    37   1  991
ENDP76     13,2331     713   2  711      ENGINOF2   36,3555     755   1  846      ERASLDOP   43,3414    1280   4 1280 1281
ENDRADAR   25,3551     569   2  541  550 ENGINOF3   36,3570     755   1  727      ERASZERO      0007 =   195   2  195
ENDRDLO    40,3024     423   1  427      ENGINCF4   36,3565     755   1  737      ERCNT         0117 =    96   7  471  475
ENDRELDS   40,3550 =   454   1  460      ENGDFF     14,2347     845   1  840      ERCDM      40,3721     475   1  475
ENDRET     10,3336    1361   5 1356 1363 ENGOFFDT   E7,1644 =   154   3  154  846 ERCDMP     E5,1563 =   129   8  378  382
ENDRMDCF      4616 =   529               ENGCFF1    14,2402     846   2  846      ERCON      40,3733     475   1  474
ENDRCLL    22,3226     371               ENGDFTSK   36,3546     755   3  242  757 ERCCUNT       1365 =   108   3  109 1278
ENORQDAT   41,2320     413               ENGDN8IT      4745 =    74   6  176  910 ERESTDRE      1360 =   108  11  108 1281
ENDRQWT    41,3530     452   1  456      ENGDNFLG      0123 =    74               EREXIT1    32,2543     577   1  575
ENDRRD29   24,3476     611   3  610  611 ENTER      41,2002     408   2  401  450 ERMINUS    40,3713     474
ENDRRMON   06,3140 =   189   1  189      ENTERDAT   07,2073     247               ERPLUS     40,3716     475   1  474
ENDRSTRT   05,2637     215   2  219      ENTERJMP   40,2157     401   1  401      ERRCR      40,3646     474   1  400
ENDRTCUT   41,2622 =   419   1  428      ENTERQR    17,2445    1439               ERRDRS     43,3304    1278   1 1278
ENDRUTIN   41,3255 =   434   1  441      ENTERUV    17,2500    1440   3 1439      ERRTEST    17,3361    1454
ENDR03     01,2247     297   1  297      ENTEXIT       0136 =   408  10  409  451 ERTHR      37,2431     382   1  382
ENDR29RD   24,3501     611   1  610      ENTMID1    13,3572    1216   1 1216      ERTHRVSE   37,2401     382   2  385  390
ENDSAM     14,2562     931   1  930      ENTMID2    13,3566    1216   1 1216      ERVECTOP   E5,1404 =   128   5  128  382
ENOSCALE   40,3077     435   3  435  436 ENTPASHI   41,2012     408               ESCAPE        0136 =    97   4 1078 1079

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BD BADLY DEFINED     CO DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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ESCAPE2      D137 =    97   2 1078 1079 FAPS      36,2DD6      38   2  753  77D FFTAG8       4000 =    28   1  443
ESTICACR  37,2116     376   2  376      FASTCHNG  31,3677     B21   9  79D  BD5 FFTAG9       4000 =    28   1 1396
ESTIMS    37,2500     385   2  376  379 FAZA      23,2773    1147   1 1149      FHNM      25,3602     573   1  572
ETPIBIT      4745 =    69               FAZAB     23,315D    1150   1 1151      FIFPSDP   34,2101     637   1  645
ETPIFLAG     0046 =    69   5  663  672 FAZA81    23,3176    1150   1 115D      FIFTYFPS  34,2663     645   1  644
EXBRAK    31,3316     BD7   1  794      FAZA82    23,32D2    115D   1 115D      FIGTIME   35,2756     670
EXDSPRET  1D,2621    1352   5  209  283 FAZA83    23,3211    115D   1 1150      FILDELV   E5,1460 =   129   1  129
EXECBANK     5163    1099   8 1097 1099 FAZAB4    23,3221    1150   1 1151      FILLED    01,3372    1120   1 1119
EXECTEM1     0061 =    95   6 1097 1105 FAZAB5    23,3230    1151   2 1151 1215 FILLER    E7,1622 =   151   1  151
EXECTEM2     0062 =    95   4 1100 11C5 FAZA1     23,2777    1148               FINALBIT     4746 =    69
EXGSU8    31,3275     BD7   1  794      FAZB      23,3072    1149   1 1148      FINALDV   00,2625    1058   3 1051 1057
EXIT         6746    1019   1  997      FAZB1     23,3075    1149               FINALFLG     0047 =    69   7  620  695
EXITEM       0114 =    96   7  431  432 FAZ82     23,3123    1149   1 1149      FINDCOUW  30,3102     904   5  766  904
EXITSPOT  31,3273     BD6   2  806      FAZB5     23,3130    1149   1 1149      FINDGIM8  27,2160     487   2  485  486
EXITVR    3D,2771     844   1  844      FAZC      23,3136    1149   2 1149      FINDKEY   07,2364     255   1  255
EXITVR1   3D,3002     844   1  845      F8ANK        00D4 =    92  31  459 1369 FINDTIME  D1,36D2    1296   2 1296
EXNORM    31,3324     BD7   1  794      FBANKMSK     4350 =  1004   2 1105      FINDVAC      5105    1097  45  213 1384
EXDVFLOW  31,3407     808               FBIASSUB  D6,3652     338   3  336  337 FINCVAC2  D1,2602    1100   2 1097 1099
EXTLOGIC  31,3212     BD5   2  793      FBR3      11,2504    1222   1 1236      FINE      01,2341     298   1  296
EXTVBACT     1043     1C2  19  224 1372 FC        E7,1615 =   151   4  151  788 FINEK2    43,2410     275
EXTV8CHK  07,2006     245   1  245      FCADRMM1  04,2406     235   1  234      FINEDNLY  14,3362     942   1  942
EXTVB1    23,200D =    32   1  272      FCDUW     3D,2000 =    34   1  904      FINETIME     4102     383   3  381 1328
EXTVER8S  43,2000 -=   36   7  263 128D FCDDD     E7,1465 =   142   6  142  790 FINIMUDD  37,2320     380   1  376
EXVERT    31,3404     808               FCOLO     E7,162D =   151   5  151  796 FIPEDB    E6,1600 =   135  10 1454 1495
ED        E7,1676 =   147               FCCMPSET  31,2226     789   1  789      FIREFCT   E6,1740 =   134   7 1431 1461
ED1       E4,1630 =   117   1  117      FDAIX     E4,1744     119   2  307  482 FIREP     16,3041    1423
ED2       E4,1636 =   117               FCAIY     E4,1745     119               FIREQR    17,2257    1436
E1        E7,1700 =   147               FCAIZ     E4,1746     119               FIRSTIME  12,2606    1176   1 1176
E1345678  43,3375    1280   1 1281      FDOT      26,2006      52   1 1137      FIRSTTME  27,3171     774
E2        E7,1702 =   147   1  147      FCPS      36,200D      38   1  749      FIVE         4756    1089  25  225 1422
E2DPS     E7,1621 =   151   3  780  821 FEED8ACK  17,3100    1447   1 1446      FIXCLPAS  40,2402     404
E3        E7,1704 =   147               FETCHZN8  3D,3212     907   1  907      FIXOELAY     5221    1113  16  503 1305
E3J22R2M     1347     1D9   1 1230      FETCH2WD  05,3665     988   2  986      FIXLOC       0120      96  63  247 1498
E32C31RM     1350     1D8   1 1229      FEXTRA       4737 =   792   1  789      FIXMIN    20,3747    1497   1 1493
E7OVERLA  E7,1471 =   142   3  142  149 FFTAG1       4000 =    28   3 1286 1367 FIXRANGE  40,2706     421   1  420
======================================= FFTAG10      4000 =    28   1  157      FIXROOT   00,3453    1074   3 1073
F         E7,1734     145   7  145  769 FFTAG11      4000 =    28               FIXY      27,2441     764   1  764
F(MASS)   20,2544    1479   3 1479      FFTAG12      4000 =    28               FLAGGON   22,3310     716   1  716
FACEREG      0154 =  1365   8 1355 1356 FFTAG13      4000 =    28               FLAGOFF   35,3505     681   1  680
FAIL-     20,3551    1493   1 1493      FFTAG2       4000 =    28   2 1296 1298 FLAGON    35,3441     680   2  680
FAILOOP   17,3237    1450   2 1450      FFTAG3       4000 =    28   1 1301      FLAGOODW  E6,1650 =   137   6  137  914
FAILREG      0375     100  12  213 1373 FFTAG4       4000 =    28   2 1346 1371 FLAGORGY  32,3021     780
FAKEPRET     5164    1099   2 1097 1107 FFTAG5       6000 =    28   3   40  598 FLAGS     13,3746    1376   1 1375
FALTOF       4370     465               FFTAG6       6000 =    28   5  520 1451 FLAGWROO     0074 =    65  32  167 1407
FALTON       4364     465  10  234 1388 FFTAG7       4000 =    28   2 1373 1374 FLAGWRD1     0075 =    67  33  219 1307

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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FLAGWR02     0076  =   68   32  167 1377 FORCEV25 42,3603      439   2  439      G(CSM)   E4,1716  =  121   4  121  875
FLAGWR03     0077  =   70   22  208 1376 FORMULA1 17,3536     1457   1 1456      G+N,AUTO 26,2261      479   3  478  742
FLAGWR04     0100  =   72   34  224 1366 FORMULA2 17,3546     1457   1 1456      GACC     E5,1706  =  124   4  960  961
FLAGWR05     0101  =   73   34  159 1445 FORMULA3 17,3651     1459   1 1459      GAINAPPR E5,1466  =  122   1  122
FLAGWR06     0102  =   75   15  188  974 FORTYONE 13,3446     1213   1 1206      GAINBRAK E5,1432  =  122   2  122  806
FLAGWR07     0103  =   77   33  198 1383 FORVEL   E7,1701  =  152   3  152  897 GAINFLTR 30,3753      920   1  914
FLAGWR08     0104  =   78   16  259  966 FORVMETR E7,1677  =  152   2  152  893 GAMCOMP  11,2655     1224   3 1223 1224
FLAGWR09     0105  =   80    6  733  843 FOUR        4751  = 1093  47  213 1464 GAMMA    E7,1477  =  147   5  147 1147
FLAP         0216  =   81    3  828  834 FOURSECS 27,2536      767   1  766      GAMPREV  E7,1607      143   7  144  645
FLAPBIT      4744  =   81                FOURTEEN    4317  = 1067   2  568 1064 GAMRP       0010  = 1132   3 1128 1132
FLASHH?   21,2022     823                FP       E7,1467  =  142   5  788  790 GCOMP    E3,1471      111  24  111  947
FLASHOFF     4433     466    6  276 1358 FRANDRES 05,2000  =   29   2   43  213 GCOMPSUB 06,3433      333   6  331  332
FLASHON      4427     466    4  409 1360 FRCS2    36,2020       38   2  751  768 GCOMPSW  E3,1477      111  10  328  385
FLASHSUB  10,3261    1360    3 1358 1359 FRCS4    36,2016       38   1  750      GCOMPZER 06,3707      338   1  960
FLASHV?   21,2030     823    1  823      FREEFBIT    4751  =   66   1  960      GCOMP1   06,3546      335   1  335
FLAT      E6,1554  =  135    6 1455 1495 FREEFLAG    0014  =   66  12  937  980 GCTR     E5,1736  =  124  10  124  961
FLATEMP      0151  = 1497    6 1489 1495 FREERET     0144  =   97               GOESELCT 07,3617     1318   1 1313
FLATOUT   31,2327     791    1  735      FRSTPAS  34,2644      644   1  644      GOT/2       1235      105  19  105  967
FLATOUT1  31,2236     789    1  789      FRSTZERO 20,2752     1482   1 1482      GOT1/2   E7,1562  =  149   5  149  876
FLATOUT2  31,2240     789    1  789      FSPASBIT    4742  =   66               GDUMP1   31,3421      809
FLATVAL   20,3767    1498    1 1489      FSPASFLG    0005  =   66   3  514      GEADDR      6141      999   1  999
FLESHLOC  10,2000  =   29    1 1257      FSUBO    26,2014       53   1 1137      GEFF     E4,1714  =  120   4  121  842
FLESHPOT  10,2037    1257    2  856 1257 FTHROT   31,2000  =   34   2   40  788 GENODV   00,2570     1056   2 1055 1059
FLGWR010     0106  =   82   24   82 1479 FT99999  30,2057      616   2  615      GENMARK  10,3022     1356
FLGWR011     0107  =   83   36  221  888 FUELNEED E7,1666  =  152               GENMASK     0162  = 1365   4 1348 1361
FLGWR012     0110  =   85    2   85  877 FULLAPS  05,2000       43   1  214      GENPL    E5,1434  =  128  27  128  129
FLGWR013     0111  =   87    1   87      FULLDSP  41,3672      471   1  471      GENRET      1142      104   4  517  524
FLIP         4606     529    2  823      FULLDSP1 41,3673      471   1  471      GENSCL   00,2346     1050   2 1050
FLOGSUB   30,2000  =   34    1  851      FULLTIME 17,3520     1456   6 1457 1461 GENSCR   00,2277     1049   4 1048 1070
FLPASS0   E7,1623  =  151    6  151  805 FUNCTION E6,1750  =  133  16 1466 1474 GENSHFT2 00,2224     1047   1 1047
FLPAUTNO  E6,1651  =  137    4  137  910 FUNCT2   21,3246     1467   2 1466      GENSHIFT 00,2214     1047   1 1038
FLPC         0212  =   80    2  840      FUNCT3   21,3251     1467               GENTRAN     5544     1371   4  299 1494
FLPCBIT      4740  =   80                FUNNYDSP E7,1666  =  152   5  152  317 GEOCOMPS E5,1562  =  129   3  386  387
FLPI         0213  =   80    3  831  843 FUNTEM      0157  = 1498   2 1489 1490 GEOIMUTT 37,2004      375
FLPIBIT      4741  =   80                FV       E4,1461  =  115  15  115 1238 GEOM     04,3074     1182   2 1180 1187
FLRCS        0214  =   80    4  826  846 FVACCADR 01,3774     1300   1 1297      GEOMSGN  E5,1672  =  126  11  126 1188
FLRCSBIT     4742  =   81    2  843      FWCOMP   31,2274      791   2  790      GEORGEJ  37,3107      391   2  389  390
FLTRSUB   30,3474     914    2  906      FWEIGHT  E7,1610  =  151   7  151  813 GEORGEK  37,3111      391
FLUNDBIT     4742  =   79    3  733  843 FXADRS   43,3604     1283   2 1284      GEOSTRT4 37,3025      390
FLUNDISP     0175  =   79    4  736  826 FXFX     43,3570     1283   1 1284      GET.LVC  06,3741      694   2  761
FLVR         0210  =   80    4  827  844 F2DPS*11 11,2000  =   29   1  814      GET+MGA  06,3725      694   1  682
FLVRBIT      4736  =   80                F2DPS*31 31,2000  =   34   2   39  817 GETABVAL 33,2217      855   1  855
FMAXODD   31,2002      40    1  789      F2DPS*32 32,2000  =   34   3   40  780 GETAOSUV 20,3246     1489
FMAXPOS   31,2003      40    1  789      F2DPS*34 34,2000  =   34   1  786      GETAZEL  14,3735      951   3  950  951
FORCEONE  20,2034     295    1  295      ===================================== GETCADR  01,3517     1126   1 1126

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GETCOMP  41,2517     418   5  416  418 GNURVST  33,3474     882   2  879  882 GOMARS   10,2331    1347
GETOAT   07,2063     247   4  245  253 GNUTFAZ5 37,3523     854   2  852  854 GOMIOAV  36,2202     728   1  728
GETDT    36,3741     758   2  754  757 GNUV     E7,1656  =  152   1  882      GOMOD    04,2224     232   1  233
GETECC   12,3720    1194   1 1194      GDABORT  32,3533     826   1  242      GOMCVE   23,2111     489   1  489
GETERAD  13,2464    1130   1 1133      GCAGIN   10,3051  = 1364               GONXT8NK 43,3707    1284   3 1284
GETGOBL  27,3177     775   1  774      GCALMCYC 41,2352     414   1  434      GDOCARG  21,3457    1473   2 1473
GETINREL 40,2324     403   4  401  406 GCANIOLE 10,3142    1358   1 1358      GODOENO  07,3656    1320   4  246 1320
GETLMATT 15,3524     974   1  970      GOBAC    13,3457    1213   2 1213      GOOOEPS1 20,2611    1480   1 1480
GETMAXDT 13,3344    1212   1 1211      GOBACK   35,3733     743   2  742      GOODEPS2 20,2635    1481   1 1481
GETMKS   07,2202     253   3  249  262 GDBAQUE  11,300D    1226   3 1228 1235 GOOOMANU 22,3234     371   1  365
GETNEWNM    5427    1292   1 1291      GOBB        4054     156   1  155      GOODNEG  20,3024    1485   1 1484
GETNOW   D4,2752     704   1  703      GOBLTIME E7,1511  =  149   3  149  775 GOODRAD  25,3254     560   1  562
GETPART2 01,3542    1295   1 1300      GCCH56   17,2115    1396   2 1396      GOPERFRS 10,2706    1354
GETPRIO     5423    1291   2 1291 1294 GCCLDSE  21,3624    1476               GOPERFS  10,2626    1352
GETRANS  36,3662     756   1  756      GOCUTOFF 36,3D66     741   2  725  727 GDPERF1  10,2624    1352  10  501 1327
GETROOT  21,3302    1467               GGDSP    10,2444    1349   1  843      GOPERF1R 10,2704    1354
GETRPSV  11,2627    1224   1 1224      GOOSPALM 41,2353     414  20  408  457 GOPERF2  10,2631    1352
GETRVN   37,3326     708   2  706  709 GCDSPR   10,2452    1349   2  478  939 GOPERF2R 10,2711    1354   2  478  515
GETRVN2  37,3363     709   1  708      GCOSPRET 10,2447    1349   4  751  945 GOPERF4  10,2634    1353   2  497  657
GETULC   26,3333     591   3  582  592 GOOSPRS  10,264D    1353   8 1347 1354 GOPERF4R 10,2714    1354   2  923  969
GETVRVG1 27,3113     774   1  774      GCDSPRS1 10,2642    1353   1 1349      GOPIN    43,2117     265  20  266  30D
GETVRVG2 27,3115     774   1  774      GODSPR1  10,2453    1349               GOPINNER 25,3547     568   2  568
GETX     12,2767    1183   3 1180 1193 GODSPR2  10,2454    1349   2 1347 1350 GOPLAY   10,3071  = 1364   1 1352
GET22/32 21,2551     896               GCDSP2   10,2445    1349               GOPOODOO    5655    1375   1  243
GET45    35,3543     682   3  682      GOESTIMS 37,2113     376   1  376      GOPOOFIX 04,2024     226   2  226  243
GFACTM   20,3105    1486   1 1481      GOEXTV8  43,200D     263   1  410      GOPOST   36,3053     741   2  725  726
GIMBL8TS 20,3077    1486   2 1482      GCFLASH  10,2477    1350  43  227  971 GOPROG   05,2665     217   2  155  156
GIMLOCK1 23,3433    1246   1 1245      GOFLASHR 10,2636    1353   2  749  754 GOPROG2  05,2766     218   2  232  29D
GL+NDATT 40,3735     475   1  474      GCFLASH2 10,2501    1350  15 1347 1353 GOPROG2A D5,2767     218   1  218
GLAMPTST C6,2507     172   1  172      GCGOMARK 10,2406    1348               GOPROG3  05,2773     218   2  218
GLINVERT C6,2500     172   1  172      GOGOPROG 04,2230     232   1  233      GDQ      41,3050     431   1  432
GLOCKCHK D6,2441     171   2  171      GCINT    35,3372     679   2  672      GOQTRIMG 21,3114    1464   2 1464 1476
GLOCKMCN 06,2434     171   1  169      GOITER   12,3415    1189   1 1189      GOREADAX 37,3434     852   1  854
GLDCKCK     5270  =  183   4  172      GOLOADLV 43,2422     276   6  263  264 GOSERV   33,2274     856
GLOKFAIL    0056  =   70   3  231 1246 GCLCC       0705  = 1300  30 1295 1300 GOSHOSUM 43,3121  =  292   1  264
GLOKF8IT    4736  =   70               GOMANUR  07,3741    1323   1  478      GOSLEEPS 10,2755    1355   3 1352 1363
GM8DR8IT    4742  =   76   1  776      GOMARK   10,2330    1346   1 1364      GOTANGLS 32,2630     606   1  606
GM8ORVSW    0137  =   76   2  776  777 GCMARKF  10,2334    1347  12  209 1364 GOTO        6651    1017  13 1018 1085
GMBLBITA 21,3632    1476   1 1475      GOMARKFR 10,2353    1347   6  272 1364 GCTOERS     6665    1017   1 1017
GM8L8ITB 21,3634    1476               GCMARKR  10,2350    1347   1 1364      GOTOGF      670C    1018   1 1017
GMERGE   07,3471    1315   1 1318      GDMARK2  10,2337    1347               GOTOGTS  17,2636    1442   1 1434
GMODE    E4,1501  =  115   1  115      GCMARK2R 10,2356    1347               GOTOPOOH    6001     226  64  219 1329
GN/CCODE    5001    1090               GCMARK3  10,2342    1347   1  210      GOTOV56     6025     598  13  479  519
GNUFAZE5 37,3527     854   2  852  853 GCMARK3R 10,2362    1347   2  273  298 GDUT     E5,1714  =  124   3  959  961
GNUR     E7,1656  =  152   4  878  883 GCMARK4  10,2345    1347   2  253  279 GOVNUPOT 40,3353     447   1  414

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GOXDSP    10,2330  = 1364                 GYROFRAC  07,3620    1318   2 1315 1318 HIPRIO    10,2523    1350   1 1350
GOXDSPF   10,2334  = 1364  13  269 1382   GYROTRIM  15,2764     962   1  968      HIRTHROT     4737  =   40   1  755
GOXDSPFR  10,2353  = 1364   3  295  297   GYTOBETQ  E5,1462  =  128               HISCALAR     0003  =   93   2  383 1020
GOXDSPR   10,2350  = 1364                 G21       E6,1706  =  136               HISECON   42,3375     426   1  425
GPMATRIX  06,3140     190   1  190        ======================================= HITEMIN      0123  =   96   3  438
GRABGRAV  15,2721     961   1  961        H         E4,1477  =  115   8  115 1236 HITEMOUT     1006  =  101   4  424  427
GRAVEL    15,2601     959   1  959        H*GHCR*T     0131  =  123   2  789      HITEST    33,2516     869
GREED     15,2714     961   1  961        HAFPA1    E7,1603  =  143   3  639  641 HIUNITX   23,2521  =   37   1  492
GRP2OFF   21,2141     867   2  867        HALF         4736  = 1093  31  336 1502 HIUNITY   23,2517  =   37   2  492
GRP2PC    04,3210    1219  24  497 1235   HALFARG   E6,1746  =  133   4 1474 1476 HIUNITZ   23,2515  =   37   4  492  522
GRP2SVQ   E5,1711  =  127   3  127 1219   HALFDP    12,2004  = 1095   3  933 1225 HI10      04,3353    1332   1 1331
GRP4OFF   32,3664     828                 HALFREV   06,3723     694   2  694      HI5          4350     465  10  159 1284
GSAV      E4,1630     117  10  117  976   HALFSEC   24,3121     515   1  513      HI6ZEROS  23,2523  =   37  17  301 1275
GSCALE    22,3651     822   2  804  813   HANDADR   17,2622    1441   1 1440      HLIGHT    25,3620     617
GSELECT   07,3424    1314   3 1313        HANG20    06,2071     159   1  158      HLITE        4747  =  618   2  617  823
GSHIFT       7624    1038   1 1005        HAPO      E4,1716  =  118   4  118  622 HMEAS     E7,1654  =  151   8  151  886
GTMP         0026  =  981   5  979  981   HAPOX     E4,1517  =  115   4  115  722 HMSIN     42,3452     438   1  434
GTS       21,3076    1464   1 1442        HAVEGLES  11,2002     688   1  771      HMSOUT    42,3230     423   1  419
GTSCADR   17,2653    1442   1 1442        HAVENCRM  04,3126    1182   1 1182      HOLD         0165  = 1498   2 1496
GTSFIN    42,2147     307   1  433        HAVEQUCT  21,3202    1466   1 1466      HOLDQ     E6,1744  =  134   2 1453 1457
GTSFINLC  41,3202     433   1  434        HBAD      34,3620     887   1  886      HOLDW     E5,1734  =  127   7  127 1149
GTSFOLT   42,2141     306   1  419        HBEAMANT  33,2002      41   1  890      HPER      E4,1720  =  118   2  316  622
GTSFOUTL  41,2566     419   1  419        HBEAMNB   E4,1672  =  120   2  877  890 HPERMIN   E4,1600  =  116   6  116  723
GTSGO+DN  21,3112    1464                 HCALC     E7,1534  =  149   8  149  878 HPERX     E4,1521  =  115   2  316  723
GTSQAXIS  21,3132    1465   1 1465        HCALCI    E7,1774  =  153   5  317  871 HRCON     42,3536     439   2  438
GTSQRT    21,3440    1473   1 1474        HDOTDISP  E7,1473  =  149  11  120  876 HRCON1    42,3277     424   1  424
GTSTEMPS  E6,1736  =  133  13  133        HEACTJET  16,3511    1430   1 1430      HSCAL     33,2010      41   1  877
GUESS     37,2020     375                 HFAIL     33,3520     883   2  878      HSTILBAD  34,3630     887   2  886  887
GUESSBIT     4752  =   68                 HFLSHBIT     4753  =   85   3  617  823 HUGEQUOT  21,3177    1466   1 1465
GUESSW       0034  =   68   3  688 1188   HFLSHFLG     0263  =   85   2  878  883 =======================================
GUESS1    37,2255     379                 HH        E6,1746  =  134  15 1456 1459 IBNKCALL     4674     994  64  167 1489
GUIDDURN  32,3261     784   1  781        HIASCENT  E6,1400     120   4  214 1479 IC        E7,1655  =  145   6  771  774
GUIDINIT  34,3343     834   2  781  831   HIDESCNT  20,2002      43   1 1479      ICDUFAIL  06,2703  =  182   1  183
GUIDSUB   31,2421     794   1  807        HIDPHALF  23,2521  =   37   6  487 1243 ICORK2    43,2223     269
GUILDEN   31,2434     795                 HIDP1/4   23,2513  =   37   1 1275      IDADDTAB  42,2650     316   2  306
GUILDRET  31,2527     796   3  794  795   HIENERGY  12,3432    1190   1 1189      IDAD0TEM     0142  =   97
GVDETER   15,2561     958   2  960  974   HIGATASK  33,2447     868   1  870      IDAD1TEM     0150      97   4  306  433
GWAKE     07,3365    1312   1 1312        HIGATCHK  33,2522     869               IDAD2TEM     0151      97   2  306
GWAKE2    07,3325    1311   1 1312        HIGATJOB  33,3634     888   1  868      IDAD3TEM     0152      98
GYCOARS   14,3156     939   1  926        HIGHCRIT  E5,1507  =  122   1  122      IDLEADR   05,3357     225   1  221
GYRCOR    15,3027     963   1  962        HIGHESTF  22,3647     822   1  804      IDLEFBIT     4745  =   78   4  755  860
GYROAGRE  07,3337    1311   1 1311        HIGH4        7745    1092   3 1000 1017 IDLEFLAG     0161  =   78   7  734  846
GYROBUSY  07,3360    1312   1 1311        HIGH9        7747    1092   8  247 1000 IDLEMASK  10,3011    1356   1 1360
GYROCMD      0047  =   92   6  177 1317   HIMINCON  42,3376     426   1  425      IDLERADR  16,2155    1405   1 1405
GYROEXIT  07,3530    1316   1 1316        HINJECT   32,3735     830   1  834      IDLERET1  10,3302    1360

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IDLESLEP 10,3535     1365   1 1355          IMUFIN20 07,3201  = 1323                    INDJUMP     6277     1005   6  999 1002
IERASTST    6130      999   1  999          IMUGOOD  07,3627    1319                    INDWORK     6207     1000   1 1000
IFAILINH 05,3361      225   1  218          IMUMON   06,2172     163   2  161           INDXYZ   16,3576  = 1432   1 1421
IFAILJMP 06,2755      183   1  164          IMUOP    06,2622     178   1  183           INERCONA 20,3045     1485   1 1480
IFAILOK  07,3225     1309   1 1308          IMUOP2   06,2643     178   1  178           INERCONB 20,3063     1486   1 1480
IFLAGC   13,3073     1207   1 1208          IMUPULSE 07,3314    1311   7  275 1392      INERCONC 20,3064     1486   1 1480
IFLAGP   13,3050     1207   1 1207          IMUSE       0007  =   66   7  233 1327      INFINAPO 12,3747     1194   2 1194
IFLEGAL  10,2562     1351   1 1351          IMUSEBIT    4744  =   66   3  167  210      INFINBIT    4745  =    79
IG       E6,1724  =   136                   IMUSEFLG    4744  = 1323   1  178           INFINFLG    0200  =    79   4 1180 1189
IGC      E5,1741  =   124   3  124 1246     IMUSLLLG 37,2315     380   3  376  390      INFINITY 12,3205     1186   5 1183 1186
IGNALG   32,3033      780                   IMUSTALL 07,3707    1322  12  210  963      INFLIGHT 23,2000  =    32   2  326 1241
IGNALGRT 32,3204      783                   IMUSUPER 37,2000  =   36   1  292           INGTS    E6,1632  =   135   9 1404 1496
IGNALOOP 32,3072      781   1  783          IMUVAR   26,3435     592   2  587  588      ININDEX  E6,1743  =   133   5 1473 1474
IGNAOSQ  E6,1412      130   1  734          IMUZERO  07,2705    1302   3  210  380      INITABIT    4752  =    80   2  965  966
IGNAOSR  E6,1413      130   1  734          IMUZEROA 07,2715    1302   1 1302           INITALGN    0205  =    80   4  965  974
IGNFLAG     0153  =    77   3  731  754     IMUZEROK 43,2131     266   1  266           INITBY   15,3111      965   1  965
IGNFLBIT    4737  =    77   2  732  741     IMUZERO2 07,2750    1303   1 1302           INITCDUW 30,3071      904   2  728  826
IGNITE   36,3106      741   1  740          IMUZERO3 07,2757    1303                    INITDSP  10,3040     1356   1 1295
IGNITE1  36,3122      742   1  741          IMUZERR  37,2325     380   1  375           INITREAD 25,3123      558   6  557
IGNITION 36,2432      732   2  242  741     IMU2     37,2000  =   36   2   44  375      INITST   34,2061      637   2  638  644
IGNYET?  36,2425      732   1  732          IMU4     37,2000  =   36   1  385           INITV    12,3516     1191   3 1189 1190
IGRET    E7,1675  =   147   2  589  590     IM30INIF 05,3373     225   1  214           INITVEL  11,2000      688   2  676  761
IGSAMEX  27,2125      486   1  486          IM30INIR 05,3374     225   1  218           INITVELX 11,2260      692   1  692
IMEDIATE 01,3621     1297   4 1296 1299     IM33INIT    5026  =  225   2  215  224      INITVEL1 11,2026      688   1  688
IMMEDRET 10,3370     1362                   INBOUND  27,3551    1270   1 1269           INITVEL2 11,2062      689   1  691
IMODES30    1277      106  67  163 1324     INCAZ    15,2310     952   1  954           INITVEL3 11,2105      689   2  689
IMODES33    1300      106  48  160 1402     INCORPEX E7,1674  =  146   5  146 1130      INITVEL4 11,2137      690   1  690
IMPLBURN 36,3526      754   1  734          INCORP1  23,2533    1143   1  592           INITVEL5 11,2166      691   1  691
IMPULBIT    4743  =    69   2  734  757     INCORP2  23,2745    1147   1  592           INITVEL6 11,2230      691   1  691
IMPULSW     0044  =    69   5  754  769     INCOR1   23,2567    1144   1 1144           INITVEL7 11,2233      691   1  690
IMUATTCK 43,2733      283   1  263          INCOR1A  23,2576    1144   1 1144           INITWMX6 26,3231      589   1  589
IMUBACK  37,2005      375                   INCOR1B  23,2625    1144   1 1144           INJTARG  32,3606      827   1  828
IMUBAD   07,3630     1319   5  167 1319     INCOR1C  23,2633    1144   2 1144           INLINK      0045  =    92   2  224 1331
IMUCADR     1301  =   106   4  210 1319     INCOR2   23,2674    1145   2 1145 1152      INLUNCHK 11,3335     1231   1 1232
IMUCAGE  06,2565      176   1  183          INCOR2AB 23,2724    1146   1 1146           INREL       0137  =    97  23  402  407
IMUCHK   15,3635      977   2  945  969     INCOR3   23,2730    1146   1 1146           INRELTAB 40,2330      403   2  403  406
IMUCOARK 43,2214      269   1  268          INCR     01,2407    1082   1 1006           INT-ABRT 11,3023     1226   1 1226
IMUCOARS 07,2771     1304   4  269  947     INCRDCDU 22,3035     367   2  368  369      INT/W    13,3532     1215   2 1214
IMUCOARV 43,2235      269   2  269  270     INDEP    E5,1765  =  126   4 1176 1177      INTBANK  13,3041     1206   1 1206
IMUCOMP  06,2000  =    29   1  328          INDERASE    6211    1000   1 1000           INTBITAB 13,3462     1213   2 1212 1213
IMUFAIL  06,2703  =   182   1  183          INDEX       6151    1000   1  998           INTBIT15    0115       96   7   96 1000
IMUFINE  07,3201     1308   4  275 1323     INDEXES  17,3134    1447   3 1446           INTB15+     0114       96   7   96 1498
IMUFINED 07,3223     1308   2 1308 1313     INDEXI   23,3765    1256   1 1255           INTEGRV  13,3133     1209  13  238 1217
IMUFINEK 43,2371      275   1  263          INDEXLOC    0130  =   97  12 1000 1083      INTEGRVS 13,3106     1208   7  658  783
IMUFINEV 43,2421      275   1  275          INDEX2      6167    1000   1 1000           INTEGRV1 13,3135     1209   2 1207

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BC BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT               XX MISCELLANEOUS TROUBLE
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SYMBOL       DEF   H      REFERENCES      SYMBOL       DEF   H      REFERENCES      SYMBOL       DEF   H      REFERENCES

INTEGRV2  13,3140    1209    1 1236      IRIGX     06,3364     331    2  330  336 ITSLGCL2  01,3710    1299    1 1299
INTEXIT   13,3224    1210    3 1211 1212 IRIGY     06,3401     331    2  330  336 ITSLIKEB  01,3623    1297    1 1295
INTFLAG      0227 =    82                IRIGZ     06,3416     331    2  330  337 ITSLNGCL  01,3735    1299    1 1295
INTFLBIT     4736 =    82    2  217 1213 IRIG1     06,3361     330    3  328  339 ITSNOVAC  01,3646    1297    1 1297
INTGRATE  11,3372    1231    2 1231 1232 ISCADR+0     4220     459    2  459  468 ITSWBIT      4735 =    77
INTGRCAL  26,3242     589    7  581  585 ISITALTO  26,2266     480    1  367      ITSWICH      0151 =    77    5  632  669
INTIME    E7,1607 =   144    5  665  691 ISITNCO   10,3156    1358    1 1358      ITSWTLST  01,3742    1299    1 1298
INTINIT   13,2000 =    30    4   46 1214 ISITPRIC  10,3241    1359    2 1360      ITURNON   06,2533     174    1  183
INTINT    35,3376     679    6  627  677 ISLIST+0     4224     459    2  459  468 ITURNON2  06,2556     175    2  174  178
INTINT2C  34,3062     649    2  641  642 ISSERVCN  04,2107     230    1  229      ========================================
INTINT3P  34,3071     649    2  632      ISSUP     05,2321     167                JACCUV    20,2647    1481    1 1480
INTLOOP   35,2514     664    1  664      ISSWOFF   06,2716     181                JAMPROC      4243     459
INTLZE    21,2356     893    1  893      ISSWON    06,2726     182    1  181      JAMTERM      4231     459    1 1359
INTMCTBS  41,2116     410    2  409      ISSZERO   06,2361     168    1  176      JAPFG*    E5,1464 =   122    1  122
INTOTHIS  13,2301     712                ISWCALL      4700     994                JBRFG*    E5,1430 =   122    2  122  821
INTPRET      6042     996  237  209 1384 ISWRETRN     4707     994    2  565  755 JOG2TTF   E5,1430 =   821    1  802
INTPRETX  31,3636     820    3  802  806 ITCTR     E7,1616 =   144    4  688  691 JETRATE   E6,1744 =   133    5  133 1417
INTPRET1  23,2000 =    32    1 1094      ITEMP1       0061      95   71   95 1408 JETRATEQ  E6,1745 =   133    3 1415 1463
INTPRET2  12,2000 =    30    1 1095      ITEMP2       0062      95   32   95 1472 JETRATER  E6,1746 =   133    3 1415 1463
INTRSM       6053     996    1 1104      ITEMP3       0063      95   29   95 1470 JETSALL   16,3560    1432    1 1432
INTSTALL  13,3410    1212   38  231 1384 ITEMP4       0064      95   16   95 1318 JETSOFF   16,3446    1429    7 1423 1432
INTVAL    37,3065     391    2  385  387 ITEMP5       0065      95   50   95 1292 JETSON    17,3435    1455
INTVEC    E5,1462 =   129                ITEMP6       0066      95    9  182 1470 JOBSLEEP     5133    1099    8  376 1369
INTVEL    11,2000 =    29    1  688      ITERATOR  12,2536    1176    1 1189      JOBSLP1   01,2777    1104    1 1099
INTWAKE   13,3421    1213    4  300 1210 ITERCTR      0026 =  1197    4  690 1177 JOBSLP2   01,3010    1104    1 1106
INTWAKEC  04,3162    1219    1 1219      ITISMASK  10,3267    1360    1 1359      JOBWAKE      5137    1099   13  374 1370
INTWAKEM  04,3157    1219    1 1218      ITRPNT1   32,3364     812                JOBWAKE2  01,3024    1105    1 1099
INTWAKEU  04,3131    1218    1 1386      ITRPNT2   32,3520     814                JOBWAKE3  01,3036    1105    2 1105
INTWAKEX  04,3174    1219    1 1219      ITR0         6373    1008                JOBWAKE4  01,3030    1105    1 1105
INTWAKE0  13,3417    1212    3  499 1219 ITR1         6362    1008                JOBXCHS   10,2775    1355    2 1351
INTWAKE1  13,3441    1213    3 1213      ITR10        6145     999                JOIN      10,3553    1366    1 1366
INTWAKLM  04,3172    1219    1 1219      ITR11        6205    1000                JPARM     E5,1620 =   123    3  123  848
INTWAKUP  04,3176    1219    1 1218      ITR12        6137     999                JSWCHBIT     4736 =    65
INTWAKLQ     1166 =  1218    3 1218 1219 ITR13        6216    1001    1 1000      JSWITCH      0001 =    65    5 1231 1236
INTWAK1Q     1166 =   104    1 1218      ITR14        6242    1002                JTLST     17,3143    1448    2 1429 1447
INTY      E5,1470 =   129    6  387  388 ITR15        6126     999                JUMPOSP   16,2206    1405    1 1402
INTYPBIT     4750 =    71                ITR7         6264    1003                JUSTOA    15,2042     251    1  252
INTYPFLG     0070 =    71   19  497 1217 ITSAJOB   01,3636    1297    1 1296      JUSTOUT   16,3155    1425    1 1426
INTZ      E5,1474 =   129                ITSAJOB2  01,3747    1300    1 1298      JLSTTRIM  15,2017     962    1  966
INVERT    20,3704    1496    4 1490 1496 ITSATBL   01,3652    1297    1 1295      JUSTZY    15,2011     251    1  252
INVFLAG   36,2651     737    1  737      ITSAVAR   01,3552    1295    1 1295      J1PARM    E5,1550 =   123    2  123  827
INVRSEQN  12,3127    1185    1 1185      ITSAWAIT  01,3571    1296    1 1296      J2PARM    E5,1554 =   123    2  123  827
IRETURN   E4,1502 =   115    8  115 1210 ITSEVEN   01,3753    1300    1 1297      J2REQSQ   13,2022      46    1 1228
IRETURN1  E7,1744     145    6  154 1218 ITSINDIR     5436    1296    1 1296      J4REQ/J3  13,2012      46    2 1228
IRIGCOMP  06,3336     330                ITSLGCL1     5445    1298    2 1298 1299 ========================================

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K.D1      24,3676    659  1  659      KPIP      33,2020     41  1  855      LANDTEMP  E7,1544 =  151  7  151  800
K(AT)     32,3741    837  1  827      KPIP1     33,2021     41  5  812  880 LARGE     00,3065   1064  1 1064
K(1/DV)   27,2014     39  1  827      KPIP1(5)  21,2004     42  3  894  895 LARGE2    00,3112   1066  2 1064 1065
KALCMAN3  22,2004    353  1 1323      KPIP2     33,2023     41  1  875      LARGE3    00,3074   1066  1 1064
KALCMON1  22,2000 =   32  4  353  367 KQ        E6,1504    133  4  133 1482 LARMENT      5601   1373  1 1376
KALCMON2  22,2000 =   32  1  358      KRDAP     E6,1506 =  133  1 1482      LASINEX   00,3631   1078  1 1078
KALEBCON  07,3762   1323  1 1323      KSPNDX    E6,1700 =  136  6  136  369 LAST      16,3331   1427  2 1427
KAOS      16,2623   1419              KT        E7,1575 =  143  3  668      LASTBIAS  06,3671    338  1  852
KCENTRAL  E6,1740 =  133  8 1465 1467 KV1       E6,1702 =  136  4  136      LASTCHG   17,3174   1449  1 1449
KDPNDX    E6,1701 =  136  3  136  369 KV2       E6,1710 =  136  4  136      LASTLAOW  E7,1745 =  153
KEEP-2    E7,1560 =  151  1  151      KV3       E6,1716 =  136  4  136      LASTLRDT  25,3520    568  1  567
KEEPPRID  10,2545   1351  2 1357 1361 K1        E6,1702 =  136              LASTNEGY  21,2711    898  2  898
KEEPVR    34,3446    845  1  845      K1ORK2    34,2542    643  1  643      LASTOK    21,2661    898  2  897
KEEPVR1   34,3450    845  1  844      K1PARM    E5,1552 =  123  1  123      LASTPOSY  21,2673    898  2  897  898
KEL       E4,1630 =  117 12  362  486 K1VAL     27,2000     38  1  768      LASTSEG   07,3521   1316  1 1316
KEPCONVG  12,2333   1172  3 1170 1171 K2        E6,1710 =  136              LASTTIME  01,3502   1126
KEPC1        0042 = 1195  3 1168 1184 K2.       34,2561    643  1  643      LASTTPIP  E7,1757 =  153  4  153  813
KEPC2        0044 = 1195  3 1168 1184 K2CNTRAL  E6,1741 =  133 22 1466 1475 LASTXCMD     0113 =   96  1  534
KEPLERN   12,2023   1168  2 1221      K2PARM    E5,1556 =  123  1  123      LASTYCMD     0112 =   96  8   96  539
KEPLOOP   12,2166   1170  1 1171      K2THETA   E6,1736 =  133 12 1465 1475 LAT          1117 =  104  8  104 1129
KEPPREP   11,2404   1220  3 1210 1226 K2VAL     27,2002     38  1  769      LAT-LONG  13,2347   1127  3  659  928
KEPRTN    E4,1512 =  115  3 1172 1221 K3        E6,1716 =  136              LATAZCHK  37,2021    375
KEPZERO   12,2006 = 1179  3 1165 1193 K3S1      22,2370    359              LATFWDV   21,2561    896
KEYCOM    04,3262   1330              K3VAL     27,2004     38  1  769      LATITUDE  E5,1402 =  128  6  128  382
KEYRRT88     4060    156  2  155  156 K4        22,2372    359              LATLONG   13,2000 =   30  1 1127
KEYRUPT   04,2000 =   28  1 1330      K4SQ      22,2374    359              LATVEL    E7,1700 =  152 18  152  899
KEYRURT1  04,3253   1330  2  155  156 ===================================== LATVMETR  E7,1676 =  152 13  152  900
KEYTEMP1     0073 =   95  6  156 1331 L            0001 =   92 315   93 1501 LATVNEG   21,2765    899  1  898
KEYTEMP2     0332 =   99  2 1331      L*WCR*T      0130 =  123  2  789      LATVPOS   21,2760    899  1  898
KIGNV/84  E5,1504 =  122  2  122  782 L,PVT-CG  E6,1527    134  1 1482      LAXIS     E4,1702 =  120  5  120  845
KIGNX/84  E5,1500 =  122  3  122  782 LADQSAVE  E7,1714 =  153  5  153  900 LBUF2     00,2470   1053  2 1077 1079
KIGNY/88  E5,1502 =  122  2  122  782 LAG/TAU   E5,1542 =  123  2  123  814 LCHAN        0001 =   93 19  160 1429
KILCLOCK  35,3560    682  2  682  683 LAGSLIST     4753 =  211  1  210      LDANZIG   00,3713   1079  1 1078
KILLAOT   07,2060    247  4  247  262 LALOTORV  13,2420   1129  1  928      LDATALST     0334     99  2   99  989
KILL88       6041    745  1  745      LAMBERT   12,3212   1187  1  690      LDLOOP72  04,3651   1386  1 1386
KILLCLOK  36,2737    738  1  738      LAMBLOOP  12,3330   1188  3 1189 1191 LDNOUMR   05,3732    991  1  991
KILLDEAD  27,2242    746  1  746      LAMENTER  12,2701   1178  1 1191      LDNOUMPI  43,3071    290  1  290
KILLMON   41,3341    442  2  442      LAMPTEST  06,2766    183  2  172  173 LDNOUMP1  05,3733    991  1  991
KILLTASK     6032    745 11  514  740 LAND      E7,1634 =  151 17  151  807 LDNPHAS1  05,3362    225  1  221
KILLTSK2  27,2200    745  2  745      LANDALT   E5,1712 =  124  3  319  928 LDNPHAS2  05,3652    988  1  985
KILL2     04,2260    233  3  233      LANDCNST  22,2000 =   32  1  822      LDPDSMAX  12,2017 = 1195  1 1194
KILMONON     4204    458  4  450  473 LANDISP   21,2145    891  4  823  824 LEADTIME  E7,1426    140  1  803
KLEENEX   10,2333   1347              LANDJUNK  34,3271    786  1  235      LEFT      00,2342   1050  1 1047
KONMAT    05,2001     51  5  979  981 LANDLAT   E5,1706 =  124  4  124  928 LEFT-     00,2336   1050  1 1047
KPARM     E5,1622 =  123  2  123  848 LANDLONG  E5,1710 =  124  4  124  928 LEFTNCOM  40,3212    437  1  437

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LEFT5        4331     464   5  416 1284 LMCSTA05 05,2157 =  198   1  198      LMVEL    E4,1757    119   3  504  571
LEGAL?    21,2105     829   2  824      LMCSTA06 05,2224    198   3  201  204 LNCHTM   E7,1660 =  150   3  150  499
LEGALTST  40,2527     406   2  406      LMCSTA07 05,2226    198   2  198  204 LNGCALL2 01,3453   1125   1 1125
LEMALONE  01,2274     297   1  297      LMDSASDL 05,2303 =  202   1  206      LOADDAP  20,2000 =   31   1  294
LEMCONIC  13,3077    1207   5  341  949 LMDSAS02 05,2136 =  202   1  202      LOADDAP1 01,2000 =   28   2   43  296
LEMGEOM   13,2000 =    30   1  322      LMDSAS03 05,2145 =  202   1  202      LOADITIS 10,3462   1363   1 1360
LEMMASS      1326     107  21  196 1487 LMDSAS04 05,2154 =  202   1  202      LOADLV   41,3020    431  10  408  438
LEMONM       0056 =    93               LMDSAS05 05,2157 =  202   1  202      LOADLV1  41,2001    408   1  276
LEMPREC   13,3056    1207  11   37  970 LMDSAS06 05,2170 =  202   1  202      LOADSTAT    1013    102   4  431  462
LEMSTORE  23,2421     699   1  699      LMDSAS07 05,2341    202   1  202      LOADTIME 10,3574   1389  35  209 1217
LEMVEC    43,3072     290   1  264      LMDSAS08 05,2355    203   1  202      LOASCENT 20,2001     43   1 1479
LENGTHCT  E5,1412 =   128   9  128  390 LMDSAS09 05,2224 =  203   1  202      LOC         0164     99  46  373 1365
LESCHK    05,3363     225   1  224      LMINT    24,3265    571   1  571      LOCCTR      0064 =   95  31  374 1359
LETABBIT     4743 =    81   3  733  829 LMKADSN  E6,1410    130   1  215      LOCKANGL 22,2402    359   1  353
LETABORT     0215 =    81   3  786  847 LMLSALDL 05,2357 =  204   1  207      LOCSAM   14,2500    930   3  930  957
LETITLIV  27,2221     746   1  746      LMLSAL01 05,2127 =  204   1  204      LOCSKIRT 22,2744 =  366   7  355  357
LGCLCADR  01,3773    1300   1 1299      LMLSAL02 05,2136 =  204   1  204      LODESCNT 20,2003     43   1 1479
LGCL2COR     5307    1125   1 1125      LMLSAL03 05,2145 =  204   1  204      LODMIXNN 42,2121    306   1  306
LGCOMP    06,3537     335   3  328  338 LMLSAL04 05,2154 =  204   1  204      LODNLV   42,2137    306   1  306
LGCUPDTE  26,3401     592   4  583  588 LMLSAL05 05,2157 =  204   1  204      LODNNLOC 41,2113    410   8  409  430
LGRET     E7,1675 =   147   5  147  592 LMLSAL06 05,2170 =  204   1  204      LODNNTAB 42,2103    306   1  410
LGWAKE    07,3375    1312   2 1312 1313 LMLSAL07 05,2276 =  204   1  204      LODPHALF 12,2004 =   37   3  324 1193
LGYRO        1311     106   9  224 1316 LMLSAL08 05,2224 =  204   1  204      LOOPMAX  12,2017   1095   3   37 1195
LGYROBIN  43,2417     275   1  275      LMLSAL09 05,2226 =  204   1  204      LOOPMAX1 12,2021   1095   1   37
LIGHTSET  05,3066     220   2  217  218 LMOMEGAN E6,1407    130   2  215 1417 LOOP1/4  04,3002 =   37   1 1131
LIM(-22)  27,3757    1275   1 1270      LMONLY   16,2462   1417   1 1417      LODSAMPT    4400    466   3  442 1331
LIMALARM  26,3675     598   2  596      LMOONBIT    4741 =   79   1  215      LOENERGY 12,3452   1190   1 1189
LIMITCOM  42,3334     425   1  425      LMOONFLG    0174 =   79   5   37 1205 LOGSUB   30,3023    851   1  840
LIMITS       4734 =  1089  10  918 1465 LMORBMDL 05,2066 =  196   1  206      LOKONBIT    4747 =   66   1  555
LIMITSUB  30,3720     919   7  908  914 LMORBM01 05,2127    196   4  196  204 LOKONSW     0012 =   66   5  272  514
LINRAT    17,2373    1438   2 1438 1439 LMORBM02 05,2136    196   6  196  206 LOLIM    12,3513   1191   2 1188
LINRATP   16,3133    1425   1 1426      LMORBM03 05,2145    197   6  196  206 LOMAT    35,3357    679   2  676  677
LINUS        5464 =  1365   2  479  515 LMORBM04 05,2154    197   6  196  206 LONG        1121 =  104   7  104 1129
LINUSCHR  10,3375    1362   2 1350 1351 LMORBM05 05,2157    197   6  196  206 LONGBASE    1150    104   2 1293 1299
LITIT     25,3634     617   1  617      LMORBM06 05,2170    197   3  196  204 LONGCADR    1146    104   2 1125 1126
LMAGSIDL  05,2407 =   206   3  195  206 LMPOS    E4,1751    119   3  504  571 LONGCALL    5277   1124   5  376 1300
LMAGSI02  05,2136 =   206   1  206      LMRENDDL 05,2232 =  200   1  206      LONGCLCL 01,3730   1299   2 1299
LMAGSI03  05,2145 =   206   1  206      LMREND01 05,2127 =  200   1  200      LONGCYCL 01,3467   1125   2 1125 1126
LMAGSI04  05,2154 =   206   1  206      LMREND02 05,2136 =  200   1  200      LONGEXIT E3,1434    110   4 1125 1126
LMAGSI05  05,2157 =   206   1  206      LMREND03 05,2145 =  200   1  200      LONGGYRO 07,3534   1316   1 1315
LMCSTADL  05,2172 =   198   2  195  206 LMREND04 05,2154 =  201   1  200      LONGPODH 01,3522   1126   2 1125
LMCSTA01  05,2127 =   198   1  198      LMREND05 05,2157 =  201   1  200      LONGRTRN 01,3507   1126   1 1126
LMCSTA02  05,2136 =   198   1  198      LMREND06 05,2224 =  201   1  200      LONGTIME    1152    104  13 1124 1299
LMCSTA03  05,2145 =   198   1  198      LMREND07 05,2276    201   2  200  204 LOOKANGL E7,1667 =  152   1  802
LMCSTA04  05,2154 =   198   1  198      LMTRAP   E6,1406    130   2  214 1417 LOOPCT   E7,1605 =  143   5  638  646

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UN UNDEFINED           = DEFINED BY EQUALS          J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED      CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF   H     REFERENCES     SYMBOL      DEF   H     REFERENCES     SYMBOL      DEF   H     REFERENCES

LOOPER    17,3034   1446   3 1441 1447 LPS20.1   24,3256    571   5  500  576 LRS24.11  26,3471    594
LOOPMX    34,2057    637   1  638      LPS20.2   25,3570    572   1  500      LRUPT        0011 =   92
LOOPRATE  16,3674   1462   2 1462 1463 LP2ALM    25,3536    568   1  568      LRVEL     25,3116    557   1  885
LOOPSIN   22,2417    359   1  360      LRADRET   E7,1650 =  151   4  151  890 LRVELBIT     4744 =   86
LOOP1     23,3720   1256   1 1255      LRADRET1  E7,1656 =  152   2  889      LRVELFLG     0273 =   86
LOOP2     23,3717   1255   1 1256      LRALPHA   E5,1522 =  122   3  123  889 LRVELX    25,3110    557   1  495
LOOP3     20,2734   1482   2 1482 1483 LRALPHA2  E5,1524 =  123   1  123      LRVELY    25,3106    557   1  495
LOOSE     37,2730    388   1  389      LRALT     25,3102    557   2  495  886 LRVELZ    25,3104    557   2  495  557
LOSCALAR     0004 =   93   6  383 1446 LRALTBIT     4747 =   86   1  617      LRVF      E5,1527 =  123   3  123  881
LOSCMBIT     4740 =   69   4  556  609 LRALTFLG     0276 =   86               LRVJOB    33,3556    885   1  882
LOSCMFLG     0041 =   69  10  500  603 LRBETA1   E5,1523 =  123   1  123      LRVMAX    E5,1526 =  123   3  123  881
LOSCOUNT  E7,1456    141  39  185  617 LRBETA2   E5,1525 =  123   1  123      LRVTIMDL  E4,1737 =  120   2  202  885
LOSDESPO  E7,1711 =  146   6  146  597 LRBYBIT      4735 =   83   8  221  869 LRVTIME   E4,1652 =  117   7  117  887
LOSSM        1100 =  609   3  603  605 LRBYPASS     0245 =   83   1  780      LRWH      E7,1421    140   1  878
LOSVOT/4  E3,1760 =  609   5  603  605 LRESC     20,2673   1481   1 1480      LRWVFF    E5,1536 =  123   2  123  882
LOSVEC    E5,1413 =  128   3  128  389 LRHEIGHT  25,3273    560   1  560      LRWVFX    E5,1535 =  123   1  123
LOSVEL    E3,1760    113   6  113  609 LRHJOB    34,3571    886   1  867      LRWVFY    E5,1534 =  123   1  123
LOS1      E5,1444 =  128               LRHMAX    E7,1420    140   2  878      LRWVFZ    E5,1533 =  123   2  123  881
LOS2      E5,1452 =  128               LRHTASK   21,2125    867   1  823      LRWVX     E5,1532 =  123   1  123
LOTEMIN      0124 =   96               LRINH        0254 =   84   3  273      LRWVY     E5,1531 =  123   1  123
LOTEMOUT     1007 =  101   1  426      LRINHBIT     4744 =   84   2  878  881 LRWVZ     E5,1530 =  123   2  123  881
LOTHRUST  33,2352    857   1  856      LRLCTR    E7,1670 =  152   5  152  889 LRXCOU    E4,1654 =  117   5  117  887
LOUNITX   12,2004 =   37               LRMCTR    E7,1672 =  152   5  152  885 LRXCDUDL  E4,1734 =  120   3  120  885
LOUNITY   12,2002 =   37               LROFF     43,2366    273   1  263      LRYCOU    E4,1655 =  117   2  117  879
LOUNITZ   12,2000 =   37               LRON      43,2325    272   1  263      LRYCOUDL  E4,1735 =  120   1  120
LOUPE     21,3620   1476   1 1475      LRPOSALM  33,2543    870               LRZCOU    E4,1656 =  117   4  117  887
LOWCRIT   E5,1506 =  122   3  122  789 LRPOSBIT     4746 =   86   1  567      LRZCDUDL  E4,1736 =  120   3  120  885
LOWFCCLD  31,2231    789   1  789      LRPOSCAL  43,2677    281   2  278      LSOISP    14,2454    928   1  928
LOWIDCOD  05,2065    195   1  991      LRPOSCAN  25,3526    568   1  567      LSORIENT  04,2757    977   2  927  970
LOWLOAD   10,3527   1364   1 1360      LRPOSFLG     0275 =   86               LSPOS     15,3647    979   4  930 1230
LOWSUPER  30,2000 =   34   8  212  657 LRPOSNXT  25,3475    567   2  567  568 LSR22.3   26,2416    581   2  510  591
LOWVERB   41,2034    409   1  409      LRPOSCUT  40,2635    420   1  419      LSR22.4   26,3200    589   1  581
LOW10        5012   1091  21  234 1283 LRPOS2    25,3454    567   2  568  888 LSTBNKCH  43,3750   1285   1 1284
LOW11        4356    465   7  158 1008 LRPOS2K   43,2147    266   1  263      LSTLIM       4747 =  746   1  746
LOW2         6250 = 1093   1 1047      LRPOS2K1  43,2161    266   2  266      LSTPTR       0144 =   97
LOW3         4757 = 1093   2  234 1044 LRP2COMM  25,3531    568   1  267      LST1      E3,1400    110  48  156 1295
LOW4         4762   1089   3  739 1367 LRRCTR    E7,1671 =  152   4  152  889 LST2      E3,1410    110  41  223 1122
LOW5         4346    465  16  401 1331 LRRESTRT  33,3650    888   1  888      LST2CON   41,2145    410   1  410
LOW7         6077    997  14  230 1363 LRSCK     25,3420    563   1  563      LST2FAN   43,2002    263   2  263  470
LOW7+2K      5013   1091   1 1003      LRSCTR    E7,1673 =  152   4  152  889 LS21X     E3,1757    113   4  503  571
LOW8         4357    465  21  193 1366 LRS22     32,2000 =   34   2   41  575 LTHVACA   05,3366    225   4  223  224
LOW9         5004   1090  12  246 1107 LRS22.1   32,2366    575   1  509      LUNABIT      4740 =   70
LO6ZEROS  12,2006 =   37   5  249 1179 LRS22.1X  E7,1737 =  148   6  148  579 LUNAFLAG     0060 =   70   9  658 1133
LPOS2BIT     4746 =   84               LRS22.2   24,3334    578   1  509      LUNOESCH  25,2432    543   1  324
LPOS2FLG     0256 =   84   1  888      LRS24.1   26,3442    593   2  520  597 LUNG      15,2666    960   2  958  959

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8D BADLY DEFINED     CO DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969                PAGE 1526

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF     H        REFERENCES      SYMBOL     DEF     H        REFERENCES      SYMBOL     DEF     H        REFERENCES

LUNLANAD 36,3142       743    1  733      MANUSTOP 22,3213       371    1  368      MAXOVSW     0140  =   97    6 1051 1066
LUNLAND  31,2423       794    1  743      MANUVER  26,2000  =     33    1  477      MAXFORCE E5,1546  =  123    2  123  814
LUNPOS   15,3647  =    979    2  491 1232 MANUVER1 26,2000  =     33    1  487      MAXJETS  17,3373    1454    1 1454
LUNRSALN     0005  =   237    2  237      MARKCHEX 07,2216       253    2  253  262 MAXNM    22,3645     723    3  723
LUNSFCHK 24,2670       511    9  496  520 MARKCNTR E7,1550  =    147   13  147  262 MAXPLUS  20,3041    1485    2 1484 1485
LUNSPH   11,3417      1232    1 1230      MARKCOP  10,2414      1348    1 1348      MAXRA    27,3462    1266    2 1266
LV           0044  =    93    2 1064 1066 MARKCTR  E7,1462  =    141    5  500  713 MAXTEST  00,2565    1055    4 1054 1068
LVBUF        6276     1004    1 1028      MARKEBAN     1070      103    1 1364      MAXTFF   27,3652    1272    1 1271
LVELBIAS 25,2000        41    1  560      MARKEND  10,2326      1346    1 1346      MAXTFF1  27,3651    1272    1 1269
LVLIMITS 21,2727       858    4  857      MARKFLAG     1070  =  1364    1 1348      MAXTRIES 24,2310     503    2  513  514
LVMINLM  21,3017       899    6  899      MARKFMSK 10,3032      1356    2 1347      MAXTRYS  25,2505     546    1  547
LVSQUARE     0042  =    93    2 1064 1069 MARKFORM 10,2340      1347                MAXVBITS 21,2005      42    8  897  899
LVWTLIST     5215     1113    1 1117      MARKNV       0370      100    5 1348 1357 MAX250   35,3642     686    1  669
LXA      01,2355      1081    1 1006      MARKOCT  10,3533      1365    1 1355      MCTOMS   25,3100     556    2  552  555
LXC      01,2361      1081    1 1006      MARKOVER 10,3422      1363    1 1346      MDOT     E7,1736  =  145    2  145  769
L14/OUT  40,2745       422    2  421  422 MARKPERF 10,2441      1349    1 1359      MOOTAPS  36,2010      38
===================================== MARKPLAY 10,2400      1348    4 1348 1364 MOOTOPS  36,2002      38    1  827
M/SCON1  42,3377       426    1  425      MARKRET  10,3414      1362    1 1361      M01          4362     465    4  462 1383
M/SCON2  42,3400       426    1  425      MARKRUPT 07,2332       255    2  155  156 MEASINC  23,2000  =   32    1 1143
M/SCON3  42,3402       426    4  425      MARKSTAT     1307      106   34  224  262 MEASINC1 23,2000  =   32    1 1147
M/SLIMIT 42,3326       425    2  425      MARKTEST 26,2510       582    1  581      METHOD1  22,2242     356    1  356
M/SNORM  42,3342       425    7  425  426 MARKTYPE 07,2513       259    5  256  261 METHOD2  22,2216     356
M/SOUT   42,3303       424    1  419      MARKWAKE 10,3024      1356    1 1363      METHOD3  22,2266     357    2  356
MAGSUB       4512      525    9  527  548 MARK2PAC     1072      103    2 1356 1357 MFI      E4,1630  =  117   12  353  355
MAGVEC2  E5,1717  =    126    6  126 1191 MARK3MSK 10,3506      1364    2 1347      MFISYM   E6,1702  =  136   12  355  357
MAINENG  30,2427       839    1  839      MARK4MSK 10,3507      1364    1 1347      MFREF    15,3445     972    2  975  976
MAINLINE 30,2710       843    2  844      MARSLEEP 10,3455      1363    1 1348      MFS      E4,1630  =  117    5  117  353
MAJ+     07,3460      1315    1 1314      MASKREG  E5,1534  =    128                MGARET   30,3266     908    1  919
MAJ-     07,3600      1318    1 1314      MASS         1243  =    105   18  105 1487 MGC      E5,1743  =  124    3  125 1245
MAKEACCS 37,3513       854    2  853      MASSCTR      0161  =   1488    5 1486 1487 MGLVFBIT     4752  =   75
MAKECADR     4645      993   16  272 1478 MASSFIX  20,2517      1479    3 1479      MGLVFLAG     0130  =   75    2  694
MAKEGEN  10,3540      1365    1 1353      MASSMON  33,2233       855                MG2      07,3717    1322    1 1322
MAKEMARK 10,2365      1347    1 1351      MASSMULT 31,2337       791    2  788      MIDAVBIT     4752  =   81
MAKEMAX  20,3033      1485    1 1485      MASS1    E7,1570  =    149    5  149  859 MIDAVFLG     0224  =   81    3 1217 1235
MAKEPLAY 10,2547      1351    3 1350 1365 MATINC       0140       97    9   97 1033 MIDDGIM  06,2000  =   29    1  694
MAKEPRIO 10,2513      1350    1 1351      MATMOVE  14,3371       943    7  939  969 MIDFLAG      0002  =   65    5 1211 1238
MAKERUPT     7757     1451    2 1450 1451 MATRIX   11,3301      1230    2 1227      MIDFLBIT     4737  =   65
MANFLAG  16,2202      1405    1 1404      MAX          0016  =   1197    4 1176 1177 MIDORLST 17,3163    1449    1 1448
MANMODE  16,3027      1422    1 1422      MAXANG   22,2364       359    1  354      MIDTOAV1 13,3553    1216    1  728
MANUCALL 22,3177       369    1  369      MAXCHECK 12,2625      1177    1 1177      MIDTOAV2 13,3547    1216    1  753
MANUFBIT     4736  =    77                MAXCHK   22,3636       723    4  622  722 MID1FBIT     4751  =   81
MANUFLAG     0152  =    77                MAXCDGA  12,3302      1188    2 1188      MID1FLAG     0223  =   81    4 1216 1218
MANUOFF  22,3113       368    1  368      MAXDB    05,3065       220    1  214      MID2     13,3646    1217    1 1217
MANUSTAL 22,3067       368                MAXDT    13,3340      1212    2 1211      MID5         4347     465    1  431
MANUSTAT 22,3122       368    1  367      MAXDV    00,2642      1059    1 1055      MID7         4144     443    4  443 1364

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H      REFERENCES      SYMBOL      DEF    H      REFERENCES      SYMBOL      DEF    H      REFERENCES

MIMRET    17,2341   1437   1 1437         MKRELEAS  07,2047    246   1  254         MONSAVE      1017    102   7  224  443
MIN          0010 = 1157   4 1176 1177    MKRUPT88     4061    156   1  155         MONSAVE1     1020    102  12  224  469
MIN+      07,3455   1315   1 1314         MKTIME    E7,1754 =  148   8  148  886    MONSAVE2     1021    102   4  441  456
MIN-      07,3575   1318   1 1314         MKVAC     07,2014    245                  MOONBIT      4740 =   65
MINABOV   33,2202    850   1  836         MKVACFNO  07,2031    245   5  245         MOONCNTR  14,2535    930   1  930
MINADR    17,2350   1438   1 1437         MKV852    07,2617    261                  MOONFLAG     0003 =   65  31  658 1238
MINANG    22,2362    359   1  354         MKV853    07,2616    261                  MOONGON   22,3516    719   1  719
MINB12       7744 =  989   1  986         MKV854    07,2615    261   1  261         MOONMX    24,3730   1137   2 1134 1136
MINB1314  05,3565    986   1  986         MKV854*   07,2620    261   1  253         MOONMXA   25,3653   1138   1 1138
MINCHECK  12,2571   1176   1 1176         MLCSV     E3,1766    113   6  552  609    MODNOTH      0173 =   37   2  299
MINCOGA   12,3320   1188   1 1191         MMADREF   41,2033    408   1  408         MOONPAD   22,3373    717   1  716
MINCON    42,3540    439   1  438         MMATRIX      0024 = 1142   8 1134 1230    MOONRATE  27,2026     44   1  834
MINCON1   42,3275    424   1  427         MMCHANG   41,3443    450   2  408  411    MOONSPOT  33,2254    855   1  855
MINCON2   42,3273    424   2  424         MMDSPLAY     5315   1286   1  219         MOONTHIS     0174 =   37   6  299 1214
MINCSM       4741 =   43   1  297         MMNUMBER     0774    101  10  229  829    MORECADR  20,2461   1412   1 1412
MINDEX       0773    101   4  230  234    MMTEMP       1057 =  235   3  234         MOREDES   25,2637    550   2  550
MINFORCE  E5,1544 =  123   2  123  814    MNKEYIN      0015 =   93   2  220 1330    MOREIDLE  16,2157   1405   3 1402 1403
MINIMP    43,3025    286   1  264         MODABORT  07,3732   1322   3 1322 1323    MORNUM    40,2312    403   2  402
MINIRECT  13,3705   1233   3  499 1215    MODDONE   12,2124   1169   3 1169         MOVATHIS  13,2746 =   37   1 1215
MINLMO    01,2000     43   1  297         MODE         0163     99  37  328 1365    MOVEACSM  13,2673   1204   3 1151 1204
MINMINLM  01,2001     43   1  297         MODEA        1106 =  103   4  325  543    MOVEALEM  13,2746   1205   4   37 1205
MINPERE   22,3365    717   2  716  719    MODEB        1110    103   4  103  546    MOVEPCSM  13,2722   1204   3 1151 1204
MINPERM   22,3363    717   1  719         MODECADR     1301    106  11  106 1322    MOVEPLEM  13,2767   1205   3 1150 1205
MINQR     17,2320   1437   2 1437         MODEEXIT  07,2746   1303   8 1302 1322    MPAC         0154     99 928   98 1498
MINRTN    17,2325   1437   1 1438         MODEGOOD  07,3722   1322   1 1322         MPAC+     00,2437   1053   2 1052
MINTIMES  16,3625   1433   1 1429         MODESLP   07,3726   1322   1 1322         MPAC+6       0162 =  422   7  422  466
MINTIME2  05,3532    986   1  986         MODESW    07,2000 =   29   1 1302         MPAC-     00,2433   1052   2 1052
MINUS1       7752 = 1093   2 1315 1363    MODE2CHK     4550    527   2  526  548    MPACSHR   00,2033   1041   2 1049 1070
MINUS2       7751 = 1300   3  221 1295    MODE70    05,3476    826   1  825         MPACSRNO  00,2050   1042   1 1041
MIS       E6,1645    135  20  135  487    MODE71    05,3500    826                  MPACTST   42,3554    439   1  438
MISCJUMP     6337   1006   1 1003         MODNGDEL  12,2600   1176   2 1176         MPACVBUF     7535   1037   5  606 1254
MIXAD     41,2260    412   1  412         MODPSDEL  12,2636   1177   2 1177         MPAC2SAV     0165 = 1364   2 1348 1357
MIXBACK   40,3103    435   1  435         MODREG       1010    101  22  214 1380    MPERFMSK  10,3521   1364   2 1347
MIXBR        0140 =   97  13  306  436    MODROUTB  04,2040 =  451   1  451         MPTEMP       0135     97  64   97 1080
MIXCON       4771 =  306   1  306         MONADR    40,3474    450   1  449         MR.KLEAN  05,2641    215   2  214 1375
MIXNN1    41,2234    412   1  412         MONBACK   41,3375    443   1  443         MRKIOBIT     4735 =   72
MIXNN2    41,2246    412   1  412         MONBUSY   41,3376    443   1  442         MRKIOFLG     0074 =   72
MIXNOUN   41,2221    412   1  409         MONDEL    41,3345    442   1  442         MRKNVBIT     4743 =   72   1 1347
MIXTEMP      0125 =   96   3  406  412    MONDO     41,3346    442   1  442         MRKNVFLG     0102 =   72   1 1358
MKABORT   07,2044    246   1  245         MONITOR   41,3255    441   7  410  411    MRUPTBIT     4747 =   73
MKALARM   07,2325    254   1  253         MONIT1    41,3257    441                  MRUPTFLG     0106 =   73
MKDEX     E7,1552 =  147   9  147  262    MONIT2    41,3272    441   2  441         MSKOATR1  20,2021    295   1  295
MKOVBIT      4751 =   73   2 1349 1356    MONREF    41,3374    443   1  443         MSTORE1   01,2370   1081   2 1082 1085
MKOVFLAG     0110 =   73                  MONREPOS  06,3115    189   1  189         MS100        7732 = 1405   2 1404 1413
MKREJ     07,2460    258   1  255         MONREQ    41,3322    442   2  442         MU(P)        0032 = 1240

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UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JCKEP CR ERASE ANYWHERE     MO MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYM8OL TABLE LISTING, INCLUDING DEFINITICN, HEALTH, PAGE OF OEF, # OF REFS, PAGE OF FIRST RFF, PAGE OF LAST REF.

SYM8OL      OEF    H       REFERENCES      SYMBOL      OEF    H       REFERENCES      SYMBOL      OEF    H       REFERENCES

MU/A      E7,1720 =  145   4  145  772 NCSMVEL   E7,1664 =  150   2  499      NEG1         7752 = 1093   5  328 1093
MUASTEER  E7,1716 =  145   5  145  773 NDCMPTST  41,2440    417               NEG1/2       4734   1089   6  223 1122
MUCHTIME  01,3512   1126   2 1125      NOXCOUW   E6,1647 =  137   6  137  914 NEG1/3    21,3242   1467   2 1467
MUEARTH   13,2006     46   8  689 1238 NOXCHNGE  12,2240   1171   2 1170      NEG100       5172   1110
MULBUSH   21,3466   1473   1 1473      NCXCTR    F5,1414 =  128   7  128  378 NEG12     00,3733   1080   3 1048 1070
MULTEXIT     5620   1374               NO1          4361    465   7  273  885 NEG180    40,3122    436   1  435
MUM       13,2004     46               NEARONE   27,3771   1275   4  839 1272 NEG2         7751   1092  11  232 1473
MUM(-37)  27,2024     44   1  848      NEEDL8IT     4750 =   66   1 1407      NEG3         7750   1092   7  883 1435
MUNFLAG      0141 =   76   8  231  862 NEEDLER   20,2336   1410   1 1407      NEG4         6115    998   2 1002 1278
MUNFL8IT     4744 =   76   4  188  860 NEEDLER2  20,2367   1410   1 1410      NEG5      41,2115    410
MUNG?     37,3377    709   1  705      NEEDLES   20,2407   1411   1 1411      NEG7         5650 =  235   2  247  950
MUNGRAV   33,3067    876   7  728  878 NEEOLES3  20,2376   1410   1 1410      NETNEG    20,3744   1496   1 1496
MUNRETRN  33,2461    869   1  876      NEEOLE11  20,2350   1410               NETZERO      6124    999
MUNRVG    33,3025    875               NEEOLFLG     0013 =   66   3  267  477 NEWAGS    32,2014    209   1  209
MUSCALE   E7,1766 =  145   2  772      NEEO28IT     4735 =   65   1 1407      NEWANGL   22,3007    367   1  366
MUTABLE   04,2004     45   6  692 1187 NEED2FLG     0000 =   65   3  267  477 NEWANGLE  25,3732   1139   4 1137 1140
MWAIT8IT     4741 =   72               NEG          6744   1019   4 1019      NEWDATA   21,2304    893   1  892
MWAITFLG     0100 =   72               NEGATE    21,3322   1468   1 1468      NEWOEL    12,2634   1177   2 1176 1177
MX        E7,1676 =  147   6  147  586 NEGCHECK  21,3664   1500   1 1501      NEWOELHI  22,3003    367   1  370
MXMYMZ    26,2763    585               NEGCOS    13,2530   1131   1 1131      NEWOELX   12,2260   1171   3 1171
MXM3      22,2312    358   4  353  486 NEGDRIVE  21,3572   1475   1 1475      NEWIBIT      4737 =   79
MXV          7337   1032   1 1005      NEGEOOT   17,3320   1453   1 1453      NEWIFLG      0172 =   79   3 1208 1212
MY        E7,1704 =  147   5  147  592 NEGFIRE   21,3716   1501   1 1501      NEWJOB       0067     95  23  223 1285
MZ        E7,1712 =  147   3  147  586 NEGFNCT1  21,3231   1466   1 1466      NEWLIST   05,3543    986   2  986
M11       E6,1414    130   9  156 1430 NEGFNCT2  21,3243   1467   1 1466      NEWLOAO   30,2160    832   1  832
M21       E6,1415    130   4  191 1443 NEGLMLV   21,2774    899   1  898      NEWLOC       0065 =   95   9 1097 1105
M22       E6,1417    130   7  190 1443 NEGMAX       4735 = 1093  13  369 1485 NEWMOOE      6063    997   6 1013 1390
M31       E6,1416    130   4  191 1443 NEGONE       7752   1092  15  221 1497 NEWMOOEA     5314   1286   2  234  379
M32       E6,1420    130   5  191 1443 NEGOUT    13,2536   1131   1 1131      NEWMODEX     5311   1286   6  375 1386
====================================== NEGP      12,3427   1189   3 1188 1189 NEWOPS       6073    997   1  996
NARROW08  20,2151   1400   1 1399      NEGPROO   27,3146    774   1  774      NEWPAR    14,2725    934   1  934
NAVKEYIN     0016 =   93   6  220  256 NEGSGN    40,2374    404   1  401      NEWPHASE  31,2362    793   1  797
N80CNLY   06,3563    336   1 1115      NEGSHAFT  25,2601    548   1  548      NEWPOS    E7,1652 =  150   4  150  499
N80X      E3,1460    110   6  328 1115 NEGTFF    27,3646   1272   2 1271      NEWPRIO      0063 =   95  12  234 1353
N80Y      F3,1461    110   2  330  337 NEGTHRST  21,3767   1502   1 1501      NEWSTATE  12,2653   1178   1 1180
N80Z      E3,1462    110   2  330  337 NEGTORK   16,3736   1463   1 1462      NEWTN     34,2702    645   2  645
N802      06,3610    336   1  338      NEGTORKU  E6,1516 =  134               NEWVEL    E7,1644 =  150   3  150  499
N803      06,3614    336               NEGTORKV  E6,1520 =  134               NEWZCOMP  22,3711   1151   1 1145
N8POSPL   37,2012    375               NEGTOTKP  E6,1514 =  133               NEXTCDU   07,3051   1305   4 1305 1306
NBRANCH   11,3264   1230   4 1227 1238 NEGTOVFL  12,2330   1172   1 1172      NEXTCOL   11,3571   1235   2 1236
N8USMASK  10,3514   1364   1 1352      NEGUQ     E6,1501    133  11  133 1475 NEXTCORE  01,2675   1101   2 1100
N81N82    23,2515 =   37               NEGUR     E6,1503 =  133   4 1403 1468 NEXTES    35,3123    672   1  671
N82COUSP  30,3524    915   1  908      NEGUSUM   21,3565   1475   3 1468 1475 NEXTIME   E6,1705 =  136   3  369  370
NCOU      E6,1702 =  136   3  367  368 NEGVMAXY  21,2717    898   2  898      NEXTINCL  05,3550    986   1  986
NCOARSE   14,3603    947   4  939  968 NEGO         4754   1089  27  159 1449 NEXTINSL  05,3700    988   1  986

HEALTH KEY: NORMALLY OEFINEO UNLESS FLAGGEO AS FOLLOWS:

UN UNOEFINEO            = OEFINEC BY EQUALS          J DEFINEO BY JOKER OR ERASE ANYWHERE      MO MULTIPLY OEFINEO
BD 8AOLY OEFINED     CO DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091       17:53 DEC. 19,1969                  PAGE 1529

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF    H      REFERENCES      SYMBOL     DEF    H      REFERENCES       SYMBOL     DEF    H      REFERENCES

NEXTLINE  22,3507    719   1  719      NOGUESS   12,3477   1190   1 1188      NOROTAT   17,3026   1446   3 1445 1450
NEXTP     E6,1472    131   7  131 1422 NOIBNKSW     6066    997   1 1038      NORRGMON  06,3126    189   6  185  189
NEXTU     E6,1473 =  131   5 1397 1435 NOINT     13,2652   1203   1 1202      NORRMBIT     4750 =   75   2  188  222
NEXTV     E6,1474 =  131   5 1397 1436 NOKILL    43,3136    292   1  293      NORRMON      0126 =   75   8  271  518
NGUIDSUB  E7,1647 =  152   3  794  807 NOLITE    33,3547    884   2  883      NOR29FLG     0061 =   70   2  843  858
NICKELDP  34,2077    637   1  640      NOLOKON   23,2026    272   1  272      NOR29NOW  33,2573    871   6  601  871
NIGNLOOP  E7,1646 =  152   2  781  807 NOLRRBIT     4742 =   84   3  867  877 NOSHIFT   10,3771   1394   6 1393
NINE         4320 = 1093   2 1494      NOLRREAD     0252 =   84   1  888      NOTALLOW  21,3416   1472   2 1471
NJETSBIT     4735 =   67               NOMDNLST  05,2172 =  195               NOTBIT12  40,3736    475   2  475
NJETSFLG     0017 =   67   1  750      NOMINIMP  43,3030    287   1  264      NOTHRBIT     4740 =   74   1  733
NN        E7,1466    142   7  200  675 NOMORE    25,3206    559   2  559  564 NOTHROTL     0116 =   74   5  749  780
NNADTAB   42,2154    307   1  306      NOMTPI    E4,1716 =  118   9  632  679 NOTIME    13,3656   1218   2 1216 1217
NNADTEM      0146     97   8  306  433 NONAVKEY  05,3100    220   3  217  220 NOTMIN    17,3061   1446   2 1446
NNTYPTAB  42,2320    310   1  306      NOPIE     35,3260    675   1  675      NOTMUCH   20,3436   1492   1 1490
NNTYPTEM     0147     97   5  306  432 NOQBRSM      5274   1123   1 1420      NOTPLAN   15,2521    956   1  956
NO.CORES  01,2635   1100   2 1100 1105 NOQRSM       5272   1123   1 1451      NOTP20    25,3051    556   1  555
NO.PJETS  E6,1521    134   3  134 1462 NORATES   30,2503    840   1  840      NOTSHIFT  24,3322    571   1  571
NO.UJETS  E6,1522 =  134   3  134 1462 NORBACK   40,3105    435   1  436      NOTWCSM   26,2450    581   1  581
NO.VJETS  E6,1523 =  134               NORDSTAL  25,2467    545   3  543  546 NOTWLEM   26,2502    582   1  582
NO.WDS       6247   1002   5 1002 1071 NOREASON  33,3203    878   1  877      NOULLAGE  36,2657    737   4  735  755
NO.9      36,3667    757   1  756      NORESET   07,3421   1313               NOUN      40,2370    404   1  401
NO-ATP    30,2663    842   1  842      NORFINAL  13,3277   1211               NOUNADD      0145 =   97  27  412  464
NO-INT    13,2063    238   1  238      NORLITE   33,3532    883   2  883      NOUNCADR     1016    102   9  409  464
NOADJUST  42,3721    492   1  492      NORMADR   42,3401    426   1  425      NOUNREG      1001    101  15  224  462
NOADS     20,3457   1492   1 1492      NORMAL    01,2340    298   1  296      NOUNTEM      0122 =   96   3  412
NOATTCNT  30,3741    919   3  906  910 NORMBNCH  10,3062   1357   1 1363      NOUNTEST  41,2462    417   2  428  429
NOATTOFF  07,3257   1309   4  167 1308 NORMEX    E7,1463    142  19  142  699 NOUPDOWN  43,3077    291   1  290
NOBITS    E5,1442 =  128               NORMEXIT  32,2532    577   1  577      NOUPFBIT     4746 =   68   1  509
NOCHG     35,3502    681   1  681      NORMGAM   E4,1503 =  115   7  115 1152 NOUPFLAG     0030 =   68   2  291
NODODT    26,2004     52   1 1137      NORMLIZ   23,2000 =   32   1  861      NOUT         1015    102   9  159  471
NODESNB   25,2544    547   1  547      NORMLIZE  23,2463    862   2  243  852 NOUTCON      4760 = 1093   1  224
NODESSM   25,2502    546   2  543  546 NORMLIZ1  33,2415    862   1  862      NOUVEAU   04,2314    233   1  231
NODIO     26,2012     53   1 1137      NORMLIZ2  33,2420    862   1  862      NOVAC        5072   1097  32  160 1403
NODOBIT      4753 =   70   3  229 1376 NORMLOP   37,2604    387   1  387      NOVACADR  01,3776   1300   1 1297
NODOFLAG     0054 =   70   6  209 1329 NORMRET   10,3430   1363   2 1361      NOVAC2    01,2626   1100   1 1097
NODSPOUT  06,2130    162   2  159      NORMSBIT     4742 =   77               NOVAC3    01,2631   1100   1 1101
NODSPY    06,2152    162   1  162      NORMSCL   16,3620   1433               NOVRWRT   35,3334    677   1  678
NODVMON1  33,2342    857   1  856      NORMSW       0156 =   77   8  689 1182 NOV37MM   04,2470    237   1  229
NODVMON2  33,2346    857   1  856      NORMTEMI     1044 =  102   3  941 1354 NOWMATX   32,2257    498   1  498
NOEBANK   43,3407   1280   1 1281      NORMTEST  00,3512   1075               NO511BIT     4751 =   84   1  869
NOEND     25,3263    560   1  560      NORMT4    06,2007    157   2  157      NO511FLG     0261 =   84   1  888
NOGIMLOC  22,2744    366   1  366      NORMUNIT  10,3727   1393  11  341 1393 NPTRAPS   E6,1433 =  130   4 1404 1417
NOGIMRUN  06,2462    172   2  171      NORMUNX1  10,3725   1393   3  591  771 NQTRAPS   E6,1434 =  131   4 1404 1418
NOGO      22,2732    365   2  365  367 NORMWAKE  10,3334   1361   1 1363      NRMAG        0040 = 1260   4 1263 1270
NOGOBL    27,3212    775   1  775      NORMZI       0044 = 1152  12 1151 1152 NRMIDBIT     4737 =   72

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MC MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969                 PAGE 1530

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H        REFERENCES        SYMBOL      DEF     H        REFERENCES        SYMBOL      DEF     H        REFERENCES

NRMIOFLG    0076  =   72                       NVSU82   41,3604     457   1  457          OCT14       5741     1376   7  183 1479
NRMNVBIT    4744  =   72                       NVTEMP      0123  =   96   9  456  468     OCT140      4776  = 1093   3  255 1438
NRMNVFLG    0103  =   72   1 1358              NVWORO      0367     100   6  739 1363     OCT1400     5007     1090  12  464 1421
NRTERM      0020  = 1260   2 1269              NVWORO1     1066     102   2  739 1359     OCT14000    5024  = 1292   2 1291 1292
NRTRAPS  E6,1435  =  131   4 1404 1419         NV500SP  10,3121    1357   3 1349 1359     OCT15       4761     1089   4  181 1067
NRUPT8IT    4750  =   73                       NWAIT8IT    4742  =   72                  OCT15000    5025  =  183   1  181
NRUPTFLG    0107  =   73                       NWAITFLG    0101  =   72                  OCT16       4317  = 1067   1 1067
NR29&ROR    5014  =  600   1  871              NXAX     15,2420     954   1  953          OCT1601  37,3054      390   1  390
NR29EBIT    4741  =   70   3  222  610         NXPCSVEL 31,2137     614   1  615          OCT1720  06,3000      183   1  179
NSAMP       1110  =  103   3  558  560         NXT8NK   43,3660    1284   2  292 1285     OCT176   00,2126     1044   2 1050
NSRCHPNT E7,1736  =  146   5  146  597         NXTFL33  06,2432     170   7  179  180     OCT177      6077  = 1300   1 1297
NSTEER   36,3676     757                       NXTI8T   06,2420     170   3  170          OCT17770    5030     1091   2 1290 1292
NTARG8IT    4751  =   76                       NXTIFAIL 06,2225     164  11  173  178     OCT17777 31,2357      792   1  788
NTARGCHK 35,3460     680   1  680              NXTIF8IT 06,2213     164   3  164          OCT20       4747  =  743
NTARGFLG    0146  =   76   3  680              NXTRR1AX 25,2263     538   1  538          OCT20002 06,3136      189   1  189
NTP/2    34,2376     641   2  641              NXTRST   05,3026     219   1  219          OCT201   24,2306      503   1  501
NUCHANG2 01,3012    1104   1 1110              NXTSUPR  43,3705    1284   1 1284          OCT20100 10,3543     1365   1 1350
NUOIRECT 01,3226    1110   1 1110              NXT6AOR  E6,1465     131   5  221 1448     OCT203   26,2257      479
NULLCLCK 36,3021     740   3  740  741         NZACCOOT    0063  = 1470   3 1471          OCT205   24,3207      518   1  517
NUM      40,2175     401   9  400  401         N45PROC  35,3563     683   1  682          OCT21       4361  =  273   3  273  429
NUMBERT  E6,1742  =  132  19 1421 1461         N490SP   24,2645     511   1  510          OCT21103    5700     1375
NUMGRPS     4756  =  225   2  218  219         N49FLAG  E7,1746  =  147   7  154  511     OCT217      5704     1375
NUVCSM   E3,1600     112   1  584              N89DISP  14,2440     928   2  927  967     OCT220   04,3252     1325   1 1324
NUVLEM   E3,1652     112   1  584              N99LOOP  31,2034     613   1  613          OCT23       4360  = 1093   2  741 1002
NV8NKTEM    1037     102   1  456              ====================================     OCT23146 21,3326     1470   1 1471
NV8USMSK 10,3517    1364   1 1359              OAN8     04,2522     250   3  249  953     OCT24       6007      226   6  233  862
NVCAOH   10,3510    1364   1 1360              O8LATE   11,3026    1227   2 1223 1224     OCT24100 10,3255     1360   1 1348
NVCOM    40,2357     404   1  404              OCCOS    14,2567     931   2  930          OCT25       4362  = 1093   2  264  273
NVOSP    10,3071    1357   2 1358 1364         OCCULT   14,2732     934   2  933  934     OCT26    04,2332      234   2  232
NVOSP1   10,3120    1357   1 1357              OCTAL27  05,3477     826   1  824          OCT27    04,3231     1239   1 1224
NVMONOPT    4155     456   1 1357              OCTAL3      6250    1002   1 1093          OCT272   06,2776      183   1  176
NVQTEM      1036     102   2  456              OCT8ACK  41,3436     447   1  449          OCT27470 05,3367      225   1 .222
NVSAVE      0371     100   3  213 1363         OCT00010    4750  =  234                  OCT30       4763  =  429   1  429
NVS888NK    4201     456   2  456              OCT00012    4363  =  503   1  497          OCT30000    4355  =  220
NVS8COM     4164     456   1  468              OCT00240 21,3437    1472   1 1471          OCT30001 05,3371      225   1  222
NVS8ENOL 40,3475     450   2  449  452         OCT02100 06,3137     189                  OCT30002    6474  = 1093
NVS8WAIT    4445     468                       OCT05776 06,3033     185   1  184          OCT305   04,2331      234   1  233
NVS8WT1     4455     468   1  468              OCT10000    4737  =  220                  OCT31       6010      226   4  211 1472
NVSU8       4154     456   3  264 1364         OCT10001    7666  = 1093   1  184          OCT32001 05,3365      225   1  222
NVSU88   41,2000     408   1  456              OCT10002 33,2250     855   1  871          OCT32002 06,3135      189   1  188
NVSU8COM    4170     456                       OCT10200 10,3541    1365   1 1351          OCT33       4764     1090   3  226 1090
NVSU8ENO    4202     456   4  450  458         OCT11       4320  = 1089                  OCT34    07,2623      261
NVSU8SY1 04,2633     468   1  468              OCT11276 21,3633    1476   1 1474          OCT348AR 42,3600      439   2  439
NVSU8USY    4442     468   2  468 1360         OCT120      4775  = 1093   2  232  233     OCT3400  10,3513     1364   1 1354
NVSU81   41,3557     457   2  408  456         OCT13    15,2217     926   1  926          OCT34300 10,3522     1364   1 1347

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS          J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969                    PAGE 1531

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF   H      REFERENCES     SYMBOL      DEF   H      REFERENCES     SYMBOL      DEF   H      REFERENCES

OCT35        4765    1090   3  739 1375 OHWELL1   04,3400    1381   5 1381 1382 OMEGCALC  26,3610     596
OCT37667  04,2372     235   1  230      OHWELL2   04,3423    1382   4 1381 1383 OMEGDISP  E7,1734  =  146   3  146  596
OCT37737  06,2162     162   1  172      OKDESNB   25,2520     547   1  547      OMEGMOON  13,2000      46   1 1206
OCT37766     7732    1092   2  157 1405 OKDESSM   25,2423     543   1  546      ONE          4753  = 1093 182  159 1501
OCT37771  37,3535     854   1  853      OKEXIT    24,3350     578   1  578      ONE/SP    25,3601     572   1  572
OCT37774     7733    1092               OKMAX     35,3077     671   1  671      ONEB-2    23,2513  =  503   1  498
OCT37776     7734    1092   3  161 1361 OKPHI     22,2722     364   1  364      ONEBASE   37,3403     709   1  705
OCT40001     6112     958   2 1093 1116 OKTHETA   22,2702     364   1  364      ONEBIT    04,3022    1179   1 1190
OCT40010  07,3200    1307   2 1307 1309 OKTOCOPY  10,2537    1351   2 1351 1356 ONEOPP    37,3063     391   1  380
OCT40072  04,2373     235   1  230      OKTCENT   10,3312    1361   1 1363      ONEOCT    26,3710     598   1  595
OCT40200     7740    1092               OKTCGRAB  13,3454    1213   1 1212      ONEORTWO     5370    1291   1 1293
OCT40201  01,3371    1119   1 1116      OKTOPLAY  10,2600    1352   3 1351 1352 ONESEK    22,3165     369   4  368  370
OCT40400     5632    1374   3 1350 1376 OKU12     22,2256     356   1  356      ONESTO2S  30,3734     919   3  913  917
OCT40420  10,3537    1365               OKU21     22,2232     356   1  356      ONETENTH  20,2450    1411   1 1411
OCT41000  43,2324     271   2  270  271 OKU31     22,2302     357   1  357      ONETHTH   34,2107     637   1  640
OCT50        4771    1090   6  306 1438 OK2DELAY  00,3753    1369   1 1369      ONLITES   25,3640     617   1  617
OCT500    04,2330     234   3  232  233 OLDATAGO     1112  =  103   4  558  563 ONULLAGE  36,2663     737   1  731
OCT501PV  24,3206     518   1  518      OLDDATA   21,2263     892   2  892      OP/INERT  43,2203     268   2  266  268
OCT51     43,3231     300   1  299      OLDESBIT     4753  =   67   2  601  603 OPJUMP       6102     997   1  997
OCT523    33,3757     890   1  888      OLDESFLG     0016  =   66               OPJUMP2      6252    1003   1  997
OCT54     06,2774     183   1  167      OLDPIPAX  E7,1763  =  153   5  153  812 OPJUMP3      6266    1004   1 1003
OCT55000  41,3747     473   1  472      OLDPIPAY  E7,1764  =  153   3  153  812 OPONLY    06,2347     168   1  166
OCT60000     4101  = 1093   2 1292 1361 OLDPIPAZ  E7,1765  =  153   4  153  812 OPTAXIS   07,2142     249
OCT62        4774  = 1327   1 1327      OLDPMIN   E6,1460     131   4 1404 1423 OPTCADR      1302  =  106   1  224
OCT63     17,2351    1438   1 1437      OLDPRIO      5402    1291   1 1294      OPTCOARV  43,2235  =  270   1  270
OCT67777  10,3536    1365               OLDQRMIN  E6,1461     131   4 1404 1437 OPTIONVN  22,3316     716   1  715
OCT7         4757  = 1366   3 1290 1295 OLDSENSE  E6,1744  = 1501   4 1500 1501 OPTIONX      1050  =  102  13  272  716
OCT700    04,2374     235   2  231  233 OLDTIME   32,3704     828   1  828      OPTION1      1143     104   7  307 1354
OCT740    06,3001     183   1  177      OLDXFORP  E6,1440     131   5  131 1415 OPTION2      1144     104  15  497  974
OCT74160  05,3370     225   1  222      OLDYFORP  E6,1441  =  131   2 1415      OPTION3      1145     104
OCT75     06,2775     183   1  182      OLDZFORQ  E6,1442  =  131   3 1404 1416 OPTNREG   E5,1463  =  128
OCT77000  06,3002     183   1  176      OMEG/MS   37,2000      44   1  382      OPTSTALL  07,3703  = 1322   1  937
OCT7777   05,3055     220               OMEGA     E7,1502  =  147   9  147 1147 OPT4      15,2105     923   1  923
OCT77770     5650    1375   5  235 1376 OMEGAD    E7,1734  =  146   3  318  519 OP8CHG0   24,2007     497   1  497
OC24100   43,2125     265   1  264      OMEGAM1   E5,1712  =  127   3  127 1148 OP8CHG1   24,2021     497   1  497
OC40010   06,2773     183   1  182      OMEGAM2   E5,1720  =  127   3  127 1148 OR8CHG2   24,2033     497   1  497
OFFCALC   26,3561     595   1  597      OMEGAM3   E5,1726  =  127   3  127 1149 ORBCHG3   32,2217     497   1  497
OFFROT    27,3310     844   1  844      OMEGAP    E6,1421     130  16  130 1430 ORBITAL   11,2000  =   29   2 1220 1233
OFFSTFAC  26,3706     598   1  595      OMEGAPD   E6,1642     135  12  135 1430 ORBITAL1  12,2000  =   30   1 1239
OFFTUNIT  10,3767    1394   1 1394      OMEGAQ    E6,1422  =  130  14  726 1439 ORBITAL2  13,2000  =   30   3   46 1239
OGABIAS   E6,1677  =  137   3  808  908 OMEGAQD   E6,1643  =  135   7  371 1433 ORBITAL3  04,2000  =   28   1 1239
OGC       E5,1737  =  124  16  124 1246 OMEGAR    E6,1423  =  130   9 1403 1439 ORBMANUV     0003  =  237   4  237
OGCPL     37,2475     383   1  390      OMEGARD   E6,1644  =  135   7  371 1433 ORBWFBIT     4746  =   71
OGCT      E5,1747  =  125   2  125  965 OMEGAU    E6,1426     130  12  130 1444 ORBWFLAG     0066  =   71   3 1214 1236
OGF       E6,1716  =  136               OMEGAV    E6,1427  =  130   2  131  134 ORDERBIT     4746  =   79

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED        = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED   CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969            PAGE 1532

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF      H        REFERENCES      SYMBOL      DEF      H        REFERENCES

ORDERSW     0201  =   79    3 1176 1177 PASTEV8     4124      443     3  443  450 PHASE2      0754      101     2  756  853
ORIG     E4,1515  =  116                PASTIT   07,2211      253     1  261      PHASE3      0756      101     1  731
ORIGCHNG 11,3440    1232    1 1232      PAUTNC   30,3153      906     2  905      PHASE4      0760      101     1  857
ORIGEX   E4,1512  =  115    4  115 1232 PAXAOIOL 16,2204     1405     1 1404      PHASE5      0762      101     1  731
ORIGIN   E5,1773  =  127                PAXOIST  E6,1564   = 1497     2 1495      PHASE6      0764      101     1  736
OTHCONIC 37,3211     706    1  709      PAXFILT  16,2647     1420     1 1414      PHASJUMP    5363     1291     1 1290
OTHERS   13,3472    1214    1 1215      PAXIS    16,2213     1413     2 1405 1498 PHEXIT   13,3175     1209     1 1209
OTHINT   37,3222     707    1  709      PAXISAOR 20,3772     1498     1 1483      PHI         0024   =  524
OTHPREC  13,3042  =   37    3  703  716 PBIASX   E3,1452      110     2  110  795 PHIV     E4,1445   =  115     6  115 1234
OTHSHIP  22,3333     716                PBIASY   E3,1454      110     1  795      PHS881   E3,1437      110
OURPERMS E7,1621  =  151    2  151      PBIASZ   E3,1456      110     1  795      PHS882   E3,1441      110
OURRCBIT    4740  =   87    6 1424 1438 PBIT        4742   =  132     4 1424 1427 PHSB83   E3,1443      110
OURRCFLG    0306  =   87                PBODY    E4,1430      114    19  115 1238 PHSB84   E3,1445      110
OURTEMPS E7,1544  =  151    1  151      PCLOOP   05,2774      218     1  219      PHS885   E3,1447      110
OUT      13,2327     713                PCONS    E4,1744   =  121     5  121  847 PHSB86   E3,1451      110
OUTGOAVE 22,3707  =  859                PCA         0026   =  125                 PHSCHNGA    5357     1290     1  230
OUTHERE     0161  = 1365    3 1361 1363 PO81     E6,1560   = 1497     1 1495      PHSCHNG2 10,2224     1292     1 1291
OUTLINK     0057  =   93                PO82     E6,1561   = 1497     1 1495      PHSNAME1 E3,1436      110     5 1292 1297
OUTOFLIM 24,3170     517    2  517  518 PO83     E6,1563   = 1497     1 1495      PHSNAME2 E3,1440      110     1  821
OUTOFPLN E5,1616  =  123    3  123  783 PO84     E6,1562   = 1497     1 1495      PHSNAME3 E3,1442      110     1  821
OUTSNUFF 43,3251     360    1  263      POOL        6526     1014     1 1005      PHSNAME4 E3,1444      110
OUTO        0010  =   93    5  158  162 PCSPFBIT    4740   =   72     2  478  479 PHSNAME5 E3,1446      110     2  883
OUT22.1  32,2535     577    2  577      POSPFLAG    0077   =   72     3  479  523 PHSNAME6 E3,1450      110
OUT22.2  24,3353     579    1  578      PCVL        6562     1015     1 1005      PHSPART2 01,3764     1300     1 1300
OVERFFIX 37,2275     380    2  378  382 POXCHNGE 12,2274     1171     2 1171      PHSPROT1    1053      102     5 1291 1299
OVERFLOW    7022    1022    3 1021 1045 PEGI     16,3304     1427     2 1427      PHSPROT2    1055      102     3  231  823
OVERFLWY    7017    1022    4 1020 1045 PERFCHEK 10,3136     1358                 PHSPROT3    1057      102     1  235
OVERFLWZ    7014    1022    4 1020 1045 PERFOLAY E5,1574   =  129     1  376      PHSPROT4    1061      102     1  234
OVERSUB  16,2310    1414   12 1416 1433 PERFERAS 37,2772      389     1  387      PHSPROT5    1063      102
OVERSUB2 20,2451    1411    3 1407 1408 PERFMASK 10,3476     1364     2 1352 1354 PHSPROT6    1065      102
OVF+     00,2414    1051    2 1051      PERF2MSK 10,3502     1364     2 1352 1354 PHS2CAOR 01,3771     1300     1 1295
OVFIND      0121      96   13  808 1103 PERF4MSK 10,3504     1364     1 1354      PI/16    27,3755     1275     2 1271 1273
OVFLCLR  12,3210    1186    1 1186      PERIAPC  23,2351      697     1  639      PICAPAR  14,2603      932     1  932
OVFLOWCK E5,1576  =  129    3  375  390 PERIAPO1 23,2341      697     3  622  665 PIC8XT   14,3005      935     1  935
======================================= PERIOOCH 12,2112     1169     1 1169      PICENO   14,2760      934     1  933
P        E5,1737  =  126   14  126 1194 PERROR   E6,1464      131     8  156 1430 PICGXT   14,2764      935     1  935
P-RATE   16,2510    1417                PFAILOK  07,3245     1309     1  168      PICKANG1 27,2147      486     1  486
P-RHCCTR    0043  =   92    4 1426      PFAILOK2 07,3240     1309     1 1309      PICKAXIS 27,2170      487     2  485
PACCFUN  E6,1556  = 1497    2 1490      PFLITE08 20,2143     1400     3  749  833 PICKX    26,2376      487     2  487
PACKOPTN 15,3374     970    2  969      PFRATBIT    4750   =   69     1  922      PICNSWP  14,3003      935     1  935
PACTIVE  05,3034     219    1  219      PFRATFLG    0051   =   69     4  764  939 PIC1     14,2640      933     3  933
PARAM    04,3030    1180    3 1180 1194 PGUIOE      1246   =  105     6  105  875 PIC2     14,2643      933     1  933
PARAM30  35,2021     619                PHASCHNG    5353     1290   119  230 1387 PIC3     14,2653      933     5  933  934
PASSIVE  23,2435     699    4  627  655 PHASETAB 10,2000   =   29     2 1286 1292 PIC4     14,2656      933     1  933
PASTEOPT    4132     443    1  443      PHASE1      0752      100     3  219 1294 PIF      E7,1612   =  151    11  151  808

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED            = DEFINED BY EQUALS             J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF    H       REFERENCES      SYMBOL       DEF    H       REFERENCES      SYMBOL       DEF    H       REFERENCES

PIFPSET  E7,1606  =  151    5  151  791 PITCHANG E4,1600  =  119    7  119  492 POSALARM 33,3653     888    2  888  889
PINACT   05,3041     219    1  219      PITCHOFF 27,3260     777    2  776      POSALPH  21,3370    1471    2 1471
PINBALL1 40,2000  =   36    2  301  400 PITFALL  11,2302     814    2  156      POSCHECK 21,3702    1501    1 1500
PINBALL2 41,2000  =   36    1  408      PITTIME  E6,1402     130    2  316  776 POSCODE     1241  =  955    6  318  955
PINBALL3 42,2000  =   36    3  283  423 PJETCTR  E6,1766     138    4  138 1420 POSDEL   12,2620    1177    1 1176
PINBALL4 04,2000  =   28    1  461      PJETSLEC 16,3362    1428    5 1423 1431 POSDELX  12,2246    1171    1 1170
PINBRBIT    4746  =   73                PLANET   15,2472     956    7  937  964 POSDRIVE 21,3574    1475    2 1465 1475
PINBRFLG    0105  =   73    1 1357      PLANTIN  24,2000  =   32    1 1135      POSEC    42,2414     426    2  426
PINBRNCH 10,3051    1356    8  229 1364 PLANTIN1 26,2000  =   33    2 1134 1140 POSFNCT1 21,3227    1466    1 1466
PINIDMSK 10,3350    1361    1 1361      PLANTIN2 26,2000  =   33    1   92      POSGMBL  37,2064     376
PINMASK     7743  = 1364    1 1357      PLANTIN3 25,2000  =   32    1 1138      POSGN    40,2407     404    1  400
PINSUPBT    4201  =  456    5  276  460 PLANVEC  E7,1553  =  147    5  147  946 POSGOOD  33,3641     888    2  888  889
PINSUPER 40,2000  =   36    1  276      PLAST    E6,1454     131    5 1416 1427 POSITA   15,3663     979    1  980
PINTEST  43,2002  =  470                PLAYJUM1 10,2616    1352    3 1357 1364 POSITB   15,3666     979    1  980
PIPABIAS E3,1452  =  110    1  328      PLAYTEM1    0155  = 1365   28 1346 1355 POSITO   15,3705     980    1  981
PIPACHK  37,2126     377    1  376      PLAYTEM3    0157  = 1365    3 1354 1362 POSITE   15,3753     981    1  980
PIPAGE      1256  =  105    5  107  866 PLAYTEM4    0160  = 1365   11 1346 1362 POSITF   15,3726     980
PIPASC   37,3077     391    1  387      PLENTY   25,3223     559    1  559      POSITON  E5,1416  =  128    6  128  383
PIPASCF  E3,1453  =  110    1  328      PLUSFIRE 21,3722    1501    1 1501      POSMAX      4733    1089   46  173 1498
PIPASCFX E3,1453     110    1  110      PLUSX    27,2423     764                POSNV    E5,1520  =  129    2  388  389
PIPASCFY E3,1455     110                PMINE    34,2073     637    2  646      POSTAND  37,3731    1328    2 1327 1328
PIPASCFZ E3,1457     110                PMINM    34,2103     637                POSTBURN 36,3227     749    4  242  755
PIPASR   37,3536     864    4  336  957 PMMASK   10,3515    1364    1 1352      POSTCDH  E7,1603     143    3  143  646
PIPATASK 37,2151     377    2  377      POINTER     0156  = 1300    7 1298 1300 POSTCOM  37,3760    1329    2 1329
PIPATMPX    1157     104    4  812  894 POINTVSM E7,1772  =  148    7  154  951 POSTCSI  E7,1601     143    2  639  646
PIPATMPY    1160     104    4  812  894 POLISH      0117      96   39   96 1088 POSTHRST 21,3656    1500    5 1501 1502
PIPATMPZ    1161     104    4  812  895 POLLEY      5051    1096    2 1096      POSTJUMP    4635     992   63  167 1394
PIPAX       0037  =   92   15  307 1310 POLY        7225    1028    7  851 1274 POSTORKP E6,1513  =  133    1  197
PIPAY       0040  =   92    6  385 1310 POLYCNT     0140  =   97    4 1028 1029 POSTORKU E6,1515  =  133    5  196  206
PIPAZ       0041  =   92    9  385 1310 POLYCOEF 12,3031    1183    1 1185      POSTORKV E6,1517  =  134
PIPCTR      1055  =  823    4  603  853 POLYCOM     7235    1028    1 1028      POSTST   33,3674     889    3  870  889
PIPCTR1  E7,1714  =  823    2  823  891 POLYLOOP    7245    1029    1 1029      POSTTPI  E7,1605     143    4  143  665
PIPFAIL  06,2650     179    1  183      POLYRET     0141  =   97    3 1028 1029 POSUPDAT 33,3125     877
PIPFREE  07,3301    1310    1  858      POLYTEMP E6,1740  =  132   10 1422 1450 POSVMAXY 21,2702     898    2  898
PIPFREE2 07,3276    1310    1 1310      POLY2       7250    1029    1 1029      POS1/2      4736  = 1093    2 1116
PIPINDEX E5,1415  =  128    6  128  381 PON      37,2251     378    1  378      POS1/4   12,3765  = 1239
PIPJOBB  37,2166     377    1  377      PON2     37,2240     378                POS1CHK  33,2536     870    1  869
PIPSDONE 37,3447     853    1  866      PON4     37,2245     378    1  378      POS2CHK  33,2540     870    1  869
PIPSRINE 37,3541  =  957    2  960  961 POODOO      5642    1375    5  245 1226 POWERDB  20,2153    1400    2 1399 1400
PIPTEM   E4,1657  =  117    7  120  887 POODOO1     5716    1376    2 1073 1126 POWFLITE 23,2000  =   32    1 1251
PIPTIME     1233     105   26  197 1215 POOFIZZ  04,2263     233    1  233      POWFLIT1 23,2000  =   32
PIPTIME1 E7,1560  =  149   11  149 1217 POOH     04,2167     231                POWRSERS    7220    1028    2  819
PIPUSE   07,3264    1310                POOHBIT     4735  =   70                PQRBIT   16,3132    1425    1 1425
PIPUSE1  07,3270    1310    1  338      POOHFLAG    0055  =   70    3  231 1212 PRATE    E4,1750  =  121    9  121  847
PITCH    E4,1764  =  121    2  318  833 POOKLEAN 05,2645     216    1  232      PROTTAB  01,2000  =  240    3 1298 1300

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS            J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF    H      REFERENCES   SYMBOL      DEF    H      REFERENCES   SYMBOL      DEF    H      REFERENCES

PREBJUMP    5316    1286               PRIO24      7715    1091   1  556      PTBAO    05,3052     219   3  218
PRECIBIT    4744  =   71               PRIO25      7716    1091   4  494  857 PTIGINC  E7,1402     140   1  668
PRECIFLG    0064  =   71   6  238 1212 PRIO26      7717    1091  10  370  610 PTOACSM  13,2704    1204   1 1209
PRECSET  23,2403     699   4  627  668 PRIO27      7720    1091   5  194 1403 PTOALEM  13,2757    1205   2  299 1209
PREDOT      7157    1027   2 1032 1035 PRIO3       5015    1091  13  253 1093 PULSEFLG    0303  =   87   4  286  786
PREDSPAL 40,3452     449   1  419      PRIO30      4355  = 1093  12  176 1363 PULSEIMU 10,3706    1392   1  382
PREGUIDE 31,2366     793   1  799      PRIO31      7721    1091   5  338 1433 PULSEM   14,3222     940
PREMM1   04,2437     236   2  230  234 PRIO32      7723    1091   4  867 1359 PULSES      4735  =   87   3  732 1436
PREMON1  11,2323     815   1  815      PRIO33      7724    1091   1 1351      PURGENCY 16,3467    1430   4 1422 1427
PREMON2  11,2324     815   1  815      PRIO34      7725    1091   1 1093      PURRS4   10,2716    1354   2 1353 1354
PRENVBSY    4437     468   1  468      PRIO35      7726    1092   1 1115      PUSH     00,3247    1071   1 1007
PREPOS29 25,3604     602   1  601      PRIO36      7727    1092   1  566      PUSHLOC     0166      99  38  253 1103
PREREAD  37,3410     852   1  731      PRIO37      7730    1092   8  234 1396 PUSHUP      6220    1002   1  998
PRERRORS 43,3273    1278   3 1279      PRIO4       4740  = 1093   4  276  493 PUTADD   41,2334     413   3  413
PRESINE  00,3526    1076   2 1076      PRIO5       5017    1091  10  231 1202 PUTCOM   41,3120     432   8  428  431
PRESTAND 37,3654    1327   1 1327      PRIO6       5020    1091   4  540 1421 PUTCOM2  41,3200     433   4  433  435
PRESTORE    6424    1010   1 1010      PRIO7       5021    1091   7  277  719 PUTDCSF2 41,3232     434   1  434
PRETIMCK 16,2667    1420   2 1419      PRLIMIT  33,2200     850   2  841      PUTDECSF 41,3217     434   2  433
PRIOBORT 10,2576    1352   2 1350 1360 PROCEED  10,3412    1362   1 1360      PUTDPCOM 41,3153     433   1  433
PRIOCHNG    5146    1099  19  277 1361 PROCEEDE 06,2075     160               PUTNORM  41,3162     433   1  432
PRIOCH2  01,3073    1106   1 1099      PROCKEY  40,3506     452   1  160      PUTSFNOR 41,3231     434   1  434
PRIODBIT    4736  =   72   1 1357      PROCKEY1 40,3514     452               PUTXY    41,2737     430
PRIODFLG    0075  =   72               PROCTNDN 06,2242     166   1  166      PUTXYZ   41,2636     428
PRIODSP  10,2510    1350   2  509  511 PRODUCT  21,3524    1474               PVALVEST    1273     106   7  193  213
PRIODSPR 10,2505    1350   2  519 1374 PROGLARM    5614    1373   2 1373      PWRCNT      0140  =   98   2  818  819
PRIDENT     5575    1373   2 1374 1376 PROGRAV  15,2652     960   1  960      PWRPTR      0117  =   98   4  818  819
PRIOLARM 10,3563    1374   7  500  888 PROG20   24,2000     496   2  236  496 POOHCHK  13,3350    1212   2 1211 1212
PRIODCT  10,3532    1365   2 1348 1355 PROG20A  24,2040     499   3  497  499 P05P06   37,2000  =   36   1 1327
PRIOPLAY 10,2617    1352   2 1348 1351 PROG21   24,3506     657   1  236      P06      37,3652    1327   1  236
PRIORITY    0167      99  34  223 1353 PROG22   24,2000  =  496   1  236      P1CHK    33,3662     888   1  888
PRIOTIME    1164     104   2 1351 1361 PROG25   24,2400     506   1  236      P12      30,2000  =   34   1  831
PRIO1       4742  = 1093               PROG52   15,2050     922   1  235      P12A     23,2000  =   32
PRIO10      4737  = 1093   5  286  776 PROJ        0022  =  152               P12ADRES 30,2314     834   1  832
PRIO11      5022    1091               PROJMAX  31,3714     822   1  807      P12IGN   36,2525     734   1  725
PRIO12      4644     902   3  213  755 PROJMIN  31,3715     822   1  807      P12INIT  30,2251     833   2  828  831
PRIO13      5023    1091   3  740 1347 PRCK     30,2553     841   2  841      P12LM    30,2061     831   1  236
PRIO14      5024    1091   3  507 1295 PRONVBIT    4745  =   73               P12LMB   30,2122     831
PRIO15      5025    1091   5  183 1363 PRONVFLG    0104  =   73   1 1358      P12RET   30,2216     833   1  843
PRIO16      5026    1091   6  183  735 PRSHRTMP    4415     466   4  422  424 P12SPOT  36,2150  =  727   1  725
PRIO17      5027    1091   5  729  846 PRT2CADR 01,3772    1300   1 1297      P12TABLE 36,2024     725   1  834
PRIO2       4741  = 1093               PSEUDO55 E7,1614  =  151   3  151  790 P2CHK    33,3670     888   1  888
PRIO20      4736  = 1093   8  270  853 PSIV     E4,1453  =  115   3  115 1234 P20FLGON 35,2366     634   4  626  668
PRIO21      5031    1091   4  330  852 PSKIPADR 16,3627    1433               P20LEMA  24,2111     500   3  500  513
PRIO22      7713    1091   6  292  871 PSTHIBIT    4741  =   84   2  869  877 P20LEMB  24,2117     500   6  500  501
PRIO23      7714    1091   2  256  888 PSTHIGAT    0251  =   84               P20LEMB1 24,2163     501   1  517

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS              J DEFINED BY JOKER OR ERASE ANYWHERE      MO MULTIPLY DEFINED
BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES

P20LEMB2  24,2166       501    1  501        P3XORP7X  35,3613       685    1  682        P40S1     27,2000  =   33    4   38  759
P20LEMB3  24,2170       501    2  501   502  P30       35,2000       619    1  236        P40S2     35,2000  =   35    1  742
P20LEMB4  24,2205       502    1  501        P30EXIT   E5,1773  =   127    1  127        P40S3     35,2000  =   35    1  735
P20LEMB5  24,2135       501    1  509        P30N33    35,2004       619                  P40TABLE  36,2040      725    1  743
P20LEMB6  24,2153       501    2  501        P30S      35,2000  =    35    1  619        P40ZOOM   35,3677      735    1  735
P20LEMB7  24,2130       500                  P30S1     34,2000  =    34    1  621        P40ZOOMA  35,3704      736    1  735
P20LEMC   24,2217       502    3  509   511  P30ZERO   35,2424       636   10  626   663  P41ADRES  36,3140      743    1  750
P20LEMC1  24,2244       502    3  241   503  P32       35,2034       626    1  236        P41BLANK  36,2265      729    1  729
P20LEMC2  24,2261       503    1  502        P32/P72A  35,2060       626    1  626        P41FJET   36,3307      750
P20LEMC3  24,2211       502    3  501   513  P32/P72B  35,2136       627    1  628        P41FJET1  36,3311      750    1  750
P20LEMC4  24,2216       502    1  504        P32/P72C  35,2157       628    1  646        P41IN     36,3314      751    1  750
P20LEMD   24,2264       503    1  502        P32/P72D  35,2163       628    1  628        P41LM     36,3276      750    1  236
P20LEMD1  24,2270       503    2  503        P32/P72E  35,2165       628    1  628        P41MANU   36,3221      749
P20LEMD2  24,2277       503    1  503        P32/P72F  35,2173       628    1  628        P41NDPM   36,3316      751
P20LEMF   24,2231       502                  P32STRT   35,2037       626    1  626        P41SPOT   36,2153      728    2  726  727
P20LEMWT  24,2232       502    6  500   524  P33       35,2223       632    1  236        P41TABLE  36,2055      726    2  743  758
P20LEM1   24,2063       500    2  500   520  P33/P73A  35,2226       632    2  632   633  P42ADRES  36,3141      743    1  752
P20LMWT1  24,2241       502                  P33/P73B  35,2240       632    1  633        P42IGN    36,2545      734    4  726  734
P20REG    04,2333       234    1  233        P33/P73C  35,2307       633    1  632        P42LM     36,3414      752    1  236
P20S      24,2000  =     32    8  496   657  P33/P73D  35,2313       633    1  633        P42SPOT   36,2150  =  727    1  726
P20S1     25,2000  =     32    3  530   572  P33/P73E  35,2321       633    1  633        P42STAGE  36,3424      752    1  726
P20S2     25,2000  =     32                  P33/P73F  35,2332       633    1  633        P42TABLE  36,2063      726    1  743
P20S3     26,2000  =     33    1  581        P34       35,2455       663    1  236        P47BOD    36,3510      754    1  754
P20S4     32,2000  =     34    1  497        P34/P74A  35,2460       663    2  663   664  P47BODY   36,3517      754    2  753  754
P21       E6,1702  =    136                  P34/P74B  35,2502       663    1  663        P47LM     36,3442      753    1  235
P21ALT    E7,1715  =    150    2  319   659  P34/P74C  35,2504       663    1  665        P50S      15,2000  =   31    5  251  959
P21BASER  E7,1675  =    150    3  150   658  P34/P74D  35,2545       664    1  664        P50S1     14,2000  =   31    2   45  928
P21BASEV  E7,1703  =    150    3  150   658  P34/P74E  35,2550       664    1  664        P51       14,3421      945    3  235  946
P21CONT   24,3555       658    1  657        P35       35,2635       668    1  236        P51B      14,3453      945    1  945
P21DSP    24,3632       658    1  658        P35/P75A  35,2644       668    1  668        P51C      14,3464      945    1  946
P21FLAG       0004  =    65    2  657   658  P35/P75B  35,2651       668    1  668        P51D      14,3502      946    1  945
P21FLBIT      4741  =    65    1  219        P40/RET       1141      104    4  740   749  P51E      14,3522      946    1  946
P21GAM    E7,1713  =    150    3  150   658  P40A/P    35,3711       742    1  743        P51G      14,3544      946    1  946
P21ORIG       1162  =   150    2  658        P40A/PMD  35,3735       743    1  743        P52A      15,2060      923    2  923
P21PROG1  24,3521       657    1  659        P40ADRES  36,3137       743    1  748        P52B      15,2062      923    1  923
P21PROG2  24,3533       657    1  659        P40ALM    36,3125       742    2  748   752  P52D      15,2143      925    2  925  927
P21PRTM   24,3667       659    1  657        P40AUTO   35,3707       742    2  727   828  P52E      15,2102      923
P21TIME   E7,1762  =    148    7  145   659  P40IGN    36,2510       733    1  726        P52F      15,2164      925    1  923
P21VEL    E7,1711  =    150    4  150   658  P40IN     36,3204       749    1  753        P52H      15,2153      925    1  923
P21VSAVE  24,3576       658    1  658        P40LM     36,3153       748    1  236        P52LS     15,2220      927    1  924
P25FLAG       0006  =    66    3  289   780  P40PHS1   36,3242       750    2  750   754  P52OUT    15,2166      925    1  926
P25FLBIT      4743  =    66    2  230   506  P40S      36,2000  =    36    6   38   748  P52T      15,2110      923    2  923
P25LEM1   24,2414       506    3  241   507  P40SJUNK  36,2372       731    2  726        P52V      15,2130      923
P25LEM2   24,2437       507    1  507        P40SPOT   36,2150       727    3  725   727  P52W      15,2137      925    1  923
P25LMWT1  24,2433       507    1  507        P40SXT4   36,3217       749    2  749   751  P57       15,3277      969    1  235

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UN UNDEFINED         = DEFINED BY EQUALS           J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     OEF      H      REFERENCES      SYMBOL     OEF      H      REFERENCES      SYMBOL     DEF      H      REFERENCES

P57A      15,3336      969                 P75       35,2641      668   1  235         QUIKDSP   06,2134      162   1  157
P57AA     15,3340      969    1  969       P76       13,2207      711   1  235         QUIKFAZ5  33,3512      883  11  856  882
P57C      15,3363      970    2  970       P76LOC    13,2000  =    30   1  711         QUIKOFF   06,2165      162   1  162
P570      15,3365      970    1  970       P76SUB1   13,2336      713   I  712         QUIKRUPT  06,2144      162   1  162
P57JUMP   15,3544      974    2  966       ====================================== QUITBIT      4747  =    81
P57OPT    15,3303      969    2  969       C             0002  =    92 437   93 1501 QUITFLAG     0221  =    81   4  300 1211
P57OPT0   15,3560      975    2  974       Q+1           6742      1019   7  159 I366 ======================================
P57OPT1   15,3601      975    1  974       Q+10000       4643       992   1  994      R         E7,1520  =   149  23  149  875
P57OPT2   15,3617      976    1  974       Q+2           6744  =  1019   5  525 1371 R(CSM)    E3,1717  =   121   7  603  875
P57OPT3   15,3620      976    1  974       Q-RATE    16,2544      1418   2 1418      R*TL**P   23,3702     1255   2 1256
P57POST   15,3171      966    3  965  966  Q-RHCCTR      0042  =    92   3 1425 1426 R-OTHER   E3,I717      112   5  121  323
P63AORES  32,3255      784    1  780       Q,RORGTS  17,2136      1434   1 1434      R-RATE    16,2602     1419   2 1418
P63DISPS  31,3437      809    1  794       QACCDOT   E6,1510  =   133   6 1403 1483 R-RHCCTR     0044  =    92   3 1425 1426
P63IGN    36,2464      733    1  727       QAXIS     F7,1717  =   153   3  833  849 R-TO-RP   24,3700     1136   6  786 1227
P63IGN1   36,2520      733                 QCOLWLSR  E6,1646  =   137   3  137  913 PACCDOT   E6,1512  =   133   4 1403 1468
P63LM     32,3000      780    1  235       QCHAN         0002  =    93   2 1087      RACTCAOR  05,3060      220   1  219
P63SPOT   36,2153  =   727    1  726       QDIFF     E6,1450  =   133   3 1464 1469 RACT1     E4,1702      117  11  118  651
P63SPOT2  32,3217      783    1  783       QERRCALC  17,2655      1443   2 1405 1434 RACT2     E4,1710      117   9  118  652
P63SPOT3  32,3237      784    1  784       QERRCALL  16,3643      1433   1 1433      RACT3     E7,1535      143  20  627  699
P63SPOT4  32,3251      784    1  784       QERROR    E6,1450  =   131   5  133 1444 PADARANG  26,3361      592   2  586  587
P63TABLE  36,2100      726    2  743  784  QGIMBITS      5007  =  1421   1 1420      RADAREAO  25,3157      559   2  156
P63ZOOM   35,3672      735                 QGIMTIMR  E6,1631       135   9  135 1472 RADARFF      4000  =    28   1  524
P64CEED   31,3457      810    1  810       QLAST     E6,1455       131   5 1416 1439 RAOARUPT  25,2000  =    32   3   41  617
P64D8     31,3707      821    1  797       QMAJ      E5,1746  =   125  17  125  977 RADCAOR      1303  =   106   4  224  545
P640ISPS  31,3442      809    2  794  810  QMIN      E5,1745  =   125  17  125  965 RADOEL       1270      106   2  565
P65START  31,2547      797    1  793       QMINEXIT  15,2755       961   1  963      RADIN     25,3332      561   1  561
P65VERT   31,3505      810                 QCK       26,2611       583   1  583      RADLITES  25,3612      617   2  560  564
P65VERTA  32,3272      811    1  810       QPLACE    E5,1417  =   128   7  128  383 RAOMOOES     0110  =    85 116  175  871
P66LOC    32,2000  =    34    1  811       QPLACES   E5,1420  =   128   3  128  382 RAONOOP   25,3513      567   2  541  567
P66VERT   31,3510      811    1  810       QPRET         0052  =    93  18  300 1235 RADSAMP   25,2003      494   2  279  494
P66VERTA  32,3300      811    1  811       QRATEDIF  E6,1436  =   131   2 1439      RAOSKAL      1351      108   1  877
P70       21,2067      824    1  235       QRAXIS    16,3630      1433   4 1421 1430 RADSTALL  07,3705     1321  17  266  888
P70A      21,2070      824    2  243  824  QRBIT         4741  =   132   4 1425 1440 RADSTART  17,2000      565   3  558  565
P70CAOR   04,2404      235    1  235       QRCNTR    E6,1747  =   133   9 1464 1476 RADTIME      1267      105   2  565
P70INIT   32,3555      826                 QRCCNTRL  17,2232      1436   1 1435      RAMIN     E5,1562  =   123   3  123  848
P70NOW?   21,2056      824                 QRNOXER       0066  =  1470   9 1471 1472 RANGCONV  32,2003       41   1  576
P70718IT     4737  =    80                 QRTIME    17,2544      1440   2 1440      PANGE     E4,1600      116  10  116  707
P7071FLG     0211  =    80    4  826  843  QRUPT         0012  =    92  13  157 I420 RANGE8Q   26,2514      582   3  582  589
P71       21,2072      824                 QSAVED    E7,1464       142   2  682  683 RANGEBQ1  26,2524      582   1  582
P71A      21,2073      824    2  243  824  QTEMP     E7,1632       144   5  621  761 RANGEOSP  E5,1616  =   123   3  123  801
P71NOW?   21,2043      823                 QTEMP1    E7,1665       144   6  144  757 RANGEVAR  E3,1770      113   1  583
P71RET    32,3667      828    1  826       QTSN45    23,3535      1249   1 1243      PANGRDOT  E7,1760  =   148   3  148  576
P72       35,2036      626    1  235       QUAOGUIO  31,3066       803                RAPFG     E5,1436  =   122   1  122
P73       35,2225      632    1  235       QUARTER       4737  =  1093   4 1075 1080 RAPO         0020  =  I266   1 1266
P74       35,2457      663    1  235       QUICTRIG  23,3617      1253   5  606 1253 RAPREC    E7,1477  =   143   2  669  672

HEALTH KEY: NORMALLY OEFINEO UNLESS FLAGGED AS FOLLOWS:

UN UNOEFINED          = OEFINED BY EQUALS              J OEFINEO BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINEO
80 8AOLY DEFINED     CD OEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL        DEF H     REFERENCES        SYMBOL        DEF H     REFERENCES        SYMBOL        DEF H     REFERENCES

RASFLAG      0106 =    82   6 1212 1213 RDLDNOR   40,3023     423   1  423      REDOMASK  10,3505    1364   2 1349
RASTEER1  27,2731     771   1  766      RDM       13,3742    1240               REDOPRID  10,2543    1351   1 1364
RATEBIAS  22,3133     369   1  369      RDDT      E7,1473 =   120   5  833  848 REDO2.17  36,2341     730   1  241
RATEDAMP  16,3220    1426   4 1424 1425 RDDTBIAS  25,2001      41   1  561      REDO4.2   36,2344     731   2  242  753
RATEDB1      4767 =  1502   1 1501      RDDTCCNV  32,2001      41   1  576      REDO5.5   37,3451     853   1  243
RATEDISP  43,2175     267   1  263      RDDTD     E4,1672 =   120   5  120  839 REDO6.7   36,3354     751   1  244
RATEDONE  16,3134    1425   1 1425      RDDTDNCM  34,3370     835   1  832      REDSPTEM  32,2017     209   2  209
RATEINDX     1322     107   3  214  266 RDDTM     E7,1750 =   148   4  148  584 REFLASH   10,2460    1349   3  739  810
RATELIM1     4766 =  1502   1 1501      RDDTMSAV  E7,1746 =   148   4  147  576 REFLASHR  10,2463    1349   1  750
RATELIM2  21,3655    1500   2 1502      RDDTV     E7,1616     143   4  144  641 REFMF     15,3471     973   3  787  974
RATELOCP  16,3645    1462   2 1420 1462 RDRET     E7,1675 =   147   3  147  592 REFSMBIT     4737 =    70   7  208 1324
RATEPRCR  16,3232    1426   1 1426      RDRLDCS   25,2065     495   1  495      REFSMFLG     0057 =    70   7  682  966
RATES     30,2510     840   1  840      RDRPTBB      4063     156   1  155      REFSMMAT  E3,1733     112  53  196  973
RATESP    05,2027      52   2  980      RDRUSECK  43,2700     282   5  266  278 REGCDARS  15,2156     925   1  926
RATESTOP  31,3411     808   2  808  821 RDSP      E5,1434 =   128               REGODSP   10,2466    1350   3  730  809
RATESTRT  05,3057     220   1  214      READACCS  37,3437     853   1  866      REGODSPR  10,2471    1350
RATEVAR   E3,1772     113   1  584      READCDUD  23,2322     524   1  522      REGSLEEP  07,3363    1312   1 1312
RATT         0000 =  1240  33  341 1217 READCDUK  22,2403     359   2  353  485 REGUR        6236    1002   3 1002
RATT1        0016 =  1240  11  211  782 READLO    40,3003     423   4  422  424 REINTBIT     4745 =    82   3 1213 1376
RBREG     E5,1402 =   122   2  122  821 READLO1   40,3014     423   1  423      REINTFLG     0236 =    82   5  713 1384
RC8-13    05,2025      52   1  980      READRBIT     4743 =    71   3  222  610 REJALM    07,2466     258   1  258
RCDUFAIL     0274 =    86               READRDDT  32,2404     575   1  577      REJECT    07,2471     258   1  258
RCDUEBIT     4745 =    86   6  186  569 READRELG     0063 =    71   1  612      REJECT2   07,2504     258   1  258
RCDUOBIT     4737 =    85   5  503  541 READV     33,3467     882   1  882      RELDSP       4457     468  10  229  829
RCDUOFLG     0266 =    85               READVBIT     4747 =    84   1  882      RELDSPON     4374     465   3  400  468
RCNDRM       0042 =   126   3 1172 1173 READVEL      0257 =    84   1  882      RELDSP1      4502     469   2  442  454
RCD       E7,1630 =   154   5  154  849 RECALTST  40,3612     462   2  431  452 RELDSP2      4473     469   2  469
RCS       17,2141    1434   4 1441 1442 RECAL1    40,3615     462   1  462      RELINTQ   10,3232    1359   2 1355 1359
RCSFLAGS     1262     105  55  213 1475 RECAL2    40,3626     462   2  462  463 RELINUS   26,2223     479   1  241
RCSMON    06,3164     193   1  193      RECAL3    40,3640     462               RELOADSV  11,3651    1236   1 1235
RCSMONEX     5270 =   192   2  193  194 RECRATIO  13,3736    1240   1 1231      RELRET       0144 =    97   4  468  469
RCSMONIT  06,3164 =   193   2  161      RECTEST   11,3342    1231   3 1230 1232 RELTAB       4066     157   4  159  447
RCSMONT   06,2000 =    29   1  192      RECTIFY   13,3671    1233   8 1150 1232 RELTAB11     4101     157   2  158 1093
RCV       E3,1534 =   111  26  111 1233 RECTOUT   13,3177    1209   2 1209 1210 REMARK    07,2576     261   3  258  260
RCVCSM    E3,1606     112   1  591      RED-OVER  31,3465     810   1  809      REMDIST   42,2000      46   1  491
RCVLEM    E3,1660     112   2  504  591 REDES-CK  31,3467     810   1  809      REMODBIT     4736 =    85   6  536  601
RDBADEND  25,3565     569   4  550  565 REDESIG   31,2654     799   1  793      REMODE    25,2202     535   2  550  602
RDCDUS    14,3405     943   1  942      REDFSMON  11,2326     815   1  815      REMODFLG     0265 =    85
RDE       13,3744    1240   1 1227      REDES1    31,2725     800   1  800      RENDEND   26,3176     588   1  585
RDES         1313 =   106   4  106  538 REDFLAG      0143 =    76   5  780  810 RENDEZ    22,2000 =    32   1 1151
RDESGAIN  25,3075     556   2  554      REDFLBIT     4746 =    76   2  799  809 RENDEZVU     0002 =   237  13  237
RDESIRED  E5,1755 =   126   3  126 1192 REDD      37,2002     375   1  292      RENDNDD   04,2266     233   2  232
RDG       E5,1402 =   821   2  802  804 REDDCTR      0320      99   3  196  217 RENDRAD   25,3277     561   1  560
RDGIMS    34,3632     887   1  885      REDOMANC  26,2154     478   1  478      RENDVOO   04,2232     232   1  232
RDIEE     E6,1452 =   133               REDOMANN  26,2125     477               RENDWBIT     4753 =    75   1  292

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091       17:53 DEC. 19,1969                PAGE 1538

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF   H       REFERENCES        SYMBOL       DEF   H       REFERENCES        SYMBOL       DEF   H       REFERENCES

RENOWFLG     0131 =   75  13  258 1236 RETNON   C6,2264     166   1  167      RNOVZ81T    4745 =   66   8  187  597
RENEWMK  C7,2501     258   1  258      RETROOT     0132 =   98   3  818  820 RNOVZFLG    0010 =   66   7  289 1327
REPETE   35,3107     671   1  671      RETURNTJ 17,3521    1456   7 1455 1459 RNGEOATA    0260 =   84
REPIP1   37,3554     865   1  866      REVCNT      6245    1002   5  295 1093 RNGEO81T    4750 =   84   2  877  R86
REPIP3   37,3562     865   1  866      REVERS   35,3136     672   1  672      RNGSC81T    4742 =   74   2  577  887
REPIP4   37,3566     865   4  866      REVERSAL 21,3607    1475   1 1475      RNGSCFLG    0120 =   74   4  562  887
REPOS8IT    4741 =   85   8  189  602 REVN1645 35,2026     620   1  620      RNRAO       0046 =   92   5  559  561
REPOSCNT E7,1423 =  141   4  141  514 REV83    37,3155     706   1  708      RN1      E7,1544 =  149   7  149 1217
REPOSMCN    0270 =   85                RFAILCNT E4,1575 =  120   3  278  495 ROAC8ACK 25,2377     541   4  541  568
REPOSKPT 25,2155     534   1  538      RFAILS   40,3734     475   1  474      ROOCOMP  32,3305     811   1  811
REPOSTM  E7,1424 =  141   5  141  515 RFAILS2  41,3746     473   1  472      ROCCOUNT E7,1746 =  153   4  795  817
REP40ALM 36,3127     742   2  726  742 RGEXIT   E7,1665 =  144                ROOFLAG     0022 =   67   1  795
REQA00   41,2064     409   1  409      RGIMBITS    5020 = 1421   1 1421      ROOFL8IT    4740 =   67   2  219  796
REQCOM   41,2312     413   2  413      RG1MTIMR E6,1633 =  135   5 1404 1464 ROOSCALE E5,1537 =  123   2  123  796
REQOATX  41,2305     413   3  428  430 RGOODEND 25,3560     569   6  536  565 ROOSCAL1 E7,1756 =  153   3  153  811
REQOATY  41,2307     413   3  428  430 RGU      E5,1626 =  123   8  123  804 ROOTASK  32,3265     811   1  811
REQOATZ  41,2311     413   3  409  430 RGVGCALC 31,2763     801   5  793  800 ROOTRAP  23,2000 =   32   1  816
REQEXLCC 41,2207     411                RHCACTIV 17,2377    1438   1 1438      ROE      14,2006      45   1  930
REQEX1   41,3506     451   1  452      RHCMOVEO 16,3223    1426   1 1424      ROLLOVER 27,3247     776   1  777
REQMM    41,3465     451   1  450      RHCSCALE    4745 =   88   1  296      ROLLTIME E6,1401     130   4  298  776
REQRET      1012     101  17  224  460 RHCSCFLG    0313 =   88                RONE     E4,1606 =  116  16  116 1269
REQUESTC 41,3512     451   1  452      RIGHT    00,2236    1048   1 1050      ROO      04,2141     230
REREAOAC 37,3611     866   3  243      RIGHT-   00,2332    1050   1 1047      ROOAO    04,2371     235   1  230
REREPOS  33,3630     888   1  240      RIGHTR   00,2031    1041   1 1049      ROOTCYCL 21,3635    1476   3 1474
RERRCALC 17,2675    1443                RIGHT5      4322     464   2  431  432 ROOTHALF 21,3631    1476   1 1474
RERROR   E6,1452 =  131   5  133 1444 RIGNX    E5,1474 =  122   2  122  782 ROOTLOOP 31,3563     819   2  819  820
RER60    26,2243     479   1  479      RIGNZ    E5,1476 =  122   2  122  782 ROOTMU      0020 = 1195   3 1173 1191
RESAMPLE 25,3264     560   1  563      RINIT    E4,1722     119  10  675  761 ROOTPS      0126 =   98   5  818  820
RESETRPT 11,2342     815   2  815  816 RLAST    E6,1456     131   5 1417 1439 ROOTPS+1    0127 =   98
RESETX2  12,3120    1185   1 1183      RLM      E4,1604 =  119  16  491  492 ROOTPSRS 31,3512     818   1  802
RESET22  04,2254     233   2  232      RLMSRCH  E7,1675 =  146   6  146  597 ROOTSTOR 31,3627     820   3  819  820
RESET57  43,2357     273   1  273      RLMUNIT     0014 =  598                ROPECHK  43,3545    12R2   1 1279
RES1GN   35,3133     672   1  672      RLS      E4,1422     114  15  198 1205 ROT-TOUV 17,3200    1449   4 1434 1489
RESO     33,2037      44   1  873      RM       E7,1756 =  148   6  148  611 ROTATE   34,3052     648   2  647
REST     10,3246    1360   1 1357      RMAG     E7,1714 =  145   5  145  772 ROTEMP1  E6,1736 =  132   3 1449
RESTART  01,2000 =   28   4  240 1299 RMAG1       0014 = 1260   4 1263 1272 ROTEMP2  E6,1737 =  132   4 1449
RESTART? 31,2522     796   1  795      RMAX     E4,1404     114   1  592      ROTFLAG     0220 =   81   5  828  844
RESTARTS 01,3527    1295   1  220      RME      12,2021 =   37   1 1211      ROTFL8IT    4746 =   81
RESTOR08 20,2115    1399   8  290 1401 RMM      12,2017 =   37                ROTINOEX E6,1743 =  132  10 1421 1450
RESTREG     0366     100   4  213 1356 RMOOINIT 05,3376     225   1  221      ROTORQUE 16,3722    1463   1 1462
RESTSLEP 10,3252    1360   1 1360      RMOOINV  25,2244     536   7  536  547 ROTSENSE E6,1737 =  134   9 1453 1461
RESULTCT E5,1537 =  128   5  377  381 RN          1217     105  16  197 1214 ROT180   26,2354     487   1  487
RESUME      5270    1123  26  162 1405 RNO/TST  42,3543     439   3  438      ROUNO    00,2116    1043   1 1007
RETJACR  E6,1477     132   4 1437 1446 RNOCON   42,3302     424   2  426      ROUNOSU8    7141    1026   4 1038 1049
RETNMORE 20,2456    1412   7 1407 1411 RNOREFCR 07,3166    1307   3  176 1327 RP       E5,1624 =  123   5  828  84R

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF      H      REFERENCES    SYMBOL      DEF      H      REFERENCES    SYMBOL      DEF      H      REFERENCES

RP-TD-R   26,3716     1134    8  781 1206 RRECTLEM  E3,1626     112    3  112 1205 RSPHERE   13,3740     1240    2 1231 1232
RPAO      23,2337      697    4  698 1275 RRECTOTH  E3,1554  =  111    1  299      RSTACK    E4,1600  =  119   10  278  494
RPADTEM   E4,1602  =   116    6  116  723 RRGIMON   06,3071     188    1  186      RSTOEGTS  21,3523     1474    2 1468
RPAD1     23,2337  =  1275                RRIMUDIE  43,2213     269    1  269      RSUBC        1100  =  103    3  498
RPASS1    E7,1477      143    4  143  647 RRINDEX      1314  =  106    3  537  538 RSUBE     14,2004       45    1  930.
RPASS2    E7,1521      143    7  143  652 RRINIT    06,2564     175    1  175      RSUBEM    14,2000       45    2  930
RPASS3    E7,1551      143   11  638  659 RRLEADIN  25,2000  =   32    1  494      RSUBL     E7,1630  =  150    4  150  499
RPASS36   E4,1606  =   118    3  118  703 RRLIMCHK     4523     526    4  189  546 RSUBM     14,2002       45    1  930
RPCOMP1   34,3475      847    1  839      RRLIMNB   25,2551     547    2  547      RTARG     E7,1443      141    9  142  771
RPCOMP2   34,3501      847    1  842      RRLIMOK      4560     527    2  527  548 RTARG1    E7,1471  =  146   11  688  692
RPCRTIME  E7,1427      140    3  568  869 RRLOSDSP  40,2017     301    2  301  302 RTB       01,2451     1084    1 1084
RPCRTQSW  E7,1430      140    2  568  670 RRLOSVEC     1100  =  577                RTB/8HIZ  01,2450     1084    1 1006
RPER         0016  =  1266    3  722 1266 RRN8      23,2041     326    3  547  596 RTBCDOES  10,2000  =   29    1 1389
RPPREC    E7,1521  =   143    2  669  672 RRN8BIT      4746  =   66                RTERM        0022  = 1260    3 1269 1271
RPQELAG      0170  =    78    6 1209 1222 RRN8MPAC  23,2065     326    1  301      RTHETA    E4,1604  =  116   10  116  708
RPQELBIT     4735  =    78                RRNBSW       0011  =   66    5  543  571 RTIG      E7,1641      144    9  144  764
RPQV      E4,1504  =   115    8  115 1232 RRN81     23,2054     326    1  326      RTMAG     E7,1722  =  145    5  145  772
RPREXIT      0050  =  1142    3 1134 1136 RROUT     25,2317     539    3  538  605 RTMU      E4,1720      118    4  638  695
RPRPXXXX  24,3716     1136    1 1134      RROUTLIM  25,2346     540    1  539      RTNARSE   E5,1710  =  126    3 1194
RPSV      E4,1521  =   115    5  115 1224 RROUT2    25,2321     539    1  540      RTNHOLD   E7,1607  =  151    4  151  791
RPTORA    26,3733     1134    1 1134      RRRANGE   25,3114     557    4  495  611 RTNLAMB   E5,1710  =  126    8  126 1191
RPTORB    26,3725     1134    1 1135      RRRDOT    25,3112     557    5  495  610 RTNPRM    E5,1753  =  126    3  126 1181
RQVV      E4,1513  =   115    7  115 1224 RRRET        1312     106    5  106  538 RTNSAVER     0145  =   98    3 1255 1256
RR-AZ     E4,1600  =   119    5  119  317 RRRSBIT      4751  =   86    1  575      RTNTR     E5,1710  =  126    1 1192
RR-ELEV   E4,1602  =   119    2  302  317 RRRSELAG     0300  =   86                RTNTT     E5,1710  =  126    3 1180
RRANGLES  13,2133      324    1  543      RRSHAFT   E7,1735  =  148    3  148  586 RTORPA    24,3722     1136    1 1136
RRANGOUT  40,2645      420    1  419      RRSONLY   25,2255     537    3  534  536 RTORPB    24,3711     1136    1 1136
RRATE     E4,1602  =   116    6  116  707 RRSPGAIN  25,2316     538    1  538      RTPN      E7,1465      142    7  655  685
RRATEDIE  E6,1437  =   131    1 1439      RRSPTDDP  40,2671     421    2  420  421 RTPNCADR  01,3566     1295    5 1295 1300
RRAUTCHK  06,3006      184    2  161      RRTARGET     1100  =  103   14  103  609 RTPNMU    10,2022      695    1  695
RRBORSIT  E7,1740  =   148    5  148  578 RRTONLY   25,2252     537    5  534  602 RTSR1/MU  E4,1716      118    4  118  695
RRCOUCHK  06,3037      186    2  184      RRTRKE       4570     528    2  617      RTSTBASE  E4,1775      120    4  279  494
RRCHECK      4576      528                RRTRUN    E7,1733  =  148    3  148  588 RTSTDEX   E4,1773      120    5  279  495
RRDATABT     4750  =    86    1  528      RRTURNON  25,2073     530    1  185      RTSTLOC   E4,1776      120    7  278  495
RRDATAFL     0277  =    86                RRZERO    25,2354     541    1  266      RTSTMAX   E4,1774      120    2  279  495
RRDESDUN  25,3015      555    1  555      RRZEROK   43,2140     266    1  266      RTX1      E5,1776  =  125   13  125 1217
RRDESEND  43,2305      271    1  263      RRZEROSB  25,2102     531    2  530  541 RTX2      E5,1777  =  125   17  622 1217
RRDESK2   43,2264      270    1  270      RRZ2      25,2401     541    1  541      RUFLAW1   17,3663     1460    1 1453
RRDESNB   25,2506      547    3  270  515 RR1AXIS   25,2257     537    1  537      RUFLAW12  17,3671     1460    2 1460
RRDESNBK  43,2236      270    1  269      RR1AX2    25,2265     538    1  537      RUFLAW2   17,3717     1460    1 1453
RRDESSM   25,2404      542    3  513  596 RR29GAIN  32,2777     609    2  608      RUFLAW3   17,3725     1461    1 1454
RRDOTOUT  40,2662      421    1  419      RSAMPDT   E4,1777     120    7  278  494 RUFRATE   17,3776     1461    2 1460
RRECT     E3,1502  =   111   15  111 1233 RSBBQ     E3,1432     110    2  197  217 RUFSETUP  17,3745     1461    4 1460 1461
RRECTCSM  E3,1554      111   11  111 1206 RSCALE    32,2177     211    1  211      RUNIT     E7,1743  =  153    8  153  891
RRECTHIS  E3,1626  =   112    4  299 1203 RSFLGBTS  05,3064     220    1  218      RUPDATED  33,3247      879

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL       DEF    H     REFERENCES       SYMBOL       DEF    H     REFERENCES       SYMBOL       DEF    H     REFERENCES

RUPTAGN      0332      99   6   99 1123 R10,R11A  21,2021     823   1  867      R23LEM1   24,3145     517   1  518
RUPTREG1     0070      95  66  157 1400 R10FLAG      0015  =   66   1  831      R23LEM11  24,3156     517   1  517
RUPTREG2     0071      95  26  164 1472 R10FLBIT     4752  =   66   4  825  900 R23LEM2   24,3200     518   2  517  518
RUPTREG3     0072      95  19  374 1472 R11       21,2000  =   31   2  823  829 R23LEM3   24,3203     518   2  517  518
RUPTREG4     0073      95   7   95 1330 R12       33,2506     869   2  869      R24END    24,3232     520   1  519
RUPTSTOR     0063  =   95               R12STUFF  34,2000  =   34   1  886      R24LEM    24,3210     519   1  514
RUPT10B8     4065     156   1  156      R2        E5,1717  =  126   3 1178      R24LEM1   24,3214     519
RUTH      16,3120    1424   1 1424      R201         4320     464   7  405 1093 R24LEM2   24,3220     519   1  520
RUTMXTAB  42,3134     319   1  306      R2VEC     E5,1662  =  126  10  126 1187 R24LEM3   24,3236     520   1  519
RUTMXTEM     0153      98   2  306  432 R21-503   24,2761     513   1  513      R24LEM4   24,3252     520   1  520
RVARMIN   E3,1774     113   1  582      R21DISP   24,3123     515   1  513      R29       33,2045     601   2  602  871
RVBOTH    33,2771     875   1  856      R21END    24,2770     513   1  513      R29.LOS   33,2123     602   1  601
RVCON     13,3242    1210   1 1209      R21LEM    24,2675     512   1  502      R29/SERV  33,2000  =   34   1  600
RVEC      E5,1654  =  126  10  498 1194 R21LEM00  24,3013     514   1  514      R29?      33,2552     871
RVO       00,3274    1071   1 1007      R21LEM1   24,2734     513               R29DLOOP  24,3363     604   1  604
RVSW         0157  =   77   7  498 1180 R21LEM10  24,2726     513   2  512  515 R29DODES  32,2550     605   1  604
RVSWBIT      4743  =   77               R21LEM11  24,3107     515   1  514      R29DPAS1  32,2564     605   1  605
RWAITK    43,2143     266               R21LEM12  24,3011     514               R29DPAS2  32,2703     608   1  606
RXZ       E7,1721  =  147  10  147  592 R21LEM13  24,3035     514   1  514      R29DVBEG  32,2553     605   2  605  607
R02       04,2000  =   28   1 1324      R21LEM2   24,2732     513   1  556      R29DVEND  32,2600     605   1  605
R02BOTH   04,3233    1324  10  341  922 R21LEM3   24,2743     513               R29FXLOC  32,2776     609   1  606
R02ZERO   04,3247    1324   1 1324      R21LEM4   24,3002     514   1  513      R29LOKON  32,2754     609   1  609
R04       43,2455     278   1  263      R21LEM5   24,2706     512   1  512      R29NODES  33,2567     871   2  871
R04A      43,2507     278   1  279      R21LEM50  24,3042     514   1  514      R29RANGE  24,3444     611   1  611
R04B      43,2531     279   1  279      R21LEM6   24,2716     513   1  512      R29RDJOB  24,3414     610   1  610
R04C      43,2546     279   2  279  281 R21LEM7   24,3040     514   1  514      R29READ   24,3401     610   2  609  610
R04END    43,2641     281   6  279  280 R21LEM8   24,3045     514   1  514      R29REMOJ  33,2113     602   1  601
R04FLAG      0063  =   71   7   71  922 R21LEM9   24,3077     515   1  515      R29RRR?   24,3467     611   1  611
R04FLBIT     4743  =   71   4  278  559 R21SRCH   24,2775     513   1  513      R29S1     25,2000  =   32   1  602
R04K      43,2633     280   1  278      R22DISP      0314  =   99   6  316  592 R301         4321     464   5  405  461
R04L      43,2635     281   1  279      R22LEM    24,2445     508   4  510  511 R30LOC    22,2000  =   32   2   44  715
R04LR     43,2603     280   3  280      R22LEM1   24,2515     509   1  509      R30OK     27,3767    1275
R04RR     43,2567     280   2  280      R22LEM12  24,2457     508               R31       37,2000  =   36   1  705
R04X      43,2524     279   1  280      R22LEM2   24,2525     509   2  509      R31CALL   40,3737     705   1  285
R04Y      43,2617     280   2  280      R22LEM3   24,2545     509   2  509      R31LOC    40,2000  =   36   1  705
R04Z      43,2461     278   1  278      R22LEM42  24,2631     511   4  503  510 R31SURF   37,3370     709   1  706
R1           0040  = 1195  19  640 1194 R22LEM44  24,2624     510   1  510      R33       42,2002     277   1  277
R1A       E5,1741  =  126  15  126 1194 R22LEM45  24,2634     511   1  511      R36       04,2642     703   2  286  704
R1C       E7,1724  =  145   4  145  773 R22LEM46  24,2642     511   2  510  511 R36INT    04,2657     703   1  704
R101         4317     464  13  405 1067 R22LEM7   24,2612     510   1  510      R36LM     04,2000  =   28   1  702
R1S       E7,1572  =  149  14  149  883 R22LEM93  24,2562     510   1  588      R36TAG2   04,2743     704   1  704
R1SAVE       1073     103   4  224 1262 R22LEM96  24,2566     510   2  592      R47       32,2000  =   34   1  208
R1VEC     E5,1654  =  126   6  126 1187 R22RSTRT  24,2654     511   1  241      R51       14,3007     936   1  925
R10       21,2000  =   31   3   42  891 R22WAIT   24,2640     511   3  508  509 R51.1     14,3011     936   1  242
R10,R11   21,2006     823   3  241  854 R23LEM    24,3137     517   1  501      R51.2     14,3047     936

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R51.3     14,3050      936    1  938            R62DISR   23,2103  =   489    1  288           SBANDEX   42,3743      492    1  492
R51.4     14,3137      937    1  937            R62FLASH  23,2103      489    2  489           SBIT1        4753  = 1277
R51C      14,3014      936    2  936   937      R65CNTR   E7,1745  =   148    5  507   582     SBIT10       4742  = 1277
R51E      14,3045      936    3  936            R65LEM    23,2123      521    3  507   582     SBIT11       4741  = 1277    2 1283 1284
R51F      14,3034      936                      R65WAIT   23,2314      524    2  522           SBIT12       4740  = 1277    1 1283
R51I      14,3035      936    1  936            R77       43,2445      278    1  264           SBIT13       4737  = 1277
R51K      14,3126      937    2  937   939      R77CHECK  25,3365      562    1  560           SBIT14       4736  = 1277
R51R63    14,3127      937    1  783            R77END    43,2655      281    1  264           SBIT15       4735  = 1277    1 1284
R52       14,3671      951    1  936            R77FLAG      0117  =    74    2  278   281     SBIT2        4752  = 1277
R52A      14,3701      950    2  950   951      R77FLBIT     4741  =    74    4  222   562     SBIT3        4751  = 1277
R52B      14,3707      950    1  950            R77IN     25,2050      495    2  494   495     SBIT4        4750  = 1277    1 1281
R54       14,3250  =   940    2  937   965      ====================================          SBIT5        4747  = 1277
R55       14,3216      940    1  937            S(XI)        0032  =  1195 .  6 1172 1178     SBIT6        4746  = 1277
R55.1     14,3223      940                      S+ZERO       4755  =  1277    9  292 1283     SBIT7        4745  = 1277    1 1284
R55.2     14,3231      940    1  940            S+1          4753  =  1277    9  292 1285     SBIT8        4744  = 1277
R55CDR    14,3247      940    2  939   940      S+2          4752  =  1277                    SBIT9        4743  = 1277    1 1281
R55RET    14,3243      940    1  940            S+3          6250  =  1277                    SBNK03       5020  = 1278    1 1283
R56       14,2603  =   932    1  936            S+4          4751  =  1277                    SCALADJ   25,3403      563    1  561
R59       15,2245      952    4  952   964      S+5          4756  =  1277                    SCALCHNG  25,3351      562    1  561
R59A      15,2257      952    1  952            S+6          6245  =  1277                    SCALDONE  21,3506     1474    1 1473
R59ALM    15,2427      954    1  954            S+7          4757  =  1278    1 1279          SCALECHK  25,3322      561    1  561
R59D      15,2375      954    1  954            S-ZERO       4754  =  1278    1 1282          SCALEDOT  17,3352     1454    1 1454
R59E      15,2445      955    1  955            S-1          7752  =  1278    2 1283 1285     SCALEE    17,3340     1453    1 1453
R59OUT    15,2455      955    4  952   954      S-2          7751  =  1278                    SCALEFAC  31,2005       40    2  792   813
R59RET    15,3037      964    1  955            S-3          7750  =  1278                    SCALELD   40,2657      421    2  421
R60INIT   32,3200      783                      S-4          6115  =  1278                    SCALEVEC  32,2132      210    2  209
R60LEM    26,2123      477    6  342   551      S-7          5650  =  1278    1 1279          SCALLOOP  21,3472     1473    1 1473
R60VSAVE  E5,1620  =   123    5  123   783      SAMETYP   15,3573      975    1  975          SCALPREP  37,3711     1328    2 1327 1328
R61       23,2000  =    32    1  521            SAMPLIM      1077      103    9  224   567     SCALSAVE     0316       99    3 1327 1328
R61C+L01  23,2127      521    1  524            SAMPLSUM     1100      103    9  103   886     SCALSHFT  E7,1720  =   147    4  147   592
R61C+L02  23,2152      522    2  521            SAMPTIME     0013  =    92    5  209   466     SCALSTRT  21,3464     1473    1 1473
R61C+L03  23,2156      522                      SAVE      E5,1464  =   128                    SCAXIS    E7,1764  =   148   27  145   953
R61C+L04  23,2302      524    1  522            SAVECDUT  E3,1766  =   609   11  606   608     SCHZEROS  37,3056      390    4  382   385
R61C+L05  23,2236      523    1  523            SAVEDEN   27,3536     1270    1 1270          SCLNORM   17,3141     1448
R61C+L06  23,2261      523    3  523   524      SAVEFLAG     1071  =  1364                    SCNDSOL   34,2776      646    7  638   646
R61C+L1   23,2307      524                      SAVEHAND  E6,1462      131    7 1426 1439     SCOUNT       1366  =   109    4  109 1282
R61C+L2   23,2275      523    1  523            SAVELCCR  10,2730     1354    1 1354          SCOUTEND  40,2736      422    4  422
R61C+L4   23,2305      524    2  523            SAVELOCS  10,2723     1354    2 1350 1353     SCRATCH   E6,1745  =   133    2 1476
R61FLAG      0024  =    67    2  521            SAVESR    E6,1505  =   133    2 1464 1476     SCRATCHX     0160  = 1488    5 1484 1488
R61FLBIT     4742  =    67    1  523            SAVET-30  E7,1477  =   149    8  149   730     SCRATCHY     0161  = 1488    3 1484 1485
R61LEM    23,2116      521    4  500   520      SAVLEMV   E7,1737  =   146    4  594   595     SCRATCHZ     0162  = 1488    4 1484 1485
R61LEM1   23,2162      522                      SAVQR52   E7,1665  =   144    2  950   951     SD        22,2366      359
R61LEM2   23,2220      523                      SAX       E5,1730  =   125    5  933   935     SDISPLAY  43,3134      292    1 1285
R61TEST   26,2246      479    1  478            SBAND     42,2000  =    36    4   46   490     SFCAD     22,2027      353
R62       23,2000  =    32    1  489            SBANDANT  42,3606      490    2  282   493     SFCMAX    E7,1573  =   143    5  669   671

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES       SYMBOL      DEF     H       REFERENCES

SECON1    42,3267     424    1  426       SETCTR    21,3672    1500                SETVAC    41,3523     452    1  451
SECON2    42,3271     424    1  424       SETEBANK     4313     464    2  412  423 SETWO     05,3567     986    3  986  988
SECO1        4777 =   758                 SETGAMMA  13,2546    1132    2 1127 1129 SETXFLAG  07,2666 =   844
SEC15     36,3754     758                 SETGLOCK  06,2465     172    4  171  172 SETXTACT  43,2105     264
SEC15DP   36,3753     758                 SETGMEX   13,2554    1132    1 1132      SETX2     26,2532     582    1  582
SEC30DP   36,3755     758                 SETIFLGS  13,2643    1203    8  238 1214 SET57     43,2354     273    1  273
SEC45     36,3760     758                 SETINFL   05,2727     217                SEUDOPDD  04,2206     232    1  234
SEC45DP   36,3757     758                 SETISSW   06,2703     181    7  167 1310 SEVEN        4757    1089   25  157 1487
SELCTSUB  17,3225    1449    3 1435 1446 SETLOC    01,2662    1101    3 1101 1105 SFAIL        1357 =   108    4  108 1279
SELECTMU  10,2000     695    4  627  668 SETMARK   10,2527    1351                SFCOM     42,2145     307    1  307
SELECTP   16,3525    1432    2 1429 1432 SETMAXDB  20,2130    1399    3 1399      SFCONST1  E5,1467 =   128
SELECTYZ  16,3555    1432    1 1421      SETMGA    06,3736     694    1  694      SFCCNUM   41,3072     432    2  418  434
SELFADRS  43,3272    1278    2  292  293 SETMINDB  20,2141    1399    6  517 1399 SFINTAB   42,2464     313    1  307
SELFBANK  01,3225    1110    1 1110      SETMDCN   13,2715    1204    3 1204 1232 SFINTABR  41,3235     434    1  434
SELFCHEC  43,2000 =    36    1 1277      SETMUER   10,2011     695    1  695      SFMIXCAL  40,3114     435    1  435
SELFCHK   43,3363    1279    5  225 1275 SETNACD      4311     464    2  409  433 SFNORCAL  40,3117     436    1  435
SELFERAS     1357     108    1  108      SETNCADR     4303     464    7  409  464 SFOUTAB   42,2556     315    1  307
SELFRET      1361 =   108    7  108 1279 SETNEGU   21,3362    1471    1 1471      SFOUTABR  41,2602     419    1  419
SELFSUPR  40,2000 =    36                 SETNORM   10,2535    1351    1 1349      SFRET     41,3107     432
SENDID    05,3764     991    2  986  990 SETOVF       7006    1021    1 1024      SFRET1    41,3071     432
SENDPULS  07,3124    1306    1 1305      SETOVF2      7155    1026    1 1022      SFRUTMIX  41,3057     431    5  412  435
SENSEGET  17,2146    1434                 SETPD        7616    1038    1 1005      SFRUTNOR  41,3051     431    5  418  436
SENSETYP  E6,1500     132    5 1430 1454 SETPOS    33,3720     889    1  889      SFTEMP1      0123 =    96   21  306  437
SENSOR    17,3757    1461    2 1453      SETPOS1   33,3701     889    1  784      SFTEMP2      0124 =    96    2  437
SENSTEST  17,3377    1454    1 1454      SETPOS2   33,3717     889    1  888      SGNAGREE  10,3613    1389    5  378 1211
SEPMIN    42,3435     426    2  424  425 SETPRIC   10,2511    1350                SGNCHECK  12,2562    1176    2 1176 1177
SEPMNRET     0144 =    97    2  426  427 SETPRPOS  33,2104     601    1  601      SGNCOM    40,2422     404    1  405
SEPSCRET     0144 =    97    2  426      SETRAD    23,2367     698    1  697      SGNDVCVF  00,2402    1051    1 1051
SEPSEC    42,3404     426    1  425      SETRADX   23,2402     698    1  698      SGNOFF       0123 =    96    3  404  405
SEPSECNR  42,3417     426    3  424  426 SETRE     13,2556    1133    2 1127 1129 SGNON        0122 =    96    3  404  405
SEPSEC1   42,3412     426    1  426      SETREX       0051 =  1133    2 1133      SGNRDOT   E5,1754 =   126    2  126 1192
SERV      32,2000 =    34    1  861      SETROUND  00,2272    1048    3 1048      SGNTAB    40,2443     405    2  404  405
SERVCACR  36,2107 =   743    1  750      SETRRCTR  25,2330     539    1  540      SGNTO1    40,3124     436    1  435
SERVEXIT  32,3746     861    7  725  861 SETRRECR  25,2167     534    3  533  601 SGNTST1   40,2462     405    3  405
SERVICER  33,2206     855    2  243  853 SETRXX    13,2571    1133    3 1133      SHAFTBQ   26,3015     586
SERVICES  33,2000 =    34    8   39  887 SETSENSE  17,3330    1453    1 1453      SHAFTCMD     1355     108    2  554  608
SERVIDLE  27,3322     860    2 1375 1376 SETTIME   17,2615    1441    1 1441      SHAFTLIM  25,2575     548    1  548
SERVOUT   33,2400     858    3  857      SETTIME4  06,2074     159    1  162      SHAFTVAR  E4,1410     114    1  587
SERV1     37,2000 =    36    2  852  864 SETTIME5  16,2152    1404    1 1405      SHFTFACT  32,3527     814    1  813
SERV2     22,2000 =    32    1  858      SETTRKF      4564     528    2  187  532 SHFTFLAG  E6,1740 =   133    4 1473 1474
SERV3     27,2000 =    33    1  860      SETUPDSP  10,2213    1286    1 1286      SHIFTR1   23,2451     701    8  622  665
SERV4     34,2000 =    34    1  887      SETUPER1  37,3005     390    1  389      SHIFT11   33,2767     874    3  875  876
SETAUG    40,2701     421    1  420      SETUP29D  33,2152     603    1  603      SHOLTS    41,3677     472    1  471
SETBANK   13,3035    1206    4 1204 1205 SETUP70   04,2376     235    1  229      SHORTMP      7312    1030   11  402 1329
SETCOARS  07,3135    1307    2  171 1304 SETUP71   04,2375     235    1  229      SHORTMP2     7316    1030    1  878

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969                  PAGE 1543

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL       DEF     H        REFERENCES        SYMBOL      DEF       H         REFERENCES       SYMBOL      DEF      H        REFERENCES

SHORTT    00,2017       1041    2 1004         SKIPDB1   20,3376       1491    1 1490         SOPTIONS  43,3337       1279    2 1279
SHORTV    00,2121       1044    1 1004         SKIPDB2   20,3462       1492    3 1491 1492    SOPTION1  43,3347       1279    1 1279
SHOW      37,2457        382    3  377  379    SKIPPAXS  16,2734       1421    2 1420 1433    SOPTION2  43,3350       1279
SHOWSUM   43,3121        292    1  292         SKIPSIM   05,2456        213    1  213         SOPTION3  43,3351       1279
SHOW1     37,2461        383    1  383         SKIPTPER  22,3626        723    1  723         SOPTION4  43,3352       1279
SHUTDOWN  16,2163       1405    1 1402         SKIPU     E6,1534        134    9  134 1464    SOPTION5  43,3353       1279
SIOLOOP   43,3314       1278    1 1279         SKIPV     E6,1535   =    134    3 1404 1464    SOPTION6  43,3354       1279
SIGN          7660      1040    1 1005         SLAP1     05,2447        213    1  411         SOPTION7  43,3355       1279
SIGNADS       0163  = 1498     12 1490 1497    SLCTMU    10,2000   =     29    1  695         SOPTON10  43,3356       1279
SIGNFIX   40,3065        435    2  435         SLEEPIE   37,3034        390    2  385  389    SOUPLY    37,3071        391
SIGNLCHK  25,2777        555    2  555         SLEFT5        4340       465    1  448         SOUTHOR   E5,1421   =    128    3  128  378
SIGNMPAC  10,3713       1393   14  355 1272    SLOAD         6504      1013    1 1005         SPARCSIN  30,3664        918    3  802  917
SIGNRET       0125  =     96                   SLOAD2        6060       996    5 1013 1393    SPARE         0007  =    195   11  196  206
SIGNTEST  40,2446        405    2  404         SLOPEBIT      4751  =     68                   SPCOS         5032      1096    5  190 1253
SIM2CACR  05,2454        213                   SLOPEHI   00,2314       1049    1 1074         SPFCSTS   37,2572        386
SINB      E5,1646   =    124                   SLOPELO   00,3007       1063    1 1075         SPECTEST  01,2652       1101    1 1105
SINBLANK  40,2572        407    1  407         SLOPESW       0033  =     68    3 1176 1189    SPEEDRUN  21,2365        894    1  893
SINCDU        0735  =    100    6  100 1256    SMALL     00,3133       1067    1 1064         SPIRAL        1237  =    955    4  262  954
SINCDUX       0741  =    100    6  482 1258    SMALLEPS  27,2366        761    1  761         SPLRET    22,3541   =    720    1   37
SINCDUY       0735  =    100    5  482 1258    SMALLTJU  16,3713       1462    1 1462         SPNOX         1261       105    8  367  368
SINCDUZ       0737  =    100    7  482 1258    SMALL2    00,3062       1064    1 1067         SPSCODE       4743  = 1301
SINF      00,3530       1076    2 1007 1252    SMALPDIF  16,2507       1417    2 1417         SPSCONT   20,2716       1482    1 1488
SINESLOC  23,3764       1256    1 1256         SMALRATE  17,3707       1460    1 1460         SPSIN         5033      1096    5  190 1253
SINGIMLC  26,2401        487    1  485         SMODE         1362  =    108    7  108 1279    SPSLOOP1  20,3112       1486    1 1487
SINI      26,2002         52    2 1138         SMODECHK  43,3326       1279    3 1279 1282    SPSLOOP2  20,3127       1486    1 1487
SINNODI       0010  = 1142      1 1138         SMPAC+    00,3405       1073    3 1073         SPSRCS    21,3736       1501    2 1430 1444
SINTH         0022  =    125   21  301 1246    SNAPAGN   05,3645        987                   SPSSTART  21,3744       1501    1 1501
SINTHETA  E7,1731   =    147    3  148  592    SNAPEND   05,3664        988                   SPT           5036      1096    1 1096
SINVEC1   26,2403        487    1  486         SNAPLOOP  05,3634        987    1  988         SPVAC         5116      1097    3  234 1353
SINVEC2   26,2405        487    1  486         SNGLCD    22,2376        359                   SPVACIN       5112      1097    1 1097
SINZERO   30,3656        917    1  917         SNTH      E5,1727   =    126   14  126 1193    SQ            1076       103    2 1096
SIN60DEG  26,3704        598    2  595         SNUFFBIT      4737  =     74    1 1445         SQRT      00,3207       1070    1 1007
SIX           6245  = 1093     33  171 1479    SNUFFER       0115  =     74    2  300         SQRTABRT  00,3402       1073    2 1073
SIXTY     43,3263       1278    1 1284         SNUFFOUT  43,3246        300    1  263         SQRTNEG   00,3373       1073    1 1073
SIZETAB   C1,2002        240    2 1298 1300    SN1       00,3553       1077    1 1076         SQRTNM2   00,3475       1075    1 1075
SIZETST   42,3561        439    2  438         SN359+    35,2420        636    1  639         SQRTNORM  00,3502       1075    1 1075
SKALSKAL      1353       108    1  877         SOB           0042  = 1142      4 1137 1138    SQRTSHFT  00,3221       1070    1 1070
SKEEP1        1371  =    109   20  109 1285    SOLNSBIT      4751  =     75                   SQRTSUB   00,3343       1073    3 1064 1078
SKEEP2        1372  =    109   10  109 1283    SOLNSW        0127  =     75    5 1187 1193    SR            0021  =     92   30  407 1476
SKEEP3        1373  =    109   14  109 1284    SOMEADS   20,3450       1492                   SRCHOBIT      4736  =     68    1  594
SKEEP4        1374  =    109   14  109 1285    SOMEERRR  37,3040        390                   SRCHOPTN      0037  =     68    4  289  519
SKEEP5        1375  =    109   10  109 1284    SOMEKEY   07,2403        256    1  255         SRDDV     00,2024       1041    1 1064
SKEEP6        1376  =    109    6  109 1285    SOMERR2   37,3047        390    1  380         SRTEST    00,3456       1075    1 1074
SKEEP7        1377  =    109   22  217 1284    SOPT      43,3732       1285    1 1285         SR30.1    22,3551        722    2  717  719
SKIPACC   10,2751       1355    1 1355         SOPTION   43,3715       1284    2 1283         SS        E7,1732   =    145    9  772  773

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SYMBOL       DEF H   REFERENCES          SYMBOL       DEF H   REFERENCES          SYMBOL       DEF H   REFERENCES

SSP         6623   1015  1 1005          STEERSW     0042 =   69  2  766          SUHALFAP 22,2717    364  1  364
STACCOOT 20,2756   1483  2 1482          STERN    31,2435    795                  SUPDACAL    4651    993  2  444 1283
STADR       6357   1008  1 1007          STIKLOAD 01,2211    296  1  296          SUPDXCHZ    5165   1110  6  285 1110
STALL    07,3710   1322  2 1321          STIKSENS E6,1444    131  8  214 1439     SUPERADR 16,2665   1420  1 1420
STAR     E5,1730 =  124  8  124  561     STIKSTRT 05,3056    220  1  214          SUPERBNK    0007 =   93 27  217 1373
STARAC   E5,1706 =  124 43  124 1248     STILBADH E7,1674 =  152  7  152  889     SUPERJOB 16,2666   1420  2 1420
STARALGN    0735    100  2  100          STILBADV E7,1675 =  152  6  152  889     SUPERSW     4727    995  3 1356 1375
STARCODE    0734    100  4  100  951     STILLRCS 17,2710   1444  3 1438 1444     SUPER011    4773   1090  3  852 1303
STARINO  E5,1757 =  125 16  125  964     STMIN-   20,3533   1493  2 1497          SUPER100    4745 = 1090
STARM       0040 =  125                  STMP        0020 =  981  7  980          SUPER101    4775   1090  1 1093
STARSAV1 E5,1760 =  125 12  125  976     STOPCLOK 36,3017    740  3  739  740     SUPER110    4776   1090  3  603 1093
STARSAV2 E5,1766 =  125  8  125  975     STOPFIRE 31,3477    810  2  810          SUPRCON  43,3264   1278  1 1284
STARTAB  14,2000 =   31  1   47          STOPRATE 20,2166   1400 10  290 1401     SURFAGAN 07,2644    262  1  262
STARTDAP 16,2046   1403                  STORANG  27,2046    485  1  485          SURFDISP 15,3144    966  2  965  968
STARTDES 25,2443    544  2  543  547     STOR8NCS 12,2140   1169  1 1172          SURFEND  07,2640    262  1  262
STARTEB     5007 =  225  1  223          STORDELT 35,3145    672  2  671  672     SURFFBIT    4744 =   79  9  215  855
STARTMNV 26,2176    478                  STORE       6425   1010  6 1009          SURFFLAG    0177 =   79 16  238 1205
STARTP1P 37,2161    377  1  377          STORE,1     6417   1010  1 1009          SURFJOB  07,2603    261  1  259
STARTP47 36,3453    753  1  753          STORE,2     6422   1010  1 1009          SURFLINE 15,3064    965  2  964  975
STARTP64 31,2556    797  1  793          STOREMAX 12,2077   1169  3 1168 1169     SURFREJ  07,2506    258  1  258
STARTP66 31,2450    795                  STOREMIN 12,2152   1169  1 1169          SURFSTAR 15,2000    251  1  254
STARTSB1 05,3114    221  1  218          STORETGO 27,2666    770  2  770          SUPESTOR 07,2520    259  1  256
STARTSB2 05,3157    222  3  218  222     STORE1      6626   1015  1 1046          SURFSUP  15,3134    965  1  965
STARTSIM 05,2452    213                  STORE1S  26,3667    597  1  597          SVCT3       5240   1115  2 1115
STARTSTO    6437   1011                  STORHAPO 22,3600    722                  SVCT3X      5256   1115  3 1115
STARTSUB 05,3105    221  4  213  220     STORHPER 22,3612    723                  SVDWN1   13,2114    323  3  299 1203
STARTSW  05,2451    213                  STORJUMP    6375   1009  1 1008          SVDWN2   13,2070    322  2 1150 1205
STATE       0074     95 44   65 1087     STORLP71 04,3625   1385  2 1385 1386     SVEXITAD 05,3474    826  1  825
STATEBIT    4747 =   71  1 1376          STORPARM 32,3642    827  1  827          SVEXTADR 27,3357    861  1  860
STATEFLG    0067 =   71  9  581 1236     STORTORK 16,3706   1462  1 1463          SW/      01,2517 = 1088  1 1006
STATEINT 13,2602   1202  3  241 1203     STORV    20,3616   1494  1 1494          SWANDBIT    4741 =   77  3  733  891
STATEUP  13,2026    238  1 1203          STORY    27,2431    764  1  764          SWANDISP    0155 =   77  1  858
STATEXIT E4,1516 =  116                  STRAT    14,2714    934  1  934          SWBIT       0131 =   97  5 1086 1088
STATINT1 13,2611   1202  2  241 1202     STRATGY  14,2706    934                  SWBRANCH    6720   1018  1 1088
STATQUO  04,2310    233  2  233          STRTGYRO 07,3376   1313  2 1311 1316     SWCALL      4622    992  5  219 1084
STCLOK1  36,2667    737  1  736          STRTGYR2 07,3402   1313  4 1314 1318     SWCHCLR  35,2535    664  1  664
STCLOK2  36,2670    737  2  728  783     STRTIDLE    5671   1375  1 1375          SWCHSET  35,2513    664  1  664
STCLOK3  36,2671    738                  STRTP66A 31,2456    795  1  796          SWINIT   05,3377    225  9  215
STCTR    20,2550   1479  1 1480          STSHOSUM 43,3547   1282  2  292  293     SWITCHES 01,2517   1086  1 1088
STCTR1   20,2553   1480  1 1481          SUBDIVDE 16,2263   1414  3 1416          SWRETURN    4631    992  9  245 1325
STDESIG  25,2613    550  2  515  550     SUBEXIT  E7,1470    142 22  626  705     SWSKIP   01,2600   1088  2 1088
STDESIG1 25,2627    550                  SUBLIST     0337 =  989 12  985  988     SWSTORE  01,2554   1087  2 1087
STEER?   31,3400    808  2  793  807     SUBTR    00,3702   1079  1 1080          SWWORD      0130 =   97  2 1086 1087
STEERBIT    4741 =   69  3  808  856     SUFFCHEK 12,3460   1190  4 1189 1190     SXA      01,2365   1081  1 1006
STEERING 36,3672    757  2  726          SUHALFA  22,2677    364  1  364          SYNCT4   06,2154    162  1  162

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UN UNDEFINED         = DEFINED BY EQUALS               J DEFINED BY JOKER OR ERASE ANYWHERE      MD MULTIPLY DEFINED
BD BADLY DEFINED    CO DEFINITION ASSOCIATED WITH CONFLICT                XX MISCELLANEOUS TROUBLE
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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969                    PAGE 1545

SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF      H       REFERENCES      SYMBOL     DEF      H       REFERENCES      SYMBOL     DEF      H       REFERENCES

SYSTEST   43,3105      292   1  264      S52.2.1   14,3640      948                    TCNOVAC      4351      465   1  451
S1           0050  =    93  30  359 1247 S52.2A    14,3631      948   1  948           TCP       E6,1445      131   3 1414 1427
S10BITS      5012  = 1278   2 128        S52.3     14,3651      949   1  925           TCPIN     43,3227      300   1  300
S13BITS   43,3265     1278   1 1284      S8BITS       4357  = 1278   1 1285           TCPINAO   43,3232      300   1  299
S2           0051  =    93  45  324 1247 ===================================== TCQ          6745  = 1286   5  265  889
S24.9SEC  36,3150      743   1  730      T            0036  = 1195  12  498 1190 TCQBNK00  00,3455     1074   1 1074
S30.1     34,2000      621   1  619      T(X)      27,3736     1274   2 1271 1272 TCQCOUW   30,3466      913   1  919
S32.1F1      0132  =    75   4  637  646 T-DTHER   E3,1570  =  112   1  196      TCQR      E6,1457      131   3 1414 1440
S32.1F2      0133  =    75   4  637  646 T/2SEC    15,2760      961   1  960      TCDSTAL   17,2050      566   2  565  566
S32.1F3A     0134  =    75   8  638  646 TABLNTH   06,2037      159   1  159      TCSI      E7,1633      144  12  196  649
S32.1F3B     0135  =    75   8  638  646 TABLTTF   E7,1562  =   151   7  151  821 TCSLEEP   00,3773     1370   1 1369
S32/33.X  34,3120      651   2  635  650 TABLTTFL  31,3705      821   1  802      TCSUBTR   00,3734     1080   1 1078
S32/33.1  34,3100      650   2  628  633 TAO          7074     1024   1 1005      TCTSKOVR     4353      465   1  746
S32BIT1      4735  =    75               TAGSUB    01,2442     1083   4 1081 1082 TCWAIT       4352      465   1  452
S32BIT2      4736  =    75               TALIGN    E5,1774  =   125   9  125  970 TDEC         1114      104   9  104 1236
S32BIT3A     4737  =    75               TANG         1106      103  29  103  608 TDECAY    E7,1740  =  145   1  766
S32BIT3B     4740  =    75               TANGNB    E7,1752  =   148   9  148  611 TDECAYFX     4770     1090
S33/34.1  35,2674      669   2  632  664 TARGETOB  E6,1476  =   131   4 1427 1440 TDEC1        0040  = 1240  57  209 1236
S34/35.1  35,3204      674   2  668  669 TARGETV   12,3551     1191   1 1191      TDEC2     E7,1573  =  143   3  627  699
S34/35.2  35,3216      675   2  665  668 TARGTDEX  31,2413      794   2  806  820 TDELTAV   E3,1520  =  111  13  111 1235
S34/35.3  35,3307      677   1  681      TASKOVER     5261     1123  81  167 1370 TDESIRED  E5,1670  =  126   5  126 1190
S34/35.4  35,3352      678   1  681      TAT          0014  = 1240  15  209 1217 TDISP     15,3333      969   1  969
S34/35.5  35,3432      680   2  665  668 TAU.      E4,1473  =   115  13  115 1226 TDISPSET  31,3643      820   2  798  R03
S3435.23  35,3235      675   1  675      TAUROD    E5,1540  =   123   2  123  813 TDPOS     E5,1756  =  127   1  127
S3435.25  35,3237      675               TAUVERT   E5,1516  =   122   2  122  811 TDVEL     E5,1764  =  127   1  127
S40.1     27,2246      760   2  749  751 TBASE1       1052      102   4  730 1296 TEMK         1075      103  10 1096
S40.1B    27,2336      761   1  760      TBASE2       1054      102   6  478 1213 TEMP      E5,1441  =  128
S40.13    27,2540      768   2  241  721 TBASE3       1056      102                 TEMFACD   E5,1440  =  128
S40.130   27,2626      769   2  768  769 TBASE4       1060      102   4  235  738 TEMPBB       0064  = 1292   1 1291
S40.130V  27,2653      770   1  770      TBASE5       1062      102   1  854      TEMPBBCN     0073  = 1292   6 1291 1294
S40.131   27,2610      769   1  769      TBASE6       1064      102   1  738      TEMPFLSH     0374      100   3  230 1356
S40.132   27,2616      769   2  769  770 TBUILDFX     4767     1090   1 1502      TEMPG        0061  = 1292   8 1291 1294
S40.132*  27,2620      769   1  770      TBUP      E4,1670  =   120  15  120  848 TEMPG2       0071  = 1292   3 1290 1293
S40.133   27,2647      770               TC        E3,1550  =   111  10  111 1233 TEMPNM       0063  = 1292   3 1291 1294
S40.134   27,2650      770   2  769  770 TCALARM2  43,3311     1278                 TEMPNUM   E6,1741  =  132   2 1432
S40.136   27,2006       38   1  769      TCCSM     E3,1622      112                 TEMPOK    06,2525      173   2  173
S40.136_  27,2010       38   1  770      TCDANZIG  27,3754  = 1274   6  571 1269 TEMPOR2      0160  = 1364  10 1348 1358
S40.137   27,2641      770               TCDH      E3,1776      113  11  196  649 TEMPP        0062  = 1292   6 1291 1294
S40.138   27,2661      770   1  770      TCFINDVC     4354      465   1  452      TEMPPHS      0154  = 1300   9 1295 1300
S40.2,3   27,2413      764   2  749  751 TCGETCAD  00,3762     1369   1 1370      TEMPPR       0070  = 1292   2 1291 1294
S40.8     27,2447      766   1  756      TCGFAPPR  E5,1470  =   122   3  122  820 TEMPP2       0072  = 1292   5 1290 1293
S40.9     27,2707      771   1  756      TCGFBRAK  E5,1434  =   122   2  122  806 TEMPR60      1163      104   7  477  835
S41.1     27,3267      779   4  751  754 TCGIAPPR  E5,1471  =   122   1  122      TEMPSW       0065  = 1292   8 1290 1293
S50       14,2500  =   930               TCGIBRAK  E5,1435  =   122   2  122  805 TEMPSWCH     0157  = 1300   3 1295 1300
S52.2     14,3620      948   2  925  942 TCLEM     E3,1674      112                 TEMPSW2      0066  = 1292   4 1290 1293

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT            XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL      DEF     H         REFERENCES      SYMBOL      DEF     H         REFERENCES      SYMBOL      DEF     H         REFERENCES

TEMPTIME E5,1430  =  128     3  128  382 TFFCONIC 27,3361     1263                TFRESH2     6000      40     3  753  831
TEMPVAR  E5,1667  =  127     3 1144 1145 TFECONML 27,3362     1263      1  722    THRESH3  36,2023      40     1  748
TEMP2G      0155  = 1300     9 1295 1300 TFFDELC     0012  = 1260      2 1272 1273 THROTLAG 31,2004      40     1  791
TEMP31   E6,1736  =  131     6 1436 1437 TFFELL   27,3654     1272      1 1270    THROTTLE 31,2144     788     2  809  814
TEMX        1253  =  105     8  105  866 TFFEL1   27,3656     1272      1 1270    THROTUP  32,3725     830     2  828
TEMY        1254  =  105     5  105  866 TFFNP       0034  = 1260      6 1263 1272 THRUST      0055  =   93     5  213  830
TEMZ        1255  =  105     7  105  866 TFFQ1       0016  = 1260      5 1269 1272 TICKTEST 22,3430     718     2  715  718
TEM1        0141      97    34   97 1357 TFFRP/RA 27,3430     1266      1  722    TICKTFF  22,3420     717     1  717
TEM2        0142      97    34   97 1391 TFFRTALF    0030  = 1260      3 1264 1271 TICKTPER 22,3410     717
TEM3        0143      97    19   97 1252 TFFSW       0167  =   78      3 1269      TIG      E7,1441     141    40  196  970
TEM4        0144      97    11   97  917 TFFSW8IT    4753  =   78                  TIG-0    36,2407     732     2  242  731
TEM5        0145      97     6   97  916 TFFTEM      0044  = 1260     13 1269 1273 TIG-30   36,2300     730     2  242  729
TEN         4363  = 1093     9  210 1423 TFFTICK  22,3453      718                TIG-30.1 36,2270     729     1  729
TENOAPPR E7,1424     140                 TFFVSQ      0024  = 1260      1 1263      TIG-30A  36,2275     730     1  729
TENDBRAK E7,1423     140     2  141  605 TFFX        0042  = 1260      7 1269 1272 TIG-35   36,2242     729     3  242  728
TENSEC   24,3117     515     1  514      TFFXTEST 27,3562     1270      1 1270      TIG-5    36,2354     731     4  242  737
TEPHEM   E3,1706     112    10  113 1387 TFFZEROS 23,2523  = 1275      2 1269 1270 TIGNOW   36,3245     750     2  735  749
TERMASC  34,3464     847     2  846  847 TFF1/ALF    0026  = 1260      7 1264 1273 TIGSAVE  E7,1762  =  145     4  756  760
TERMATE  10,3373    1362     1 1360      TFF1/4   23,2513  = 1275      4 1263 1269 TIGSAVEP E7,1764  =  145     2  756
TERMEXTV    5472  =  264     4  269  275 TFI      E7,1453  =  141                  TIGTASK  36,2573     735     1  726
TERMNVEC 12,3640    1193     1 1193      TGO      E7,1516  =  149     39  149  848 TIGTASK1 35,3656     735     1  735
TERM1TMP    0157  =   98     3 1256      TGOCALC  27,2464      766                TIMECHEK 10,3322    1361     1 1361
TERM40   36,3262     750     3  749  750 TGOCOMP  32,3716      829      2  826  828 TIMECHK  22,3075     368     1  368
TERRLAMB E5,1757  =  126     2 1189 1190 TGOFFNOW 21,3412     1472      3 1471 1472 TIMEDELT 13,3667    1218     4 1216 1217
TEST     01,2566    1088     1 1088      TGO1     E7,1501  =  829      2  828  829 TIMED1OL 04,3545    1384     2 1384 1387
TESTBIT  40,3572     461     3  461      THOUMP   31,2326      791                TIMEDIOR 04,3557    1384     1  244
TESTCOS  32,2673     607                 THETA       0024  =  125     11  941 1243 TIMEGMBL 21,3327    1470     2 1442 1483
TESTLOOX 31,3623     819     1  819      THETACON 27,2411      762      1  760      TIMEHOLD    1104     103     7  557  611
TESTLOOP 13,3256    1211     6 1209 1237 THETAO      0321       99     22   99 1305 TIMEINC  13,3641    1217     1 1218
TESTNN   41,2046     409     1  443      THETAN   E5,1452  =  129      1  129      TIMEOVFL 12,2311    1172     1 1170
TESTOFUF 40,3230     437     4  435  445 THETCOMP 34,3554      848      2  827  848 TIMEP       0030  =  981     3  979  980
TESTVB   41,2041     409                 THETCRIT E5,1560  =  123      2  123  827 TIMER    E5,1470  =  128
TESTXACT 43,2076     264    20  269 1280 THIRO    35,3644      686      2  671  847 TIMERAD  12,3557    1192     1  627
TESTY    35,2742     669     1  669      THIRTEEN    4761  = 1067      2 1064 1394 TIMESTEP 11,3311    1230     4 1212
TET      E3,1516  =  111    30  111 1232 THISAXIS 23,2515  =   37      1   37      TIMETEST 01,3575    1296     1 1299
TETCSM   E3,1570     112     5  112 1387 THISPREC 13,3056  =   37      2  703  717 TIMETHET 12,2732    1180     5  498  665
TETLEM   E3,1642     112     4  112 1387 THISSHIP 22,3356      717      1  716      TIMEX    35,3201     672     2  670  672
TETDTHEP E3,1570  =  112                 THISTRIP E7,1761  =  153      6  153  813 TIME1       0025  =   92    21  167 1361
TETTHIS  E3,1642  =  112     1  712      THISVINT 13,2066      238      1 1217      TIME2       0024  =   92    39  196 1389
TEVENT      1341     107     6  196  825 THROCHK  34,2656      645      2  644      TIME2SAV    0314      99     4   99 1329
TFF      E4,1540  =  116    11  116  723 THRDISP  E7,1750  =  148      2  319  788 TIME3       0026  =   92     4  221 1122
TFF/RTMU    0036  = 1260     6  716 1271 THREE       6250  = 1093     45  235 1450 TIME4       0027  =   92     4  159  221
TFFALFA     0032  = 1260     6 1264 1271 THREE/8  12,3757     1239      1 1225      TIME5       0030  =   92     5  221 1413
TFFBANK  22,3320     716     1  715      THREEDEG 32,2546      577      1  577      TIME6       0031  =   92     7 1396 1449
TFFCALLS 22,3565     722     1  722      THRESH1  36,2022       40      1  748      TIMEGMBL 21,3335    1471     1 1472

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TIMSUBM      0016  = 1142    3 1139       TORQUE    37,2117     376   1  390        TRUNNCMD     1354     108    4  538  608
TIMSUBO   E3,1706  =  113    1 1139       TOTATTER  43,2170     267   2  263  267   TRUNVAR   E4,1411     114    1  588
TITER     E7,1613  =  143    5  669  671  TPAGREF      7262    1030  19  277 1389   TRYCOUNT  25,3200     559    1  559
TIX       C1,2416    1082    1 1006       TPASS4    E7,1630     144   9  196  773   TRYGTS    17,2623    1441    1 1434
TJCALC    17,3402    1454    2 1454       TPOVL        6613    1015   1 1015        TRYSWN    25,2534     547    1  547
TJETLAW   17,3304    1453    2 1431 1444  TPERTICK  22,3460     718   1  718        TRYSWS    25,2472     546    1  543
TJETU     E6,1525  =  135    2 1455 1456  TPIP      E7,1624  =  151   5  151  798   TRYUDRV   16,2753    1421    1 1422
TJLAW     17,2715    1444    1 1448       TPIPOLD   E7,1573  =  151   2  796  798   TSCALE    32,2174     211    1  210
TJLAWADR  17,3142    1448    1 1444       TPLEFTN   40,3207     437   3  422  437   TSCALINV     4750  =  821    1  820
TJMIN     17,3774    1461    1 1459       TPMODE    10,3634    1390  11  582 1185   TSENSE    17,2176    1435    1 1435
TJP       E6,1524     134   18  134 1462  TPREV     E5,1761  =  126   3 1189 1190   TSIGHT    E7,1561  =  147   17  259  973
TJU       E6,1525  =  134   19  135 1501  TPSL1        4404     466   6  426  437   TSIGHT1   14,3154     938    1  936
TJV       E6,1526  =  134    3 1403 1447  TPUSH     00,3272    1071   1 1071        TSKOVCDR  01,3521    1126    1 1126
TJZERO    21,3775    1502    2 1502       TR*GL**P  23,3562    1252   1 1252        TSL&TCQ   30,3610     916    1  916
TLAND     E5,1400  =  122    6  122  927  TRACE1    40,3272     445                 TSLC         7621    1038    1 1005
TLIM      06,2514     173    1  164       TRACE1S   40,3303     445                 TSLCLOOP  00,2201    1046    1 1046
TLOAD        6473    1013    3  359 1093  TRACKBIT     4747  =   68  14  282 1307   TSLCTEST  00,2207    1046    1 1046
TM        E6,1732  =  136    4  366  369  TRACKFLG     0031  =   68   6  289  711   TSLC2     00,2172    1046    1 1038
TMANUCHK  22,3064     368                 TRAKFWDV  E7,1703  =  152   2  152  893   TSNEXTP   16,3014    1422    4 1421 1422
TMARK     E5,1432  =  128    4  128  382  TRAKLATV  E7,1702  =  152   5  152  900   TSNEXTS   17,2226    1435
TMEXITL   05,3716     988                 TRANSM1   E4,1400  =  118   2  118  388   TSNUMBRT  17,2216    1435    1 1438
TMFAIL2   04,3344    1331    2 1332       TRANSPDS  22,2326     358   1  353        TSSL      00,2101    1043    3 1041 1050
TMFI      E6,1702  =  136    9  354  355  TRANSTM   E7,1662  =  150   3  150  499   TSSR      00,2025    1041
TMIN      34,2111     637    2  646       TRANS4    17,2352    1438   1 1435        TSTA8     40,3703     474    1  475
TMINDEX      0336  =   99    7   99  989  TRAPEDP   E6,1430     130  11  130 1417   TSTARTB2  E4,1604  =  116    7  341  717
TMIS      E6,1702  =  136   15  136  353  TRAPEDQ   E6,1431  =  130   6 1403 1418   TSTCON1   41,3674     472    1  471
TMODE        6502    1013    1  524       TRAPEDR   E6,1432  =  130   6 1403 1418   TSTCON2   41,3675     472    1  471
TMPTOSPT  33,2440     867    1  856       TREDES    E7,1666  =  152   6  799  820   TSTCON3   41,3676     472    1  472
TMRESUME  05,3720     989                 TREDESCL  31,3711     822   1  820        TSTFBANK  27,2232     746    1  746
TNEWA     E7,1431     140    2  756       TRG*NBSM  23,3666    1254   5  251  962   TSTFORDP  41,2470     417    1  416
TNONTEST  06,2227     165    1  163       TRG*SMNB  23,3653    1254   2  577  890   TSTLTS1   41,3647     471    1  471
TNUV      E3,1526  =  111   12  111 1235  TRIG1     23,3335    1243   1 1243        TSTLTS2   41,3700     472    1  471
TOBALL    26,2136     477    1  477       TRIG2     23,3346    1243   1 1243        TSTLTS3   41,3705     472    1  472
TOBALLA   26,2144     477    2  478       TRIMACCL  31,2000      39   1  807        TSTLTS4   40,3534     454    1  473
TOBALLC   26,2165     478    1  478       TRIMDONE  01,2325     298   1  777        TSTORE       6457    1011    1 1011
TOCON2       5417    1291    1 1292       TRIMGIMB  27,3217     776   1  298        TSTPOINT  23,3757    1256
TOF-FF    27,2000  =   33    1 1263       TRIPA     E5,1664  =  127   5  127 1145   TSTRLSRM  13,2573    1133    1 1133
TOF-FF1   27,2000  =   33    2   46 1275  TRKFLCDU  06,3070     187   2  187        TSTRT     E7,1611  =  143    3  285  705
TOFAR     25,3577     572    1  572       TRKFLCN      4601     529   2  528  617   TTEMP     E6,1706  =  136    8  367  370
TOOBADF   22,2724     365    1  353       TRKMKCNT  E7,1462     141  11  141 1215   TTF/8     E7,1642  =  151   20  151  869
TOOBADI   22,2742     365    1  354       TRMTRACK  43,3045     289   2  263  598   TTF/8CL   31,3026     802    3  793
TOPSEUDO  17,2553    1440    1 1440       TRMTRAK1  42,2054     289   1  289        TTF/8TMP  E7,1552  =  151    5  151  798
TORKJET1  20,2000      42    2 1482       TRNSPSPD  22,2335     358   1  354        TTFDISP   E7,1475  =  149    4  149  820
TORQCONS  20,3151    1487    1 1487       TRUE36DX  12,3172    1185   1 1184        TTFINCR   31,2573     798    4  793  797
TORQNDX   E5,1440  =  129    8  375  390  TRLNBQ    26,3110     587                 TTFSCALE     4740  =  821

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SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF     H        REFERENCES      SYMBOL      DEF     H        REFERENCES

TTHROT   E7,1617  =  151    3  151  790 UAXIS    20,3322     1490                UNWCTEST 30,3514      914    2  907
TTD      E4,1666  =  120    4  120  839 UCSM     E7,1636  =  150    3  150  498 UNX/2        0000  =  137    7  906  914
TTOAXIS  E6,1741  =  134   10 1456 1459 UDB1        0135  = 1497    2 1494 1495 UNY/2        0006  =  137    1  907
TTDGO    E7,1453     141   26  141  845 UD82        0136  = 1497                UNZ/2        0014  =  137    8  906  907
TTOTIG      1271     106    2  318  559 UC83        0140  = 1497                UNZ2     06,2313      167    1  168
TTPI     E7,1635     144   19  196  672 UD84        0137  = 1497    2 1494 1495 UPACTOFF 04,3743     1388    2 1386 1388
TTPIO    E7,1637     144    3  628  633 UERROR   E6,1750  =  132    3  132 1444 UPBUFF      1173  =  104   29  206 1387
TURNITON 35,3726     743    1  742      UHYP     E7,1717  =  153    7  153  896 UPCOUNT     1172  =  104    5  104 1382
TURNOFFQ 16,2714    1420    1 1420      UHZP     E7,1725  =  153    6  120  896 UPDATBIT    4745  =   67    1  510
TURNOFFR 16,2724    1421    1 1420      UJETCTR  E6,1767  =  138    4 1404 1501 LPDATCHK 33,3115      877    2  869  870
TURNON   17,3154    1448                ULC      E7,1723  =  147    8  147  591 UPDATEVG 36,3615      756    2  752  757
TURNONBT    4753  =   86    1  530      ULLAGER     4746  =   88    3  737 1435 UPDATE2  04,2000  =   28    2 1218 1381
TURNONFL    0302  =   86                ULLAGFLG    0314  =   88    2  226  737 UPDATFLG    0027  =   67   10  289  683
TVEC        0032  = 1240    4 1228      ULLAGOFF 36,2566      735    1  242      UPDATIME 42,2016      277    1  277
TWEEKIT     0050  = 1197    4 1176 1190 ULLGNOT  36,2327      730    5  725  730 UPDATNN  41,2322      413    3  443  458
TWELVE      5741  = 1476    1 1473      ULLGTASK 36,2350      731    3  240  740 UPDATOFF 43,3102      291    1  264
TWIDDLE     5173    1113   26  377  961 ULOS     E4,1710  =  118    6  669  677 LPDATRET    0117  =   96    3  413  414
TWD         4752  = 1093  109   37 1497 UMPAC+   00,3170     1068    2 1068      UPDATV8  41,2342      413   10  406  458
TWOPI    35,3640     686    5  627  675 UMPAC-   00,3162     1068    2 1068      UPDAT1   41,2347      414    2  413  447
TXO      E7,1653  =  154    4  154  844 UN       E5,1673  =  126    9  126 1193 UPDNLIST 05,2407  =  195
TX789    E7,1471  =  147    3  147 1151 UNAJUMP  00,2000     1007    1 1004      UPDTCALL 22,3206      370    1  369
TYPEP    16,3567    1432    1 1432      UNFC/2   E6,1652  =  137   19  137  904 UPCTMENC 42,2032      277
TYPEPCLY 17,3263    1450    2 1450      UNFV/2   E6,1666  =  137    5  137  904 LPDTPHAS    4756  = 1383    1 1384
T1TOT2   E4,1652     117    6  118  646 UNFVLIM  30,3756      920    1  914      UPEND70  04,3701     1387    1 1384
T2A      30,3007  =  850    1  840      UNFVX/2  E6,1666  =  137                UPEND71  04,3610     1385    1 1384
T2TEST   30,2452     840    2  839  846 UNFVY/2  E6,1670  =  137    3  906  907 UPEND72  04,3642     1386    1 1384
T2TOT3   E4,1654     117    5  318  646 UNFVZ/2  E6,1672  =  137    3  906  907 UPEND73  04,3514     1383
T3       30,3011     850    1  840      UNIT     00,3023     1064    3  606 1394 UPENT2   10,3545     1366    4 1355 1360
T3RPT88     4057     156    1  155      UNIT/R/  E7,1536  =  149   39  149  896 UPERROR  43,3765     1380    1 1380
T3RUPT   01,3410    1122    2  155  156 UNITDV   00,3151     1068    3 1066      UPERROUT 04,3736     1388    4 1380 1387
T3RUPT2  01,3415    1122    1 1123      UNITGOBL E7,1520  =  149    2  775  873 UPFLAG      5504     1367   74  267 1384
T4JUMP   06,2116     161    2  160      UNITNORM 04,3120     1182    1 1182      UPENDVAC 04,3522     1384    1 1383
T4RPTBB     4064     156    1  155      UNITX    23,2521     1094   13   37 1094 UPJOB    04,3527     1384    1 1384
T4RUP    06,2000  =   29    2  157  158 UNITY    23,2517     1094    5   37  890 UPLIM    12,3277     1188    1 1187
T4RUPT   06,2000     157    2  155  156 UNITZ    23,2515     1094   10   37  873 UPLOADNV 04,3474     1383    2 1381 1382
T5ADR       1263     105    5  155 1483 UNKNOWN     0007  =  195                UPLOCBIT    4750  =   78    3 1331
T5TEMP      0061  =  138    1 1411      UNLR/2      0024  =  152                UPLOCKFL    0164  =   78
T6ADR       4055     156    1  155      UNLRB/2     0024  =  152                UPMNSVCC 04,3206     1219    1 1218
T6FURTHA E6,1470     131   11 1396 1449 UNP36    E4,1614  =  118    3  703      UPNEG       7564     1037    1 1037
T6JOB    17,2061    1396                UNRM     E4,1660  =  118    7  670  679 UPOK     04,3327     1331
T6JOBCHK 17,2055    1396    1 1397      UNSETR1  10,3361     1361    1 1360      UPOLDMOD    1170  =  104    3  104 1386
T6NEXT   E6,1466     131   12  221 1449 UNSUSPEN 40,3542      454    1  454      UPOUT    04,3667  = 1386    7 1381 1388
======================================= UNVEC    E7,1543  =  143    5  652  653 UPOUT4   04,3670  = 1383    3 1382
U=SCAXIS 27,2134     486    1  486      UNWC/2   E6,1660  =  137   10  137  906 UPPART2  04,3357  = 1381    1 1381
UAXDIST     0141  = 1497    2 1494 1495 UNWCLOCP 31,3354      608    1  808      UPPART3  04,3540  = 1384

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BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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SYMBOL     DEF     H       REFERENCES      SYMBOL     DEF     H       REFERENCES      SYMBOL     DEF     H       REFERENCES

URROS      7554     1037   1 1037          UTIME    21,3714    1501   1 1500          VARFG*   E5,1460  =  122   1  122
UPRSV   24,2312      503   2  502   514    UV          0154  = 1498   7 1490 1497     VAPREC   E7,1505  =  143   2  669  672
UPRSV1  24,2332      504   1  504          UXVECT   E7,1717  =  146   7  146  597     VARADAR  25,2060     495   1  494
UPRSV3  24,2364      504   1  504          UXVECTPR    0014  =  598   3  595          VARALARM    5734    1376   4  182 1324
URRSV4  24,2345      504   1  504          UYVECT   E7,1725  =  146   6  146  597     VAROELAY    5224    1113  11  166 1304
URPSV5  24,2327      504   1  504          UYVECTRR    0022  =  598   2  595          VARIANCE E5,1706  =  127  12  127 1144
URRPT88    4060  =   156   1  155          UZ          0024  = 1240   4 1227 1229     VATT        0006  = 1240  23  571 1217
UPRRT1  04,3310     1331                   U1ROS    22,2250     356   1  356          VATT1       0024  = 1240  14  210  801
URRURT  04,3276     1331   1  155          U2       E5,1711  =  126   5  126 1192     V8AC     33,3625     886   1  885
URSTORE 04,3476  =  1383   1 1382          U2PDS    22,2224     356   1  356          V8CCARK  43,2200     268   1  263
UPSVFLAG E3,1501 =   111   6  111  1219    U3RDS    22,2274     357   1  357          V8FANDIR 41,2146     410   1  410
UPTEMP     1166      104  12  104  1386    ====================================== V8IAS    E5,1620  =  123   3  795  813
URTEST  04,3350     1331   2 1331          V        E7,1526  =  149  20  149  895     V8RROC   40,3476     452   5  411  460
URTHROT 32,3647      828                   V(CSM)   E3,1725  =  121   7  603  875     V8RELOSR 40,3524     454   1  400
URTHROT1 32,3654     828   1  829          V-OTHER  E3,1725     112   5  121  323     V8RFSEQ  40,3521     453   1  411
URTMFAST 06,2676     180   1  183          V/SC        7627    1039   1 1005          V8RFG    E5,1410  =  122   2  122  821
UPVERB     1171  =   104   5  104  1384    V/SCDV   00,2750    1062   3 1061          V8PFG*   E5,1424  =  122   2  122  821
URVER8SV   1165      104   2 1380          V/SC1       7635    1039   1 1039          V8RQEXEC 41,3501     451   1  411
URVERIFY 04,3441    1382`  3 1382  1383    V/SC2    00,2654    1060   1 1039          V8RQWAIT 41,3525     452   1  411
URVRFYNV 04,3475    1383   1 1382          VACDSR   10,2660    1353   1 1353          V8SP1LD  41,3031     431   2  428  429
URWAKE  04,3532     1384                   VACFOUND 01,2621    1100   5 1100          V8SR2LD  41,3032     431   2  428  430
UP1     E4,1660      117  11  118   653    VACSTCR  07,2525     259   1  256          V8SP2LO* 40,3523     453   1  452
UP21       4362  =  1383   1 1382          VACT1    E7,1471     143   4  146  647     V8SP3LD  41,3033     431   1  428
UR70       4755  =  1381   1 1380          VACT2    E7,1513     143   3  641  653     V8TERM   40,3504     452   2  411  459
UP71       4753  =  1381   1 1380          VACT3    E7,1543     143  13  143  699     V8TSTLTS 41,3626     471   1  411
UP72       4752  =  1381   1 1380          VACT4    E7,1565     143   6  144  641     VBUF        0122      96  71   96 1497
UP73       6250  =  1381   1 1380          VACX     E4,1537  =  115   1  115          VBZERO   43,2126     266   1  263
UR         0000  =   493   1  492          VACY     E4,1541  =  115   1  115          V804N12  26,2117     342   1  341
URATEDIF E6,1426 =   131   5 1439  1441    VACZ     E4,1543  =  115                   V805N06  15,3634     976   1  970
URR        0006  =   493   2  492          VAC1        0401     100                   V805N09     5006  =  925   3  936  971
URRV       0016  =  1240   8 1227  1240    VAC1ADRC 05,3364     225   1  223          V806N18  26,2120     342   1  342
URRECT  F5,1646  =   126   4  126  1173    VAC1USE     0400     100   4  223 1100     V806N98  37,2472     383   1  383
UR1     E5,1721  =   126  11  126  1193    VAC2        0455     100                   V856CADR    6030     598   1  598
USEAUD  41,2105      409   1  409          VAC2USE     0454     100   3  224 1100     V86N5    14,3320     942   1  941
USECOS  30,3645      917   1  917          VAC3        0531     100                   V864     43,2725     282   1  263
USEGTS  33,2336      857                   VAC3USE     0530     100   3  224 1100     V867     31,2000  =   34   1  613
USEJETS 33,2375      858   4  857          VAC4        0605     100                   VB67A    30,2000  =   34   1  615
USEMAXDT 13,3333    1211   1 1212          VAC4USE     0604     100   3  224 1100     V897DEX     4765  =  739   1  736
USEPIOS 13,3000     1205   1 1205          VAC5        0661     100   1 1300          V899DEX     4760  =  739   1  732
USEQRFLG   0304  =    87                   VAC5USE     0660     100   3  224 1100     VCV      E3,1542  =  111  21  111 1233
USEQRJTS   4736  =    87   6  755  1483    VAD         6754    1020   1 1005          VCVCSM   E3,1614     112   1  584
USFRPRIO   0163  =  1365   3 1351  1361    VALMIS   37,2263     379   1  390          VCVLEM   E3,1666     112   2  504  584
USEVF   33,3426      881   1  881          VALTCHK  33,3454     882   3  879  882     VD8      17,2533    1440   1 1440
USRRCADR   4713      994   7  606  1252    VAL67    05,2043      52   3  979  980     VOEF     00,3232    1071   1 1007
UT      E7,1672      145  10  145   764    VARFG    E5,1444  =  122   1  122          VOG      E5,1410  =  821   1  804

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VOGVERT   E7,1644  =  152   3  795  813 VERTOISP 31,3471      810   1  794      VNLODOT   42,2034      277   1  277
VOG2TTF   E5,1424  =  821   1  802      VERTORFT 37,2231      378               VNLOOGYR  43,2420      275   1  275
VO1          4360     465  15  225 1093 VERTGUIO 31,3503      810   3  793  796 VNPLANV   15,2560      957   1  956
VE        E4,1664  =  120   6  120  839 VERTSKIP 37,2534      385   1  385      VNPOOH    35,3621      685  13  619  681
VEARTH    E5,1706  =  124   6  124  957 VEX      E7,1742      145   3  749  767 VN0611    35,2065      626   1  627
VECAGREE  00,3010    1063   4 1060 1394 VFAIL    33,3535      883   2  880      VN0641    37,2473      383   1  375
VECANG1   26,2407     487   1  486      VFLAG       0062  =    70   4  932  935 VN0655    35,2120      627   1  626
VECANG2   26,2411     488   1  486      VFLAGBIT    4742  =    70               VN1       E7,1552  =   149   7  149 1217
VECLEAR   27,2043     485   1  485      VFLSHBIT    4752  =    85   1  823      VN1645    35,3515      682   6  620  695
VECOFANG  22,2723     364   2  364      VFLSHFLG    0262  =    84   2  880  883 VN2       E7,1656  =   151   4  152
VECPNT1   27,2032     485   1  522      VG       E7,1706      145   6  145  766 VOK       26,2666      584   1  584
VECPNT2   27,2035     485   1  485      VGAIN*   27,2455      766   1  775      VOK1      26,2727      585   1  585
VECPOINT  27,2040     485   3  342  478 VGBODY   E7,1501  =   149  10  149  839 VOK2      26,2731      585   1  585
VECPT     27,2000  =   33   1  484      VGOISP   E7,1663  =   144   4  316  766 VONE      E4,1614  =   116   9  707 1263
VECQTEMP  E6,1724  =  136   4  485  487 VGPREV   E7,1700  =   145   8  241  771 VONE'     E4,1567  =   115   3 1263 1269
VECSGNAG  10,3773    1394   2  211      VGTIG    E7,1700  =   145  10  145  768 VOPENEO   06,3231      194   1  193
VECSHIFT  23,2441     700   3  639  652 VGU      E7,1626  =   151   9  151  811 VPASS1    E7,1505      143   6  143  647
VECTAB    E4,1531  =  115  10  115 1228 VGVECT   E7,1645  =   154   6  154  839 VPASS2    E7,1527      143   5  143  652
VECTABNO  E4,1574  =  115               VHY      E7,1704  =   152   4  153  897 VPASS3    E7,1557      143   8  643  699
VEC1      E6,1645  =  137   8  137  976 VHZ      E7,1705  =   153   4  153  897 VPASS4    E7,1505  =   146   2  665  675
VEC2      E6,1653  =  137   6  964  976 VIGN     E5,1472  =   122   2  122  782 VPD          0000  =   935
VEHUPBIT     4744  =   67               VINIT    E4,1730      119   5  676  761 VPOVL        6576     1015
VEHUPFLG     0026  =   67  13  290 1150 VINJNOM  34,3366      835   1  832      VPPREC    E7,1527  =   143   2  669  672
VELBIAS   E6,1771     138   1  380      VINTFBIT    4751  =    71               VPRCJ        7430     1035   1 1005
VELCHK    25,3232     560               VINTFLAG    0071  =    71  27  238 1235 VRATEOIF  E6,1427  =   131   3 1440
VELCONV   21,2003      42   2  896  857 VIPRIME  E4,1736      119   7  665  774 VRECT     E3,1510  =   111  11  111 1233
VELDABIT     4745  =   84   2  879  885 VJETCTR  E6,1770  =   138   2 1404 1420 VRECTCSM  E3,1562      111   2  834  977
VELDATA      0255  =   84               VLAUN    E5,1510  =   129   5  388  389 VRECTLEM  E3,1634      112
VELSC     37,3101     391   1  387      VLAUNS   E5,1462  =   129               VRIGHT2   00,2242     1048   1 1048
VELUPOAT  33,3255     879               VLIGHT   25,3646      617   1  617      VROTATEX     7423     1034   3 1044 1066
VERB      40,2354     404   1  400      VLITE       4751  =   618   2  617  823 VROUNO       7143     1026   6 1034 1035
VERBFAN   41,2133     410   7  409  412 VLOAO       6510     1013   1 1005      VSCALF    32,2201      211   1  210
VERBMASK     4144  = 1364   1 1349      VLOAO*      6112  =  1093   1 1012      VSELECT   E7,1651  =   151  11  151  889
VERBNOUN  E7,1615     143   4  625  685 VLOAOCOO    4735  =  1093   1 1012      VSELECT*     0131  =   123   3  881
VERBREG      1000     101  21  224  462 VMAX     E4,1405      114   1  592      VSHRRNO   00,2073     1042   4 1044 1080
VERBSAVE     1040     102   3  409  450 VMEAS    E7,1652  =   151   4  151  885 VSHR2     00,2060     1042   1 1042
VERBTAB   41,2151     410   1  410      VMEASCHK 33,3250      879   5  877  883 VSQ       00,3245     1071   1 1007
VERB37    04,2000  =   28   1  226      VMGOE       6524     1013   2 1035 1071 VSQSUB    00,3317     1072   3 1064 1071
VERB69    43,2037     263   1  263      VMONITOR 21,2617      897   1  900      VSSL      00,2145     1045   3 1044 1050
VER885    43,3254     301   1  264      VMOON    E5,1722  =   124   8  125  980 VSSR      00,2127     1044   1 1048
VER896    43,3233     300   1  264      VN          1225      105  10  197 1214 VSTILBAD  33,3626      886   1  885
VERIFBIT     4751  =   78   1 1383      VNCON    43,3151      293   1  292      VSTORE       6446     1011
VERIFLAG     0165  =   78               VNDSPCON 40,3352      447   1  447      VSU          6752     1020   1 1005
VERIFYMK  07,2443     256   1  256      VNLDRCDU 43,2263      270   1  270      VSUBC     E3,1760  =   113   3  498
VERROR    E6,1751  =  132               VNLOOCOU 43,2234      269   2  269  283 VSUN      E5,1714  =   124   7  124  980

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VTARGET  E5,1702  =  126   4  126 1191 V06N22       5010      1090   4  489  968 V16N54    37,3407      709    1  705
VTARGTAG E5,1701  =  126   5  126 1191 V06N33    35,2032       620   1  619      V16N56    40,2076      302    1  301
VTIG     E7,1647  =  144   7  144  764 V06N33*   24,2311       503   1  497      V16N63    14,2437      847    1  846
VTPRIME  E7,1565  =  144   4  665  692 V06N33A   30,3022       850   1  831      V16N66    43,2671      281    1  280
VUPDAT   33,3375     881   1  880      V06N34*   15,2170       925   2  923  969 V16N67    43,2672      281    1  280
VUPDATED 33,3453     882               V06N37    35,3632       686   3  627  664 V16N72    43,2667      281    1  280
VV/SC       7632    1039               V06N42    35,2033       620   1  619      V16N78    43,2670      281    1  280
VVARMIN  E3,1775     113   1  584      V06N43    24,3674       659   1  659      V16N80    24,3255      520    1  519
VVEC     E5,1743  =  126  15  126 1194 V06N43*   24,3342       787   1  786      V16N85B   36,3765      758    4  730  752
VVECT    E7,1706  =  153  16  153  895 V06N48    01,2337       298   2  297  298 V16N85C   34,3474      847    1  847
VVXSC       7407    1034               V06N49NB  24,2666       511   1  511      V1683     36,3766      758    1  754
VXBEAMNB E4,1644  =  117   2  117  890 V06N51    42,3765       493   1  492      V2           0022  =  935
VXINH       0250  =   83   2  881  884 V06N55    35,3633       666   2  627  684 V2FG      E5,1510  =  122    2  122  811
VXINHBIT    4740  =   83   1  880      V06N58    35,3634       686   1  665      V3           0030  =  935
VXM         7342    1032   1 1005      V06N59    35,3635       686   1  681      V34TON49  24,2607      510    1  511
VXM/MXV     7345    1033   1 1032      V06N60    31,3720       822   1  810      V37       04,2040      229    2  300  451
VXRCM    E7,1703  =  146   3  146  597 V06N61    36,3152       744   1  739      V37BAD    04,2067      229    1  234
VXSC        7404    1034   1 1005      V06N63    31,3716       822   1  809      V37FLAG      0162  =   78    1  859
VXSCAL   33,2016      41               V06N63*   30,3020       850   1  843      V37FLBIT     4746  =   78    3  230 1375
VXV         7463    1036   2 1005 1259 V06N64    31,3717       822   2  809  810 V37KLEAN  05,2650      216    2  232 1375
VYBEAMNB E4,1636  =  117   3  117  890 V06N68    43,2365       273   2  273      V37NONO   04,2326      234    1  230
VYSCAL   33,2014      41               V06N71    07,2624       261               V37N99    04,2037      227    1  227
VZBEAMNB E4,1630  =  117   3  117  890 V06N72PV  24,3136       516   1  515      V37QCAD   04,2370      235    1  233
VZSCAL   33,2012      41   1  879      V06N75    35,2417       636   2  628  633 V37RET    04,2116      230    1  859
V0          0006  =  935               V06N76    30,3021       850   1  832      V37XEQ    04,2334      234    1  235
V00N25      6010  =  211               V06N79    15,2464       955   1  954      V37XEQC   04,2363      234
V00N34      4242  =  211               V06N79*   07,2625       261   1  262      V41K      14,3556      947    1  945
V01N14   32,2170     211               V06N81    35,3636       686   2  619  680 V43K      43,2771      284    1  283
V01N25   10,3477    1364   2 1352 1354 V06N84    13,2334       713   2  711      V47TXACT  43,2430      276    1  263
V01N46   20,2112     296   1  295      V06N87    14,3774       951   1  951      V50N00    10,3501     1364    1 1359
V01N70   14,3773     951   1  950      V06N87*   07,2331       254   1  247      V50N00A   32,2171      211
V01N70*  15,2463     955   1  952      V06N89*   14,2477       928   1  928      V50N16    32,2173      211    1  210
V01N71   07,2330     254   1  247      V06N90N   04,2756       704   1  704      V50N25X   43,2674      281    1  279
V04N06   10,3503    1364   1 1354      V06N93    14,3246       940   1  940      V50N48    01,2337  =  298    1  298
V04N12X  43,2673     281   1  279      V06N99    31,2143       615   1  613      V50N68    43,2365  =  273    1  273
V04N1272 23,2037     272   1  272      V06N990S  31,2024       613   1  613      V50PASTE  10,3204     1359    1 1359
V05N00M1 10,3516    1364   1 1357      V06N9933  31,2051       613   1  613      V59GP63   25,3541      568    1  266
V05N09      5006    1090   6  626 1374 V0647     01,2336       298   1  297      V6N34     24,3675      659    1  657
V06N05   24,2665     511   1  509      V1           0014  =    935               V6N99PRO  31,2032      613    1  613
V06N07   10,3500    1364               V1S       E7,1600  =    149  14  149  882 V67       43,3240      300    1  263
V06N11   35,2415     636   1  626      VISTO2S   10,3621      1389   4  367 1246 V67CALL   31,2007      613    1  300
V06N13   35,2416     636   1  632      V16N20    14,3215       939   1  939      V67CLRF   31,2110      614    1  614
V06N16   32,2172     211   2  209      V16N40    36,3764       758   1  749      V67FLAG      0160  =   77    3  613  614
V06N16A  04,2755     704   1  703      V16N44    22,3317       716   2  716  719 V67FLBIT     4744  =   78
V06N18   26,2260     479   2  477  478 V16N45    35,3637       686   1  692      V67SURF   31,2102      614    1  614

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT                  XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REES, PAGE OF FIRST REF, PAGE CF LAST REF.

SYMBOL      DEE     H        REEERENCES      SYMBOL      DEF     H       REEERENCES      SYMBDL      DEF     H       REFERENCES

V67WW     31,2120      614    1  613        WAIT68    43,2334      273    1  273        WDRKTIME 16,2624     1419    1 1419
V67XXX    30,2042      615    1  615        WAKECAD   00,3774     1370    1 1365        WOZERD   05,3612      987    2  986  991
V70UPDAT  43,3751     1380    1  263        WAKECADR  10,3511     1364    3 1355 1356   WPLATI   E5,1560  =   129
V71UPDAT  43,3753     1380    1  263        WAKEPLAY  10,3025     1356    1 1361        WPLATC   E5,1464  =   129
V72UPDAT  43,3755     1380    1  263        WAKER     00,3766     1369    1 1370        WPDSTORE 26,3276      590    1  590
V73UPDAT  43,3757     1380    4  263 1380   WAKESTAL  13,3461     1213    2 1212 1213   WRDRET       0115  =    96
V74       43,3066  =   290                  WAKETEST  01,3045     1105    1 1105        WRENDPOS E4,1400      114    3  118  614
V82CALL   22,3242      715    1  285        WANGI     E5,1436  =   129    1  376        WRENDVEL E4,1401      114    2  590  614
V82CON    43,3000      285    1  285        WANGO     E5,1434  =   129    1  376        WRITEP       5744     1397    6 1396 1447
V82EMBIT      4752  =   78                  WANGT     E5,1440  =   129    1  129        WRITEU       5750     1397    1 1447
V82EMFLG      0166  =   78    7  717  722   WANTAPS   36,2324      730    1  726        WRITEV       5761     1397    1 1447
V82FLAGS  E4,1537  =   116    6  116  718   WBANK     26,3331      591    1  590        WRTDESIR 15,3070      965    1  965
V82GOFF   22,3247      715    1  715        WCALC     22,2746      366                  WSHAFT   E4,1402      114    2  590  614
V82GOFF1  22,3321      716    1  715        WCENTRAL  E6,1742  =   133    2 1465 1466   WSIZE    26,3437      592    1  590
V82GOFLP  22,3267      715    1  716        WCHPHASE      1346     108   13  733  820   WSTOR    33,3432      881    3  881
V82GON    22,3465      719    1  715        WCHPHCLD  E7,1621  =   151    7  151  809   WSUREPOS E4,1406      114    2  590  614
V82GON1   22,3503      719    2  719  720   WCHVERT   E7,1647  =   152    3  796  810   WSURFVEL E4,1407      114    2  590  614
V82GON2   22,3536      719    1  719        WDAGAIN   41,3416      447    1  447        WTABORT  01,3364     1119    1 1117
V82GON3   22,3541      720    1  720        WDCNT         0137  =    97    4  445  447   WTLST2   01,3375     1121    8 1118 1119
V82PERE   43,2772      285    1  264        WDRET         0115  =    96    8  445  448   WTLST4   01,3261     1117    1 1121
V82REDSP  22,3475      719    1  719        WEARTH    26,2020       53    1 1140        WTLST5   01,3311     1118    1 1116
V82STALL  22,3300      715    1  716        WEIGHT/G      1243  =   105    6  760  769   WTLTCADR 01,3775     1300    3 1296 1299
V83CALL   37,3121      705    1  705        WHATALM   31,2410      794    1  803        WTRUN    E4,1403      114    2  591  614
V83PERE   43,3002      285    1  264        WHATDISP  31,2404      794    1  809        WVELSTOR 26,3313      590    1  590
V89CALL   26,2022      341    1  286        WHATEXIT  31,2402      794    1  806        WWBIAS   E4,1604  =   116   11  319  615
V89CALL1  26,2072      342    1  342        WHATGUID  31,2372      793    1  802        WWPOS    E4,1600  =   116   15  300  615
V89PERF   43,3010      286    1  264        WHATOUT   31,2330      791                  WWVEL    E4,1602  =   116    9  319  615
V89RECL   26,2036      341    1  342        WHCHREAD      1356     108    6  108  587   ==========================================
V90PERE   43,3017      286    1  264        WHERETC   31,2203      789    1  788        X            0024  =  1195   22 1169 1184
V97NOD    10,3542     1365    1 1359        WHICH     E7,1455      141   30  243  857   XAD      01,2401     1082    1 1006
V99RECYC  36,3003  =   739    1  726        WHICHADR  32,3743      830    1  826        XAD2     01,2404     1082    2 1082
=========================================   WHIMPER       5634    1374    3  860 1376   XCHNYLDC 10,3224     1359    1 1355
W         E5,1400      122   34  122 1235   WHOCARES  E7,1471  =   142    4  490 1353   XCHQADD  10,3016     1356    1 1355
W.IND         1256  =  107    4  107  590   WHOLECON  42,3534      439    3  438        XCHSLEEP 10,2765     1355    1 1356
W.IND1        1257  =  107                  WIDED8    20,2152     1400    1 1399        XCHTOEND 10,3223     1359    3 1351 1355
WAITABIT  36,2567      735    5  725  727   WITCHONE  10,3206     1359    3 1351 1355   XCHX     01,2373     1082    1 1006
WAITADR       0063  =   95    3 1113 1117   WIXA          1315     106    5 1147 1149   XCOMMON  12,3066     1184    1 1186
WAITBANK      0062  =   95    1 1116        WIXB          1316     106    3 1147 1149   XDC      E5,1664  =   124   12  124 1248
WAIT88        5220     1113    2 1113 1123   WLINIT    26,3251      590    3  582  591   XDELVBIT     4744  =    69
WAITEXIT      0061  =   95    7 1113 1369   WLOOP     12,3013     1183    1 1183        XDELVFLG     0045  =    69    6  619  766
WAITLIST      5203     1113   46  166 1316   WLSREPOS  26,3274      590    1  590        XDIFF    12,2163     1170
WAITMASK  10,2761     1355    1 1355        WLSREVEL  26,3311      590    1  590        XDSPBIT      4753  =    73    1 1346
WAITPOOH  01,3524     1126    1 1116        WM        E4,1724  =   121    6  121  876   XDSPFLAG     0112  =    73    1  209
WAITTEMP      0064  =   95    3 1121        WMATEND   11,3700     1236    1 1234        XI           0030  =  1195    7 1170 1189
WAIT2     01,3232     1116    2 1113        WMATRXNG  43,3114      292    1  264        XKEP     E3,1552  =   111    3  126 1233

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SYMBOL      DEF    H      REFERENCES       SYMBOL      DEF    H      REFERENCES       SYMBOL      DEF    H      REFERENCES

XKEPCSM   E3,1624    112                XKEPCSM   YCCT      E4,1710 =  120   5  120  841 ZERDD     23,2523 = 1151
XKEPLEM   E3,1676    112                YOOTO     E4,1674 =  120   3  120  838 ZERODT    21,3450   1473   2 1473
XKEPNEW   E4,1527 =  115   3  115 1221 YLIM      E5,1564 =  123   2  123  827 ZEROPLUS  20,3020   1484   1 1484
XMAX         0012 = 1195   9 1169 1172 YMKRUPT   07,2421    256   1  255      ZEPOTJ    17,2620   1441
XMIN         0014 = 1195   6 1169 1172 YN8       E5,1672 =  124   6  376 1245 ZERCVEC   12,2006   1095  13   37 1239
XMKRUPT   07,2415    256   1  256      YN8PIP    E4,1553 =  115   3  115  800 ZERDVECS  23,2523   1094  18   37 1151
XN8       E5,1664 =  124  12  375 1389 YNBSAV    E4,1636 =  117   4  117  975 ZI        E5,1642 =  127  25  127 1152
XN8ADR    37,2476    383   1  375      YDK       32,3620    827   1  827      ZIXA         1317    106   4 1147 1149
XN8ECADR  10,2035   1257   1 1257      YRATE     E4,1752 =  121   5  121  842 ZIX8         1320    107   4 1147 1149
XN8PIP    E4,1545 =  115  11  115  907 YREG         1003    101   3  429  438 ZN8       E5,1700 =  124   6  376 1245
XN8PIPAO  33,2414    858   1  856      YREGLP       1006    101   2  101  438 ZNBPIP    E4,1561 =  115   1  907
XOKFL8IT     4743 =   84   1  869      YSCI      E5,1714 =  125   1  125      ZN8SAV    E4,1644 =  117   3  973  975
XORFLG       0253 =   84   1  869      YSCREE    E7,1614 =  149   1  764      ZONE1     17,3615   1458   2 1455 1458
XDVINFLG     0311 =   87   7  226  869 YSM       E5,1650 =  124   4  124 1245 ZDNE2     17,3606   1458
XOVINHI8     4743 =   87   2  9 4 1422 YSMD      E7,1614 =  149   6  149  977 ZONE2,3   17,3602   1458   1 1455
XPREV     E3,1552 =  126   2 1170 1173 YSZERO    07,2177    252   1  252      ZDNF3     17,3610   1458   1 1458
XRANGE    E7,1642 =  154   5  154  832 YUNIT     12,2002   1095   2   37  962 ZONE3LIM  E6,1555 =  135   1 1458
XREG         1002    101  10  307  432 YV           1125 =  104  11  104 1236 ZONE3MAX  20,3766   1498   1 1489
XREGLP       1005    101   3  403  432 YZCHK     07,2171    252   1  251      ZDNE4     17,3427   1455
XROT      26,2372    487   1  487      ====================================== ZONE4,5   17,3416   1454
XSCI      E5,1706 =  125   1  125      Z            0005 =   92  24  306 1374 ZONE5     17,3461   1455   1 1455
XSCREF    E7,1606 =  149   3  764      ZACCOCT   20,2755   1482   1 1482      ZON1,2,3  17,3575   1457   1 1454
XSM       E5,1642 =  124  24  124 1245 ZAPTJ     21,3676   1501   1 1501      ZOOM      35,3667    735   4  241  737
XSMADR    37,2477    383               ZATTEROR  20,2154   1400  13  287 1440 ZOOM8IT      4744 =   74   1  794
XSMD      E7,1606 =  149  15  149  977 ZAXIS1    E7,1725 =  120   6  833  845 ZOOMFLAG     0122 =   74   2  731  735
XSQC(XI)     0034 = 1195   5 1172 1178 ZDATA2    21,2261    892   1  900      ZDCMTIME  E7,1422    140   5  241  807
XSTORE    C1,2347   1081   3 1081      ZOC       E5,1700 =  124   5  124 1248 ZPRIME       0026 =  125   7 1241 1242
XSU       C1,2412   1082   1 1006      ZOCT      E4,1712 =  120   3  120  838 ZREG         1004    101   3  409  438
XTRANS    17,3112   1447   3 1437 1445 ZOOTO     E4,1676 =  120   6  120  848 ZREGLP       1007    101   2  101  438
XUNIT     12,2004   1095   9   37 1227 ZDCTOCMP  34,3524    848   1  838      ZRUPT        0015 =   92   2 1420 1451
XXXALT    E7,1670    144   4  144  657 ZEROUMMY  E7,1646 =  151   2  151  152 ZSCI      E5,1714 =  125
XYMARK    E7,1551 =  147  18  147  952 ZERLINA   E7,1443 =  142   4  142  815 ZSCREF    E7,1622 =  150   1  764
X1           0046 =   93  69  253 1392 ZERO         4755   1089 318  159 1502 ZSM       E5,1656 =  124   2  124 1245
X1INPUT   E7,1611 =  144               ZERO/SP   23,2523 =  598   1  572      ZSMD      E7,1622 =  149   5  150  977
X2           0047 =   93  29  491 1264 ZERCANS   00,3376   1073   2 1073      ZSPCR     15,2413    954   1  953
X789      E3,1700    112   5  198 1151 ZERDDATA  21,3047    900   1  893      ZUNIT     12,2000   1095   4   37 1230
====================================== ZERDDP    12,2006 = 1095               ZV           1133 =  104   8 1231 1236
Y         E4,1734 =  120   6  120  849 ZERCENBL  16,3201   1426   2 1426      Z1TEM        0131 = 1497   4 1493 1494
YAW       E4,1762 =  121   3  121  833 ZFROHIGH  21,3453   1473   1 1473      Z123      23,2545   1143   1 1144
YAWANG    E4,1602 =  119   2  491  492 ZEROICDU     5457   1301   4  167 1303 Z123COMP  17,3561   1457   3 1455 1457
YAWOUN    30,2230    833   1  833      ZERCING   37,2367    381   2  375  385 Z3TEM        0152 = 1497   1 1489
YCO       E7,1632 =  154   6  154  841 ZERDING1  37,2371    381   1  381      Z5TEM        0132 = 1497   4 1492 1493
YCOMP     27,3313    849   3  827  838 ZERCLGUP  21,3615   1475   2 1475      ======================================
YCDNS     E4,1746 =  121   3  121  842 ZEROLSTY  21,3023    899   7  898  899 0.35356   20,3104   1486   2 1480 1481
YDC       E5,1672 =  124   5  124 1246 ZERDNDX   E5,1571 =  129  11  375  385 CEBANK    43,3366   1280

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00314OCT    5764    1397   4 1397 1436 1/10SEC     4753  = 1425                1406POO  31,3672     821   1  794
06SEC    23,2321     524   1  523      1/2DEG   31,3713     822   1  802      15/16    12,3771    1239   1 1227
07400OCT 16,3617    1433   1 1421      1/40     16,3624    1433   4 1415 1417 15ADRERS 01,2430    1083   7 1081 1085
====================================== 1/6TH    14,3772     951   1  950      15BITADR    6255    1003   1 1009
1.2SPOT  01,2016     240   4  240  244 1BITDP   26,2413     488               1500DEC  24,2667     511   2  503  511
1.3SPOT  01,2024     240   1  240      181      12,2004  = 1142   1 1132      16OCT    30,3570     915   1  915
1.5SECS  26,3714     558   1  504      1DEC70   21,2103     824   1  824      17TO20   43,3670    1284
1.5SPOT  01,2027     240               1DEC71   21,2104     824   1  823      170MS       4361  =  885   1  885
1.95SECS 33,3102     876               1DEG08   05,3502     826   1  825      180DEGS  31,3712     822   1  802
1-CSTH   E5,1733  =  126   4  126 1188 1DPB2    34,2067     637   2  638  640 180MESS  27,3123     774   1  773
1-30KFT  33,3112     876   1  869      1DPB28   34,2071     637   2  638  643 180SETUP 36,3637     756   1  756
1/.03       4733  = 1498   3 1490 1492 1JACC    E6,1530     134  10  134 1489 ======================================
1/ACCFIX 06,3244     194   1  193      1JACCCON 20,3216    1488   1 1487      2.0SPT   04,2126     230
1/ACCJOB 21,3652    1478   2  194 1399 1JACCQ   E6,1531  =  134   6 1463 1487 2.11SPOT 01,2043     241
1/ACCONT 20,3235    1489   2 1481 1483 1JACCR   E6,1532  =  134   6 1463 1487 2.11SPT  04,2127     230
1/ACCRET 20,3675    1495   2 1483 1495 1JACCL   E6,1533  =  134  12 1481 1493 2.13SPOT 01,2046     241
1/ACCS   20,2463    1478   2  858 1478 1OVSQRT2 42,3766     493   2  491      2.15SPOT 01,2051     241
1/ACCSET 21,3645    1478   1 1403      1REV     12,2073    1168   1 1168      2.17SPOT 01,2054     241
1/ACOAST E6,1572  =  135   1 1455      1SEC        4777    1090  18  271  947 2.2SPOT  01,2016  =  240   1  240
1/ACOSTP E6,1552  = 1497   2 1490      1SEC+1   43,2676     281   2  278  280 2.21SPOT 01,2057     241
1/ACOSTT    0127  = 1497   5 1491 1496 1SECX       4777  =  383               2.3SPOT  01,2032     240   1  240
1/ANET      0160  = 1498   7 1492 1496 1SECXT   E5,1572  =  129   2  385  386 2.5SPOT  01,2035     241
1/ANET-  20,3716    1496   1 1493      1SEC2D   27,2675     770   1  769      2.7SPOT  01,2040     241
1/ANETP  E6,1550  = 1497   5 1427 1490 1STAR    15,3032     964   2  964  976 2.7SPT   04,2130     230   1  230
1/ANET1  E6,1566  =  135  13  135 1495 1STOR2NO 10,3164    1358   1 1358      2/3      04,3227  = 1239   1 1227
1/ANET2  E6,1567  =  135   6 1441 1487 1STCTWCS 16,2256    1414   3 1413 1414 2BLANK   40,2601     407   6  404  462
1/ATEM1     0123  = 1497  22 1493 1497 1STO2S   10,3615    1389   3  375  954 2DZERO   12,2006  = 1131
1/ATEM2     0124  = 1497   4 1492 1493 1TC2&TCQ 30,3643     917   2  917      2EBANK   43,3402    1280   1 1281
1/DV0    E7,1570  =  850   2  836      1TD2SL8  10,3645    1390   6 1389 1390 2INTOUT  40,2766     423   1  419
1/DV1    E7,1634  =  154   5  154  836 10,11    21,2037     823   1  823      2J       33,2043      45   1  873
1/DV2    E7,1636  =  154   5  154  836 10SECS   32,3733     830   1  844      2J3RE/J2 13,2016      46   2 1228
1/DV3    E7,1640  =  154   5  154  836 100CS    33,3103  =  850   2  842      2K          4741  = 1093   3 1000 1105
1/GYRO   06,3515     335   3  330  337 100MRUPT    7732  =  157               2K+3        4444     468   1  468
1/MU        0016  = 1195   4 1168 1187 100PCTTC 36,2014      38   1  827      2NCPETRN 22,3117     368   2  368
1/NETMIN 20,3724    1496   2 1493 1496 110SPIN  40,3440     449   4  405  446 2PHSCHNG    5327    1290  10  496  858
1/PIPA   06,3271     328   3  387  961 1200     23,3250    1151   1 1149      2PI+3    27,3215     775   2  773
1/PIPADT    1074     103  10  167  960 120MRUPT 06,2041     159   1  162      2PI/8    26,3440     592   2  586  588
1/PIPA1  06,3300     328   1  328      120MS       5741  =  183               2PISC    04,3020    1179   2 1169 1186
1/ROOTMU    0022  = 1195   5 1168 1178 13-11,1  41,3745     473   1  472      2RNDEND  40,3227     437
1/RTMU   27,2030      46               13,14,15    7743    1092   5  284 1411 2ROUND   40,3217     437   3  435  436
1/RTMUE  22,2002      44   2  716  719 13,7,2      4615     529   2  187  528 2SEC(17) 30,3007     850   1  850
1/RTMUM  22,2000      44   1  719      130DEG   35,3654     686   1  663      2SEC(18) 33,3103     876   2  838  850
1/WLOOP  12,3151    1185   1 1185      14,11,9  06,2171     162   1  159      2SEC(28) 33,3105     876   1  880
1/10     01,2342     298   1  296      14MS     17,3136  = 1438   6 1437      2SEC(9)  30,3016     850   1  836
1/10S       4753  = 1438               1406ALM  31,3674     821   2  794      2SECDELY 00,3735    1369   3  273  511

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SYMBOL      OEF     H       REFERENCES      SYMBOL      OEF      H       REFERENCES       SYMBOL      OEF      H       REFERENCES

2SECS      5000      1090    7  568 1365 360CHECK  12,3122     1185    2 1183       50EGTEST  15,3130      965    2  965
2STARS  15,3030       964    1  976      360LAM8   12,3473     1190    1 1187       5FAILTAB  06,3250  =   194    2  193  194
2VEXHUST E7,1742  =   767                360SW        0206  =    80    3 1183 1185  5MKALARM  07,2453      257    2  256  262
2V1STO2S 10,3636     1390    2  325      360SW8IT     4753  =    80                 5SEC      36,3762      758    2  729  731
20.50EGS 25,2603      548    1  548      39900EC   37,2471      383    1  378       5SECOP    36,3761      758    1  728
20J     33,2041        45    1  873      =====================================      5SECS     27,2701      770    2  769
20MRUPT    7734   =   161    3  159  162 4.11SPOT  01,2107      242                 504AZ        0022  =  1142    3 1140
20SEC   32,2176       211    1  210      4.13SPCT  01,2112      242                 504F         0006  =  1142    5 1138 1139
200MS   16,3622      1433    2 1419      4.15SPOT  01,2115      242                 504LM     E4,1412      114    3 1134 1230
201R04  43,2675       281    1  279      4.17SPCT  01,2120      242                 504LPL       0016  =  1142    4 1141
21/22REG   0115   =    96    3  400  474 4.2SPOT   01,2070      241    1  240       504RM     04,2002       45    1 1133
25/32      7721   =  1433    1 1428      4.21SPOT  01,2123      242                 504RPR       0000  =  1142    4 1134 1136
25KFT   33,2204       850    1  844      4.23SPCT  01,2126      242                 526ALARM  24,2102      500    1  571
2500EC  24,2304       503    2  502      4.25SPOT  01,2131      242                 5400      23,3246     1151    1 1147
250MS+1    4766   =   281    1  280      4.27SPCT  01,2134      243                 59.99SEC  42,2542      439    1  438
26SECS  36,3763       758                4.3SPCT   01,2076      242    1  240       59MIN     42,2541      439    1  438
27T030  43,3676      1284                4.31SPOT  01,2137      243                 =====================================
=====================================    4.33SPOT  01,2142      243                 6.2SPOT   01,2016  =   244    1  240
3.2SPOT 01,2016   =   241    1  240      4.35SPOT  01,2145      243                 6.3SPOT   01,2200      244    1  240
3.3SPOT C1,2062       241    1  240      4.37SPOT  01,2150      243                 6.5SPOT   01,2203      244
3.5SEC  27,2677       770    1  769      4.5SPCT   01,2101      242                 6.7SPOT   01,2206      244
3.5SPCT 01,2065       241                4.7SPOT   01,2104      242                 60D       23,3247     1151    1 1149
3/32    12,3767      1239    1 1227      4.9SEC    36,3151      743    1  729       6FAILTAB  06,3260  =   194    2  193  194
3/4     C4,3217      1239    5  953 1238 4FMAXNCM  31,2360      792    1  788       6KFT/SEC  33,3114      876    1  882
3/40P   22,3655       822    2  802  804 4SEC(17)  30,3005      850    2  768  839  6SEC      27,2703      770    2  770
3/5     12,3755      1239    1 1227      4SEC(28)  33,3107      876    1  812       6SEC(18)  30,3013      850    1  836
3/64    12,3763      1239    1 1227      4SECS        5003     1090    3  167  790  6SECONOS  26,3713      598    1  594
3/80P   22,3653       822    1  802      40CYC        4771  =  1425    1 1427       6SECS     25,3530      568    1  567
3AXIS8IT   4746   =    74    2  477  478 40CYCL       4771  =  1438    1 1439       600EC     05,3063      220    1  214
3AXISFLG   0124   =    74    7  231  950 40FPS     05,3503      845    1  845       60MIN     35,2426      636    6  628  633
3CSECS  13,3665      1218    1 1217      420EG     15,2762      961    1  958       60MS         4776  =  1438    2 1437
3J22R2MU 13,2024       46                49FPS     34,3364      835    1  833       60SCNOS   24,2444      507    1  507
3SECCNOS 26,3711      598    1  522      =====================================      600MS     07,3740     1323    1 1306
3SECS      5002      1090    1  788      5.2SPCT   01,2153      243    1  240       600SEC    24,3672      659    1  659
300EG   24,3355       579    1  578      5.3SPOT   01,2167      243    1  240       600SECS   13,2627     1203    2  240 1203
300EGCHK 24,3337      578                5.4SPOT   01,2161      243                 63/64+1      7731     1092
30KCHK  33,2472       869                5.50EGS      4562      527    2  527  548  =====================================
30ROMSK 06,2761       183    1  163      5.5SPOT   01,2172      243                 7/12      04,3221     1239    1 1227
330EC      4254       460    1  460      5.7SPCT   01,2175      244                 700EC     32,2553      826
33ROMSK    5026   =   183    2  169      5/128     04,3225     1239    1 1228       770ECML   37,3075      391    1  385
340EC      4242       459    2  211  459 5/8       13,3732     1240    6 1205 1229  770010CT  05,3062      220    1  214
350EG   15,2763       961    1  558      5BLANK    40,2536      406    6  406  461  790ISP    15,2437      954    2  954
360-COU 40,2625       420    2  420  435 5BLANK1   40,2557      407                 =====================================
360-COUE 40,2634      420    1  420      5B10      01,2477     1085                 8192AUG   07,3550     1316    1 1316
360-COUO 40,2623      420    1  419      5DEGREES  14,2601      931    2  931  965  820EGS       4563      527    1  527

HEALTH KEY: NORMALLY OEFINEO UNLESS FLAGGEO AS FOLLOWS:

UN UNOEFINED          = DEFINEO BY EQUALS             J DEFINEO BY JOKER OR ERASE ANYWHERE     MO MULTIPLY OEFINED
8C 8ADLY DEFINEO     CO DEFINITION ASSOCIATEO WITH CONFLICT          XX MISCELLANEOUS TROUBLE
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SYMBOL TABLE LISTING, INCLUDING DEFINITION, HEALTH, PAGE OF DEF, # OF REFS, PAGE OF FIRST REF, PAGE OF LAST REF.

SYMBOL     DEF     H       REFERENCES     SYMBOL     DEF     H       REFERENCES     SYMBOL     DEF     H       REFERENCES

89SECS   27,2705     770    1  770        9/16      04,3223    1239    1 1227       90SECS    06,3005     183    2  166
89TEST   40,2161     401    2  400        9,6,4     05,3375     225    1  218       99999CON 32,3257     784    1  781
====================================== 90MSCALR 17,2053     566    1  565

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

UN UNDEFINED          = DEFINED BY EQUALS           J DEFINED BY JOKER OR ERASE ANYWHERE     MD MULTIPLY DEFINED
BC BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL      DEF    H PAGE     SYMBOL      DEF    H PAGE     SYMBOL      DEF    H PAGE     SYMBOL      DEF    H PAGE

+AZ       11,2364     816     AUTOMANV  26,2172     478     CDUNDX    E5,1536 =   128     DEC51     04,3232    1324
+EL       11,2376     816     AUTOMODE     0301 =    86     CDUREACF  E5,1441 =   128     DEGINSF2  40,3055     435
=======================       AUTRATE1     4753 =    88     CDUREADI  E5,1442 =   128     DEG60     15,2471     955
-AZ       11,2357     816     AUTRATE2     4752 =    88     CDUSCMD      0054 =    92     DELRSPL   22,3541 =    37
-EL       11,2371     816     AUTR1FLG     0321 =    88     CDUTIMEF  E5,1436 =   128     DELTEE    E7,1611 =   143
-LOKONFG  23,2040     272     AUTR2FLG     0320 =    88     CDUTIMEI  E5,1434 =   128     DELVMID   E7,1575 =   143
-MUDT1    33,2033      44     AUXFLAG      0147 =    76     CHAN      E5,1443 =   128     DELVTEST  27,2252     760
=======================       AVEMDBIT     4753 =    81     CHKBIT10  17,2237    1436     DERCOF+1     0153 =    98
?            6001 =   743     AVEPAGEC  33,2267     856     CHKLIST   05,3537     986     DERCOF-1     0151 =    98
=======================       AVFLBIT      4747 =    69     CHKSA8    14,3253     941     DERCOF-2     0150 =    98
ABORT        5634 =  1376     =======================       CKIMUSE      5244    1115     DERCOF-3     0147 =    98
ABTTGBIT     4745 =    81     BADRCOT   31,3615     819     CKMDMORE  43,3765 =  1380     DERCOF-4     0146 =    98
ABVAL     00,3201    1069     BDTCK     27,2461     766     CL1/NET+  20,3466    1492     DERCOF-5     0145 =    98
ACCOKFLG     0317 =    88     BHIZ      01,2453    1084     CNGL      22,2400     359     DERCOF-6     0144 =    98
ACMODBIT     4737 =    68     BIASTEMP  E6,1710 =   136     CNTCHK    07,2235     253     DERCOF-7     0143 =    98
ACOSABRT  00,3723    1080     BIGAOS    20,3345    1490     CNTRCHK   43,3513    1281     DERCOF-8     0142 =    98
ADDRESS      6106     398     BIT14+7   26,2256     479     COARFINE  14,3352     942     DEX2         0144 =    98
ADRS+1    43,3652    1284     BIT4H     30,3015     850     COFMAXGC  22,2176     355     DFRNT     40,3420     448
AFCCALC2  31,3161     804     BIT8,9    17,3140    1448     COGAFBIT     4750 =    80     DGOOD?    32,2743     609
AFDUMP    31,2151     788     BLANKCHK  10,3133    1358     COMPMAT   13,2240     712     DIDFLAG      0020 =    67
AGSBUFFE  E4,1615 =   118     BLANKRET     0114 =    96     CONTDES2  26,3576     595     DIMOBIT      4753 =    71
AGSDISPK  32,2022     209     BNKCHK    43,3743    1285     CONV3     42,3623     491     DMENFBIT     4743 =    74
AGSLIST   05,2407 =   195     BNKCFTN   43,3342    1279     COPYCYC2  33,2632     872     DNLRALT      1336 =   107
AGSUPDAT     0001 =   237     BRSPOT1   31,2545     797     CORFOUND  01,2637    1101     DNLSTADR     0333 =    99
ALCGKK    37,2627     387     BRSPOT2   31,2652     799     COUNTPL   E5,1542 =   128     DOALAPM      5155 =  1376
ALGORTHM  21,3142    1465     BRSPOT3   31,3024     802     CSMDKFLG     0305 =    87     DOALIGN   15,3104     965
ALINEX    26,2067     341     BRSPOT4   31,3210     805     CS359+    35,2422     636     DODNADR   05,3531     986
ALKCG     37,2632     387     BUSYMASK  10,3530    1364     CULTBIT      4745 =    71     DODNCHAN  05,3577     986
ALMNCADR     5724    1376     BUTTONS   05,2701     217     CYCLSHFT  43,3522    1282     DOPSAMP2  25,2027     494
ALPHATRY  21,3344    1471     B12-1        4356 =   465     C1MP      E6,1722 =   136     DOSHIFT   21,3536    1474
ALRM527   24,3001     514     B5TO88    01,2466    1084     C1PP      E6,1720 =   136     DOTIXRR   01,2425    1082
ALTROUT   21,2160     891     =======================       C2MP      E6,1716 =   136     DPAGPEE      7260    1030
ALTSCALE     0272 =    86     CADRMARK     0373     100     C2PP      E6,1714 =   136     DPMOOF    10,3717    1393
AMEMORY   E4,1400 =   114     CALCDIR   E5,1460 =   128     C2SQM     E6,1712 =   136     DPSBURN   E6,1747 =   132
ANTENFLG     0267 =    85     CALCTHET  27,2255     760     C2SQP     E6,1710 =   136     DP0          0036 =   935
AORBSFLG     0125 =    74     CALC2BIT     4752 =    70     =======================       DP1          0040 =   935
AOSV      E6,1543 =   134     CALC3BIT     4751 =    70     DAPDATA3  01,2303     297     DSKYFLAG     0113 =    73
APSESBIT     4747 =    79     CALSAM    15,2536     957     DAPLRUPT  E6,1753 =   138     DSPDECNR  40,3316     446
ARCOMP    21,2167     891     CDELF/2      0016 =  1260     DBSELFLG     0316 =    88     DSP506B   43,2345     273
ASCSPOT   23,2505     862     CDRIVE    06,2012     158     DBSL2FLG     0315 =    88     DTDECAY   36,2004      38
ASECXT    E5,1573 =   129     CDUANG    E5,1543 =   128     DCDU      E6,1634 =   137     DUMPCNIC  27,3427    1264
ASENT5    30,2000 =    34     CDUDANG   E5,1440 =   128     DEC-12    12,2016    1095     DUMPRPRA  27,3465    1266
ASENT7    23,2000 =    32     CDUFLAG   E5,1461 =   128     DEC-6     12,2015    1095     DUMPTFF1  27,3550    1270
ASTNCLOK  32,3206     783     CDUINC    10,3661    1390     DEC27        4764 =  1090     DUMPTFF2  27,3645    1271
ATOPTHIS  13,2733 =    37     CDULIMIT  E5,1443 =   128     DEC29        4765 =  1090     DVCNTSFT  33,2323     856

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BD BADLY DEFINED     CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE

DVMON     33,2314     856      END2DEC   40,3341     446      GEORGEK   37,3111     391      IMUFIN20  07,3201  = 1323
DVMONCON  36,2554     734      ENGONFLG     0123  =   74      GEOSTRT4  37,3025     390      IMUGOOD   07,3627    1319
DXCHIT+1     0125  =   98      ENTERDAT  07,2073     247      GETACSUV  20,3246    1489      IMUZERO3  07,2757    1303
D21       E6,1704  =  136      ENTERQR   17,2445    1439      GETRDDT   21,3302    1467      INFINBIT     4745  =   79
D6OR9BIT     4752  =   71      ENTPASHI  41,2012     408      GET22/32  21,2551     896      INTFLAG      0277  =   82
=======================      ERADFBIT     4737  =   67      GLOKFBIT     4736  =   70      INTOTHIS  13,2301     712
E/BKCALL  04,2562     372      ERMINUS   40,3713     474      GMBLBITB  21,3634    1476      INTVEC    E5,1462  =  129
E/CALL    04,2601     373      ERRTEST   17,3361    1454      GN/CCODE     5001    1090      INTYPBIT     4750  =   71
E/JOBWAK  04,2615     374      ETPIBIT      4745  =   69      GOAGIN    10,3051  = 1364      INTZ      E5,1474  =  129
E/SWITCH  04,2577     372      EXCVFLCH  31,3407     808      GOCLOSE   21,3624    1476      IRIGCOMP  06,3336     330
EARTCNTR  14,2514     930      EXVERT    31,3404     808      GODSPR1   10,2453    1349      ISSUP     06,2321     167
EIGHT        4750  = 1093      E0        E7,1676  =  147      GODSP2    10,2445    1349      ISSWOFF   06,2716     181
END-E3    E3,1777  =  113      E02       E4,1636  =  117      GDGDMARK  10,2406    1348      ISWCALL      4700     994
END-E4    E5,1400  =  120      E1        E7,1700  =  147      GOMARK2   10,2337    1347      ITRPNT1   32,3364     812
END-E5    E5,1774  =  129      E3        E7,1704  =  147      GOMARK2R  10,2356    1347      ITRPNT2   32,3520     814
END-E6    E6,1774  =  139      =======================      GOMARS    10,2331    1347      ITR0         6373    1008
END-E7    E7,1777  =  154      FALTOF       4370     465      GOPERFRS  10,2706    1354      ITR1         6362    1008
END-E7.0  E7,1745  =  154      FAZA1     23,2777    1148      GOPERFS   10,2626    1352      ITR10        6145     999
END-E7.1  E7,1747  =  154      FAZB1     23,3075    1149      GOPERF1R  10,2704    1354      ITR11        6205    1000
END-E7.2     4000  =  154      FDAIY     E4,1745     119      GOPERF2   10,2631    1352      ITR12        6137     999
END-E7.3  E7,1630  =  154      FDAIZ     E4,1746     119      GOSERV    33,2274     856      ITR14        6242    1002
END-E7.4  E7,1777  =  154      FFTAG11      4000  =   28      GOXDSP    10,2330  = 1364      ITR15        6126     999
END-E7.5  E7,1655  =  154      FFTAG12      4000  =   28      GOXDSPR   10,2350  = 1364      ITR7         6264    1003
END-IN/M  E7,1672  =  144      FFTAG13      4000  =   28      GPP4OFF   32,3664     828      ITSWBIT      4735  =   77
END-UE       1377  =  108      FIGTIME   35,2756     670      GTSGO+ON  21,3112    1464      =======================
ENDBALL   26,2352     482      FINALBIT     4746  =   69      GUESS     37,2020     375      JAMPROC      4243     459
ENDCHKG   37,2366     381      FINEK2    43,2410     275      GUESSBIT     4752  =   68      JETSON    17,3435    1455
ENDDAPT4     5270  =  191      FIREP     16,3041    1423      GUESS1    37,2255     379      JSWCHBIT     4736  =   65
ENDHMSS   42,3606  =  440      FIRECR    17,2257    1436      GUILDEN   31,2434     795      =======================
ENDLLJOB  31,3431  =  809      FIRSTTME  27,3171     774      GYTOBETQ  E5,1462  =  128      KADS      16,2623    1419
ENDLRH    34,3617     886      FIXCLPAS  40,2402     404      G21       E6,1706  =  136      KEYCOM    04,3262    1330
ENDMANUV  26,2200     478      FLAGDRGY  32,3021     780      =======================      KLEENEX   10,2333    1347
ENDMARKS  07,2317     254      FLAPBIT      4744  =   81      HIGATCHK  33,2522     869      K1        E6,1702  =  136
ENDNVBSY  04,2641     468      FLASHH?   21,2022     823      HITEST    33,2516     869      K2        E6,1710  =  136
ENDPASTE     4143     443      FLPCBIT      4740  =   80      HLIGHT    25,3620     617      K3        E6,1716  =  136
ENDPINBF     4512  =  469      FLPIBIT      4741  =   80      =======================      K3S1      22,2370     359
ENDPINS1  40,3737  =  475      FLVRBIT      4736  =   80      ICORK2    43,2223     269      K4        22,2372     359
ENDPINS2  41,3750  =  473      FREERET      0144  =   97      IDAOOTEM     0142  =   97      K4SQ      22,2374     359
ENDRMODF     4616  =  529      FSPASBIT     4742  =   66      IDAD3TEM     0152      98      =======================
ENDROLL   22,3226     371      FUELNEED  E7,1666  =  152      IDLEPET1  10,3302    1360      LASTLADW  E7,1745  =  153
ENDRQDAT  41,2320     413      FUNCT3    21,3251    1467      IG        E6,1724  =  136      LASTTIME  01,3502    1126
ENDSPCCT  40,3451     449      =======================      IGNALG    32,3033     780      LATAZCHK  37,2021     375
ENDSTEER  36,3652     756      GDUMP1    31,3421     809      IGNALGRT  32,3204     783      LATFWDV   21,2561     896
ENDS40.9  27,2725     771      GENMARK   10,3022    1356      IMMEDRET  10,3370    1362      LEMONM       0056  =   93
ENDVPUSH     6543    1014      GEOIMUTT  37,2004     375      IMUBACK   37,2005     375      LOS1      E5,1444  =  128

HEALTH KEY: NORMALLY DEFINED UNLESS FLAGGED AS FOLLOWS:

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BD BADLY DEFINED     CO DEFINITION ASSOCIATED WITH CONFLICT                 XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL        DEF H PAGE     SYMBOL        DEF H PAGE     SYMBOL        DEF H PAGE     SYMBOL        DEF H PAGE

LOS2      E5,1452 =  128     MXMYMZ    26,2763    585     OCT34     07,2623    261     POOH      04,2167    231
LOTEMIN      0124 =   96     ========================     OCT37774     7733   1092     POOH8IT      4735 =   70
LOUNITX   12,2004 =   37     N8C3      06,3614    336     OCT40200     7740   1092     POSGM8L   37,2064    376
LOUNITY   12,2002 =   37     NBPOSPL   37,2012    375     OCT40420  10,3537   1365     POSITF    15,3726    980
LOUNITZ   12,2000 =   37     NB1N82    23,2515 =   37     OCT67777  10,3536   1365     POSTORKV  E6,1517 =  134
LPOS28IT     4746 =   84     NOCMFTST  41,2440    417     OCT7777   05,3055    220     POSUPOAT  33,3125    877
LRALTFLG     0276 =   86     NEEOLEII  20,2350   1410     OGF       E6,1716 =  136     POS1/4    12,3765 = 1239
LRPOSALM  33,2543    870     NEGTORKU  E6,1516 =  134     OLDESELG     0016 =   66     POWFLIT1  23,2000 =   32
LRPOSFLG     0275 =   86     NEGTORKV  E6,1520 =  134     OMEGCALC  26,3610    596     PRE8JUMP     5316   1286
LRS24.11  26,3471    594     NEGTOTKP  E6,1514 =  133     OPTAXIS   07,2142    249     PRECIPIT     4744 =   71
LRUPT        0011 =   92     NEG100       5172   1110     OPTION3      1145    104     PRIOOFLG     0075 =   72
LRVEL8IT     4744 =   86     NEG5      41,2115    410     OPTNREG   E5,1463 =  128     PRIO1        4742 = 1093
LRVELELG     0273 =   86     NETZERO      6124    999     OR8WF8IT     4746 =   71     PRIO11       5022   1091
LSTPTR       0144 =   97     NEWI8IT      4737 =   79     OROER8IT     4746 =   79     PRIO2        4741 = 1093
LUNA8IT      4740 =   70     NJETS8IT     4735 =   67     ORIG      E4,1515 =  116     PROCEEDE  06,2075    160
========================     NO.VJETS  E6,1523 =  134     ORIGIN    E5,1773 =  127     PROCKEY1  40,3514    452
MANUF8IT     4736 =   77     NO8ITS    E5,1442 =  128     OTHSHIP   22,3333    716     PROOUCT   21,3524   1474
MANUFLAG     0152 =   77     NOMDNLST  05,2172 =  195     OURRCFLG     0306 =   87     PROJ         0022 =  152
MANUSTAL  22,3067    368     NOPESET   07,3421   1313     OUT       13,2327    713     PRONV8IT     4745 =   73
MARKFORM  10,2340   1347     NOPFINAL  13,3277   1211     OUTGOAVE  22,3707 =  859     PSKIPAOR  16,3627   1433
MASKREG   E5,1534 =  128     NORMS8IT     4742 =   77     OUTLINK      0057 =   93     PSTHIGAT     0251 =   84
MASSMON   33,2233    855     NORMSCL   16,3620   1433     ========================     PULSEM    14,3222    940
MOOTAPS   36,2010     38     NORMTEST  00,3512   1075     P-RATE    16,2510   1417     PUTXY     41,2737    430
METHOO2   22,2216    356     NRMIC8IT     4737 =   72     PARAM30   35,2021    619     PUTXYZ    41,2636    428
MGLVF8IT     4752 =   75     NRMIOFLG     0076 =   72     POA          0026 =  125     P12A      23,2000 =   32
MIOAV8IT     4752 =   81     NRMNV8IT     4744 =   72     PERFCHEK  10,3136   1358     P12LM8    30,2122    831
MIOFL8IT     4737 =   65     NRUPT8IT     4750 =   73     PHI          0024 =  524     P20LEM87  24,2130    500
MIO1F8IT     4751 =   81     NRUPTFLG     0107 =   73     PHS881    E3,1437    110     P20LEMF   24,2231    502
MKOVFLAG     0110 =   73     NSTEER    36,3676    757     PHS882    E3,1441    110     P20LMWT1  24,2241    502
MKVAC     07,2014    245     NTARG8IT     4751 =   76     PHS883    E3,1443    110     P20S2     25,2000 =   32
MKVB52    07,2617    261     NVSBWAIT     4445    468     PHS884    E3,1445    110     P21       E6,1702 =  136
MKVB53    07,2616    261     NVSU8COM     4170    456     PHS885    E3,1447    110     P30N33    35,2004    619
MOOE71    05,3500    826     NWAIT8IT     4742 =   72     PHS886    E3,1451    110     P41FJET   36,3307    750
MONIT1    41,3257    441     NWAITFLG     0101 =   72     PHSNAME4  E3,1444    110     P41MANU   36,3221    749
MOON8IT      4740 =   65     ========================     PHSNAME6  E3,1450    110     P41NORM   36,3316    751
MRKIO8IT     4735 =   72     OCT0001C     4750 =  234     PHSPRDT5     1063    102     P52E      15,2102    923
MRKIOFLG     0074 =   72     OCT0210C  06,3137    189     PHSPROT6     1065    102     P52V      15,2130    923
MRUPT8IT     4747 =   73     OCT10000     4737 =  220     PIN8R8IT     4746 =   73     P57A      15,3336    969
MRUPTFLG     0106 =   73     OCT11        4320 = 1089     PINTEST   43,2002 =  470     P63IGN1   36,2520    733
MU(P)        0032 = 1240     OCT20        4747 =  743     PIPASCFY  E3,1455    110     P63ZOOM   35,3672    735
MULTEXIT     5620   1374     OCT203    26,2257    479     PIPASCEZ  E3,1457    110     P65VERT   31,3505    810
MUM       13,2004     46     OCT21103     5700   1375     PIPUSE    07,3264   1310     P70INIT   32,3555    826
MUNRVG    33,3025    875     OCT217       5704   1375     PLUSX     27,2423    764     P70NOW?   21,2056    824
MWAIT8IT     4741 =   72     OCT30000     4355 =  220     PMINM     34,2103    637     P7071BIT     4737 =   80
MWAITFLG     0100 =   72     OCT30002     6474 = 1093     PON2      37,2240    378     P71       21,2072    824

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UN UNDEFINED           = DEFINED BY EQUALS            J DEFINED BY JOKER OR ERASE ANYWHERE      MO MULTIPLY DEFINED
BD BADLY DEFINED    CD DEFINITION ASSOCIATED WITH CONFLICT              XX MISCELLANEOUS TROUBLE
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UNREFERENCED SYMBOL LISTING, INCLUDING DEFINITION, HEALTH, & PAGE OF DEFINITION.

SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE      SYMBOL      DEF    H PAGE

P71NOW?  21,2043      823      R55.1     14,3223      940      SFRET1    41,3071      432      S52.2.1   14,3640      948
========================      R60INIT   32,3200      783      SHAFTBC   26,3015      586      ========================
QUACGUIO 31,3066      803      R61C+LC3  23,2156      522      SIGNRET      0125  =   96      TBASE3       1056      102
QUITBIT     4747  =   81      R61C+L1   23,2307      524      SIM2CADP  05,2454      213      TCALAPM2  43,3311     1278
========================      R61LEM1   23,2162      522      SINB      E5,1646  =  124      TCCSM     E3,1622      112
RCOUFAIL    0274  =   86      R61LEM2   23,2220      523      SLOPEBIT     4751  =   68      TCLEM     E3,1674      112
RCOUDFLG    0266  =   85      ========================      SNAPAGN   05,3645      987      TDECAYFX     4770     1090
ROIFF    E6,1452  =  133      S+2          4752  = 1277      SNAPENO   05,3664      988      TEMP      E5,1441  =  128
ROM      13,3742     1240      S+3          6251  = 1277      SNGLCO    22,2376      359      TEMPADD   E5,1440  =  128
RODSP    E5,1434  =  128      S+4          4751  = 1277      SOLNSBIT     4751  =   75      TENOAPPR  E7,1424      140
RECAL3   40,3640      462      S+5          4756  = 1277      SOMEADS   20,3450     1492      TESTCCS   32,2673      607
REDOMANN 26,2125      477      S+6          6245  = 1277      SOMEERRR  37,3040      390      TESTVR    41,2041      409
REGOOSPR 10,2471     1350      S-2          7751  = 1278      SOPTION2  43,3350     1279      TETOTHER  E3,1570  =  112
REMODFLG    0265  =   85      S-3          7750  = 1278      SOPTION3  43,3351     1279      TFFCONIC  27,3361     1263
REPOSMON    0270  =   85      S-4          6115  = 1278      SOPTION4  43,3352     1279      TFFSWBIT     4753  =   78
REDEXLOC 41,2207      411      SAVE      E5,1464  =  128      SOPTION5  43,3353     1279      TFFTICK   22,3453      718
RERRCALC 17,2675     1443      SAVEFLAG     1071  = 1364      SOPTION6  43,3354     1279      TFI       E7,1453  =  141
RGEXIT   E7,1665  =  144      SBIT1        4753  = 1277      SOPTION7  43,3355     1279      TGOCALC   27,2464      766
RHCSCFLG    0313  =   88      SBIT10       4742  = 1277      SOPTON1C  43,3356     1279      THOUMP    31,2326      791
RLMUNIT     0014  =  598      SBIT13       4737  = 1277      SOUPLY    37,3071      391      TICKTPER  22,3410      717
RMM      12,2017  =   37      SBIT14       4736  = 1277      SPECSTS   37,2572      386      TIMEP     E5,1470  =  128
RNGEDATA    0260  =   84      SBIT2        4752  = 1277      SPSCODE      4743  = 1301      TMANUCHK  22,3064      368
ROD      04,2141      230      SBIT3        4751  = 1277      STARM        0040  =  125      TMEXITL   05,3716      988
RODTPS+1    0127  =   98      SBIT5        4747  = 1277      STARTDAP  16,2046     1403      TMRESUME  05,3720      989
ROTFLBIT    4746  =   81      SBIT6        4746  = 1277      STARTMNV  26,2176      478      TRACE1    40,3272      445
RPAD1    23,2337  = 1275      SBIT8        4744  = 1277      STARTP66  31,2450      795      TRACE1S   40,3303      445
RPQFLBIT    4735  =   78      SCLNORM   17,3141     1448      STARTSIM  05,2452      213      TRUNBC    26,3111      587
RRCHECK     4576      528      SD        22,2366      359      STARTSTO     6437     1011      TSNEXTS   17,2226     1435
RRDATAFL    0277  =   86      SECAO     22,2027      353      STARTSW   05,2451      213      TSSR      00,2025     1041
RRLOSVEC    1100  =  577      SEC01        4777  =  758      STATEXIT  E4,1516  =  116      TSTPOINT  23,3757     1256
RRNBBIT     4746  =   66      SEC15     36,3754      758      STCLOK3   36,2671      738      TTFSCALE     4740  =  821
RRRSFLAG    0300  =   86      SEC15OP   36,3753      758      STDESIG1  25,2627      550      TURNON    17,3154     1448
RUPDATED 33,3247      879      SEC30OP   36,3755      758      STERN     31,2435      795      TURNONFL     0302  =   86
RUPTSTOR    0063  =   95      SEC45     36,3760      758      STURHAPO  22,3600      722      T6JOB     17,2061     1396
RVSWBIT     4743  =   77      SEC45OP   36,3757      758      STORHPER  22,3612      723      ========================
RWAITK   43,2143      266      SELFSUPR  40,2000  =   36      STRATGY   14,2706      934      UAXIS     20,3322     1490
R21LEM1  24,2734      513      SENSEGET  17,2146     1434      SUPER100     4745  = 1090      UDB2         0136  = 1497
R21LEM12 24,3011      514      SETCTR    21,3672     1500      S32BIT1      4735  =   75      UDB3         0140  = 1497
R21LEM3  24,2743      513      SETINFL   05,2727      217      S32BIT2      4736  =   75      UNFVX/2   E6,1666  =  137
R22LEM12 24,2457      508      SETMARK   10,2527     1351      S32BIT3A     4737  =   75      UNKNOWN      0007  =  195
R24LEM1  24,3214      519      SETPRIO   10,2511     1350      S32BIT3B     4740  =   75      UNLR/2       0024  =  152
R29?     33,2552      871      SETXFLAG  07,2666  =  844      S3435.25  35,3237      675      UNLRB/2      0024  =  152
R300K    27,3767     1275      SETXTACT  43,2105      264      S40.133   27,2647      770      UPONLIST  05,2407  =  195
R51.2    14,3047      936      SFCONST1  E5,1467  =  128      S40.137   27,2641      770      UPOTMEND  42,2032      277
R51F     14,3034      936      SFRET     41,3107      432      S50       14,2500  =  930      UPENO73   04,3514     1383

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SYMBOL       DEF    H PAGE     SYMBOL       DEF    H PAGE     SYMBOL       DEF    H PAGE     SYMBOL       DEF    H PAGE

UPLOCKFL     0164 =   78     VYSCAL    33,2014      41     ZONE2     17,3606    1458     3.5SPOT   01,2065     241
UPOK      04,3327    1331     V0           0006 =  935     ZONE4     17,3427    1455     3J22R2MU  13,2024      46
UPPART3   04,3540 = 1384     V00N25       6010 =  211     ZONE4,5   17,3416    1454     30DEGCHK  24,3337     578
UPRPT1    04,3310    1331     V00N34       4242 =  211     ZSCI      E5,1714 =  125     30KCHK    33,2472     869
UPTHROT   32,3647     828     V01N14    32,2170     211     ========================     360SWBIT     4753 =   80
UPWAKE    04,3532    1384     V06N07    10,3500    1364     0EBANK    43,3366    1280     ========================
USEGTS    33,2336     857     V06N71    07,2624     261     ========================     4.11SPOT  01,2107     242
USEQRFLG     0304 =   87     V1           0014 =  935     1.5SPOT   01,2027     240     4.13SPOT  01,2112     242
========================     V2           0022 =  935     1.95SECS  33,3102     876     4.15SPOT  01,2115     242
VACZ      E4,1543 =  115     V3           0030 =  935     1/RTMU    27,2030      46     4.17SPOT  01,2120     242
VAC1         0401     100     V37XEQC   04,2363     234     1/10S        4753 = 1438     4.21SPOT  01,2123     242
VAC2         0455     100     V50N00A   32,2171     211     1/10SEC      4753 = 1425     4.23SPOT  01,2126     242
VAC3         0531     100     V67FLBIT     4744 =   78     1BITOP    26,2413     488     4.25SPOT  01,2131     242
VAC4         0605     100     V74       43,3066 =  290     1SECX        4777 =  383     4.27SPOT  01,2134     243
VECTABND  E4,1574 =  115     V82EMBIT     4752 =   78     100MPUPT     7732 =  157     4.31SPOT  01,2137     243
VEHUPBIT     4744 =   67     ========================     120MS        5741 =  183     4.33SPOT  01,2142     243
VELCHK    25,3232     560     W.IND1       1257 =  107     17T020    43,3670    1284     4.35SPOT  01,2145     243
VELDATA      0255 =   84     WCALC     22,2746     366     ========================     4.37SPOT  01,2150     243
VELUPDAT  33,3255     879     WHATOUT   31,2330     791     2.0SPT    04,2126     230     4.5SPOT   01,2101     242
VERIFLAG     0165 =   78     WPLATI    E5,1560 =  129     2.11SPOT  01,2043     241     4.7SPOT   01,2104     242
VERROR    E6,1751 =  132     WPLATO    E5,1464 =  129     2.11SPT   04,2127     230     ========================
VERTDRFT  37,2231     378     WRDRET       0115 =   96     2.13SPOT  01,2046     241     5.4SPOT   01,2161     243
VFLAGBIT     4742 =   70     ========================     2.15SPOT  01,2051     241     5.5SPOT   01,2172     243
VINTFBIT     4751 =   71     XDELVBIT     4744 =   69     2.17SPOT  01,2054     241     5.7SPOT   01,2175     244
VLAUNS    E5,1462 =  129     XDIFF     12,2163    1170     2.21SPOT  01,2057     241     5BLANK1   40,2557     407
VPD          0000 =  935     XKEPCSM   E3,1624     112     2.5SPOT   01,2035     241     5B10      01,2477    1085
VPOVL        6576    1015     XKEPLEM   E3,1676     112     2.7SPOT   01,2040     241     ========================
VRECTLEM  E3,1634     112     XSMADR    37,2477     383     2DZERO    12,2006 = 1131     6.5SPOT   01,2203     244
VSTORE       6446    1011     X1INPUT   E7,1611 =  144     2RNDEND   40,3227     437     6.7SPOT   01,2206     244
VUPDATED  33,3453     882     ========================     2VEXHUST  E7,1742 =  767     63/64+1      7731    1092
VV/SC        7632    1039     ZERODP    12,2006 = 1095     26SECS    36,3763     758     ========================
VVXSC        7407    1034     ZEROD     23,2523 = 1151     27T030    43,3676    1284     70DEC     32,3553     826
VXSCAL    33,2016      41     ZEROTJ    17,2620    1441     ========================

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    DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL          DEF  PAGE  SYMBOL

    0000   65  NEED2FLG        0010 1132  GAMRP           0016 1260  TFF01           0026 1260  TFF1/ALF        0040 1195  R1
    0000   92  A               0010 1142  CVECTR          0016 1266  RPER            0027   67  UPDATFLG        0040 1240  TDEC1
    0000  137  UNX/2           0010 1142  OVECTR          0017   67  NJETSFLG        0027   92  TIME4           0040 1260  NRMAG
    0000  237  COSTALIN        0010 1142  SINNODI         0017   92  BRUPT           0030   68  NOUPFLAG        0041   69  LOSCMFLG
    0000  493  UR              0010 1195  ALPHA           0020   67  DIDFLAG         0030   92  TIME5           0041   92  PIPAZ
    0000  935  VPO             0010 1196  CGGAMIN         0020   92  CYR             0030   93  CHAN30          0042   69  STEERSW
    0000 1142  504RPR          0010 1197  MIN             0020  125  COSTH           0030  935  V3              0042   92  D-RHCCTR
    0000 1240  RATT            0011   66  RRNBSW          0020  931  CSUN            0030  981  TIMEP           0042   93  LVSQUARE
    0001   65  JSWITCH         0011   92  LRUPT           0020  981  STMP            0030 1195  XI              0042  126  RCNORM
    0001   92  L               0011   93  DSALMOUT        0020 1195  ROOTMU          0030 1197  COSF            0042 1142  SDB
    0001   93  LCHAN           0012   66  LCKCNSW         0020 1260  NRTERM          0030 1260  TFFRTALF        0042 1195  KEPCI
    0001  237  AGSUPDAT        0012   92  CRUPT           0020 1266  KAPO            0031   68  TRACKFLG        0042 1260  TFFX
    0002   65  MIDFLAG         0012   93  CHAN12          0021   67  ERADFLAG        0031   92  TIME6           0043   92  P-RHCCTR
    0002   92  Q               0012 1195  XMAX            0021   92  SR              0031   93  CHAN31          0044   69  IMPULSW
    0002   93  QCHAN           0012 1260  TFFOELQ         0022   67  RODFLAG         0032   92  CDUX            0044   92  R-RHCCTR
    0002  237  RENDEZVU        0013   66  NEEDLFLG        0022   92  CYL             0032   93  CHAN32          0044   93  LV
    0003   65  MCCNFLAG        0013   92  SAMPTIME        0022  125  SINTH           0032  663  DELFLD          0044 1152  NORMZI
    0003   92  EBANK           0013   93  CHAN13          0022  152  PROJ            0032 1142  BVECTR          0044 1195  KEPC2
    0003   93  HISCALAR        0014   66  FREEFLAG        0022  598  UYVECTPR        0032 1195  S(XI)           0044 1260  TFFTEM
    0003  237  ORBMANUV        0014   93  CHAN14          0022  931  CMOON           0032 1240  MU(P)           0045   69  XDELVFLG
    0004   65  P21FLAG         0014  137  UNZ/2           0022  935  V2              0032 1240  TVEC            0045   92  INLINK
    0004   92  FBANK           0014  598  RLMUNIT         0022 1142  504AZ           0032 1260  TFFALFA         0046   69  ETPIFLAG
    0004   93  LOSCALAR        0014  598  UXVECTPR        0022 1195  1/ROCTMU        0033   68  SLOPESW         0046   92  RNRAD
    0004  237  DESASCNT        0014  935  V1              0022 1240  COSPHI/2        0033   92  CDUY            0046   93  X1
    0005   66  FSPASFLG        0014 1195  XMIN            0022 1260  RTERM           0033   93  CHAN33          0047   69  FINALFLG
    0005   92  Z               0014 1196  OCOGA           0023   92  EBOP            0034   68  GUESSW          0047   92  GYROCMD
    0005   93  CHAN5           0014 1197  CELINDEP        0024   67  R61FLAG         0034   92  CDUZ            0047   93  X2
    0005  237  LUNRSALN        0014 1240  TAT             0024   92  TIME2           0034   93  OPTMD1          0050   69  AVFLAG
    0006   66  P25FLAG         0014 1260  RMAG1           0024  125  THETA           0034 1195  XSQC(XI)        0050   92  CDUXCMD
    0006   92  BBANK           0015   66  R10FLAG         0024  152  UNLR/2          0034 1260  TFFNP           0050   93  S1
    0006   93  CHAN6           0015   92  ZRUPT           0024  152  UNLRB/2         0035   92  CDUT            0050 1142  RPREXIT
    0006  137  UNY/2           0015   93  MNKEYIN         0024  524  PHI             0035   93  OPTMD2          0050 1197  TWEEKIT
    0006  493  URP             0016   66  CLDESFLG        0024 1142  AVECTR          0036   68  DRIFTFLG        0051   69  PFRATFLG
    0006  935  V0              0016   92  BANKRUPT        0024 1142  MMATRIX         0036   92  CDUS            0051   92  CDUYCMD
    0006 1142  504F            0016   93  NAVKEYIN        0024 1195  X               0036  935  OP0             0051   93  S2
    0006 1240  VATT            0016  931  CEARTH          0024 1240  UZ              0036 1195  T               0051 1133  SETREX
    0006 1292  BB              0016  934  CSS             0024 1240  VATT1           0036 1197  DEP             0051 1142  EARTHMXX
    0007   66  IMUSE           0016 1142  TIMSUBM         0024 1260  TFFVSQ          0036 1260  TFF/RTMU        0052   70  CALCMAN3
    0007   93  SUPERBNK        0016 1142  504LPL          0025   92  TIME1           0037   68  SRCHOPTN        0052   92  CDUZCMD
    0007  195  ERASZERO        0016 1195  1/MU            0026   67  VEHUPFLG        0037   92  PIPAX           0052   93  OPRET
    0007  195  SPARE           0016 1196  CGGAMAX         0026   92  TIME3           0040   68  ACMODFLG        0053   70  CALCMAN2
    0007  195  UNKNOWN         0016 1197  MAX             0026  125  PDA             0040   92  PIPAY           0053   92  CDUTCMD
    0010   66  RNDVZFLG        0016 1240  RATT1           0026  125  ZPRIME          0040  125  STARM           0054   70  NODOFLAG
    0010   92  ARUPT           0016 1240  LRPV            0026  981  GTMP            0040  935  OP1             0054   92  CDUSCMD
    0010   93  OUT0            0016 1260  COELF/2         0026 1197  ITERCTR         0040 1142  COB             0055   70  POOHFLAG
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL         DEF  PAGE  SYMBOL

   0055   93  THRUST         0070   95  RUPTREG1       0112   96  LASTYCMD       0124   96  LOTEMIN        0137   97  WDCNT
   0056   70  GLOCKFAIL      0070 1292  TEMPPR         0113   73  DSKYFLAG       0124   96  SFTEMP2        0137 1497  UD84
   0056   93  LEMUNM         0071   71  VINTFLAG       0113   96  LASTXCMD       0124   98  DXCRIT         0140   97  DSPMMTEM
   0057   70  REFSMFLG       0071   95  RUPTREG2       0114   96  BLANKRET       0124 1497  1/ATEM2        0140   97  MATINC
   0057   93  OUTLINK        0071 1292  TEMPG2         0114   96  DSEXIT         0125   74  AOPBSFLG       0140   97  MAXDVSW
   0060   70  LUNAFLAG       0072   71  D6OR9FLG       0114   96  EXITEM         0125   96  MIXTEMP        0140   97  MIXBR
   0060   93  ALTM           0072   95  RUPTREG3       0114   96  INTB15+        0125   96  SIGNRET        0140   97  POLYCNT
   0061   70  NOR29FLG       0072 1292  TEMPP2         0114 1498  DBVAL2         0125   98  DXCRIT+1       0140   98  PWRCNT
   0061   95  EXECTEM1       0073   71  DIMOFLAG       0115   74  SNUFFER        0126   75  NORRMON        0140 1497  UDB3
   0061   95  ITEMP1         0073   95  DSRUPTEM       0115   96  DECRET         0126   98  ROOTPS         0141   76  MUNFLAG
   0061   95  WAITEXIT       0073   95  KEYTEMP1       0115   96  INTBIT15       0127   75  SOLNSW         0141   97  DSREL
   0061  138  T5TEMP         0073   95  RUPTREG4       0115   96  WDRET          0127   98  ROOTPS+1       0141   97  POLYRET
   0061 1292  TEMPG          0073 1292  TEMPBBCN       0115   96  WRDRET         0127 1497  1/ACDSTT       0141   97  TEM1
   0061 1405  COSMG          0074   65  FLAGWRD0       0115   96  21/22REG       0130   75  MGLVFLAG       0141   98  DERPTR
   0062   70  VFLAG          0074   72  MRKIDFLG       0115 1498  DBVAL3         0130   96  BUF            0141 1497  UAXDIST
   0062   95  EXECTEM2       0074   95  STATE          0116   74  NOTHROTL       0130   97  INDEXLOC       0142   97  DSMAG
   0062   95  ITEMP2         0075   67  FLAGWRD1       0116   96  ADDRWD         0130   97  SWWORD         0142   97  IDADDTEM
   0062   95  WAITBANK       0075   72  PRIODFLG       0116 1498  DRIFTER        0130  123  ABVEL*         0142   97  TEM2
   0062 1292  TEMPP          0076   68  FLAGWRD2       0117   74  R77FLAG        0130  123  L*WCR*T        0142   98  DERCOF-8
   0063   71  READRFLG       0076   72  NRMIDFLG       0117   96  CHAR           0131   75  RENDWFLG       0142   98  DEXDEX
   0063   71  R04FLAG        0077   70  FLAGWRD3       0117   96  DECOUNT        0131   97  SWBIT          0143   76  REDFLAG
   0063   95  ITEMP3         0077   72  PDSPFLAG       0117   96  ERCNT          0131  123  H*GHCR*T       0143   97  COUNT
   0063   95  NEWPRIO        0100   72  FLAGWRD4       0117   96  POLISH         0131  123  VSELECT*       0143   97  TEM3
   0063   95  RUPTSTOR       0100   72  MWAITFLG       0117   96  UPDATRET       0131 1497  Z1TEM          0143   98  DERCOF-7
   0063   95  WAITADR        0101   72  NWAITFLG       0117   98  PWRPTR         0132   75  S32.1F1        0143   98  DEXI
   0063  138  DINDX          0101   73  FLAGWRD5       0117 1498  ACCRETRN       0132   98  RETRODT        0143   98  DEX1
   0063 1292  TEMPNM         0102   72  MRKNVFLG       0120   74  ENGSCFLG       0132 1497  Z5TEM          0143 1497  DB81
   0063 1470  NZACCDOT       0102   75  FLAGWRD6       0120   96  FIXLOC         0133   75  S32.1F2        0144   97  DSPWORET
   0064   71  PRECIFLG       0103   72  NRMNVFLG       0121   74  DMENFLG        0133   97  BUF2           0144   97  FREERET
   0064   95  ITEMP4         0103   77  FLAGWRD7       0121   96  OVFIND         0134   75  S32.1F3A       0144   97  LSTPTR
   0064   95  LOCCTR         0104   73  PRONVFLG       0122   74  ZOOMFLAG       0135   75  S32.1F3B       0144   97  RELRET
   0064   95  WAITTEMP       0104   78  FLAGWRD8       0122   96  DECTEM         0135   97  DMPNTEMP       0144   97  SEPMNRET
   0064 1292  TEMPBB         0105   73  PINBRFLG       0122   96  DISTEM         0135   97  MPTEMP         0144   97  SEPSCRET
   0065   71  CULTFLAG       0105   80  FLAGWRD9       0122   96  NOUNTEM        0135 1497  UDB1           0144   97  TEM4
   0065   95  ITEMP5         0106   73  MRUPTFLG       0122   96  SGNON          0136   97  DOTINC         0144   98  DERCOF-6
   0065   95  NEWLOC         0106   82  FLGWRD10       0122   96  VBUF           0136   97  DVSIGN         0144   98  DEX2
   0065 1292  TEMPSW         0106   82  RASFLAG        0122 1497  ACCSW          0136   97  ENTRET         0144 1497  DB82
   0066   71  ORBWFLAG       0107   73  NRUPTFLG       0123   74  ENGONFLG       0136   97  ESCAPE         0145   97  NOUNADD
   0066   95  ITEMP6         0107   83  FLGWRD11       0123   96  HITEMIN        0136  408  ENTEXIT        0145   97  TEM5
   0066 1292  TEMPSW2        0110   73  MKOVFLAG       0123   96  NVTEMP         0136 1497  UD82           0145   98  DERCOF-5
   0066 1468  CHNL12         0110   85  FLGWRD12       0123   96  SFTEMP1        0137   76  GMBDRVSW       0145   98  RTNSAVER
   0066 1470  QRNDXER        0110   85  RADMODES       0123   96  SGNOFF         0137   97  DOTRET         0145 1497  DB84
   0067   71  STATEFLG       0111   87  DAPBOOLS       0123 1497  1/ATEM1        0137   97  DVNORMCT       0146   76  NTARGFLG
   0067   95  NEWJOB         0111   87  FLGWRD13       0124   74  3AXISFLG       0137   97  ESCAPE2        0146   97  NNADTEM
   0070   71  INTYPFLG       0112   73  XOVINFLG       0124   96  CODE           0137   97  INREL          0146   98  DERCOF-4
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

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  0146 1497  0883            0161   78  IDLEFLAG        0215   81  LETABORT        0311   87  XOVINFLG        0455  100  VAC2
  0147   76  AUXFLAG         0161 1365  OUTHERE         0216   81  FLAP            0312   87  DRIFTDFL        0530  100  VAC3USE
  0147   97  NNTYPTEM        0161 1488  MASSCTR         0217   81  ABTTGFLG        0313   88  RHCSCFLG        0531  100  VAC3
  0147   98  DERCOF-3        0161 1488  SCRATCHY        0220   81  ROTFLAG         0314   88  ULLAGFLG        0604  100  VAC4USE
  0147 1497  AXGSTEM         0161 1498  ARET            0221   81  QUITFLAG        0314   99  R22DISP         0605  100  VAC4
  0150   77  ATTFLAG         0162   78  V37FLAG         0223   81  MID1FLAG        0314   99  TIME2SAV        0660  100  VAC5USE
  0150   97  IDAD1TEM        0162  422  MPAC+6          0224   81  MIDAVFLG        0315   88  OBSL2FLG        0661  100  VAC5
  0150   98  DERCOF-2        0162 1365  GENMASK         0225   81  AVEMIDSW        0316   88  OBSELFLG        0705 1300  GOLOC
  0151   77  ITSWICH         0162 1488  SCRATCHZ        0227   82  INTFLAG         0316   99  SCALSAVE        0734  100  AOTCODE
  0151   97  IDAD2TEM        0162 1498  ABSAOS          0230   82  APSFLAG         0317   88  ACCOKFLG        0734  100  STARCODE
  0151   98  DERCOF-1        0163   78  AVEGFLAG        0236   82  REINTFLG        0320   88  AUTR2FLG        0735  100  SINCDU
  0151 1497  FLATEMP         0163   99  MODE            0245   83  LRBYPASS        0320   99  REDOCTR         0735  100  SINCDUY
  0152   77  MANUFLAG        0163 1365  USERPRIO        0250   83  VXINH           0321   88  AUTR1FLG        0735  100  STARALGN
  0152   98  DERCOFN         0163 1498  SIGNAOS         0251   84  PSTHIGAT        0321   99  CPHI            0737  100  SINCDUZ
  0152   98  IDAD3TEM        0164   78  UPLOCKFL        0252   84  NOLRREAG        0321   99  THETAD          0741  100  SINCDUX
  0152 1497  Z3TEM           0164   99  LOC             0253   84  XOFFLG          0322   99  CTHETA          0743  100  COSCDU
  0153   77  IGNFLAG         0164 1365  CCPINDEX        0254   84  LRINH           0323   99  CPSI            0743  100  COSCDUY
  0153   98  DERCOF+1        0164 1498  -SIGNAOS        0255   84  VELDATA         0324   99  DELV            0745  100  COSCDUZ
  0153   98  RUTMXTEM        0165   78  VERIFLAG        0256   84  LPOS2FLG        0324   99  DELVX           0747  100  COSCDUX
  0154   77  ASTNFLAG        0165   99  BANKSET         0257   84  READVEL         0326   99  DELVY           0751  100  -PHASE1
  0154   99  MPAC            0165 1364  MPAC2SAV        0260   84  RNGEDATA        0330   99  DELVZ           0752  100  PHASE1
  0154 1300  TEMPPHS         0165 1498  HOLD            0261   84  NO511FLG        0332   99  KEYTEMP2        0753  100  -PHASE2
  0154 1365  FACEREG         0166   78  V82EMFLG        0262   84  VFLSHFLG        0332   99  RUPTAGN         0754  101  PHASE2
  0154 1498  UV              0166   99  PUSHLOC         0263   85  HFLSHFLG        0333   99  ONLSTAOR        0755  101  -PHASE3
  0155   77  SWANDISP        0167   78  TFFSW           0264   85  CDESFLAG        0333   99  ONLSTCOD        0756  101  PHASE3
  0155 1300  TEMP2G          0167   99  PRIORITY        0265   85  REMODFLG        0334   99  LDATALST        0757  101  -PHASE4
  0155 1365  PLAYTEM1        0170   78  RPCFLAG         0266   85  RCDUOFLG        0334  989  CTLIST          0760  101  PHASE4
  0155 1488  -EPSILON        0172   79  NEWIFLG         0267   85  ANTENFLG        0335   99  ONTMGOTO        0761  101  -PHASE5
  0155 1488  EPSILON         0173   37  MOONOTH         0270   85  REPOSMON        0336   99  DUMPLOC         0762  101  PHASE5
  0156   77  NORMSW          0173   79  CMOONFLG        0271   85  OES1GFLG        0336   99  TMINDEX         0763  101  -PHASE6
  0156 1300  POINTER         0174   37  MOONTHIS        0272   86  ALTSCALE        0336  989  ONECADR         0764  101  PHASE6
  0157   77  RVSW            0174   79  LMOONFLG        0273   86  LRVELFLG        0337   99  ONO             0765  101  CDUSPOT
  0157   98  TERM1TMP        0175   79  FLUNDISP        0274   86  RCOUFAIL        0337  989  SUBLIST         0765  101  CDUSPOTY
  0157 1300  TEMPSWCH        0177   79  SURFFLAG        0275   86  LRPOSFLG        0340  100  ONTMBUFF        0767  101  CDUSPOTZ
  0157 1364  CCPMPAC         0200   79  INFINFLG        0276   86  LRALTFLG        0366  100  RESTREG         0771  101  CDUSPOTX
  0157 1365  PLAYTEM3        0201   79  ORDERSW         0277   86  RROATAFL        0367  100  NVWORD          0773  101  MINDEX
  0157 1488  GCCKTEMP        0202   79  APSESW          0300   86  RRRSFLAG        0370  100  MARKNV          0774  101  MMNUMBER
  0157 1498  ANET            0203   80  COGAFLAG        0301   86  AUTOMODE        0371  100  NVSAVE          0775  101  DSPCNT
  0157 1498  FUNTEM          0205   80  INITALGN        0302   86  TURNCNFL        0372  100  CAGRFLSH        0776  101  DSPCOUNT
  0160   77  V67FLAG         0206   80  360SW           0303   87  PULSEFLG        0373  100  CADRMARK        0777  101  DECBRNCH
  0160 1364  TEMPOR2         0210   80  FLVR            0304   87  USEQRFLG        0374  100  TEMPFLSH        1000  101  VERBREG
  0160 1365  PLAYTEM4        0211   80  P7071FLG        0305   87  CSMDKFLG        0375  100  FAILREG         1001  101  NOUNREG
  0160 1488  COEFCTR         0212   80  FLPC            0306   87  OURRCFLG        0400  100  VAC1USE         1002  101  XREG
  0160 1488  SCRATCHX        0213   80  FLPI            0307   87  ACC4-2FL        0401  100  VAC1            1003  101  YREG
  0160 1498  1/ANET          0214   80  FLRCS           0310   87  AORBTFLG        0454  100  VAC2USE         1004  101  ZREG
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEE  PAGE  SYMBOL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBCL        DEF  PAGE  SYMBOL        DEF  PAGE  SYMBOL

   1005  101  XREGLP        1070  103  MARKEBAN      1162  150  P21ORIG       1275  106  DELQEROR      1355  108  SHAFTCMD
   1006  101  HITEMOUT      1070 1364  MARKFLAG      1163  104  TEMPR60       1276  106  DELREROR      1356  108  ELBIAS
   1006  101  YREGLP        1071  103  EBANKTEM      1164  104  PRIOTIME      1277  106  IMODES30      1356  108  WHCHREAD
   1007  101  LOTEMOUT      1071 1364  SAVEFLAG      1165  104  UPVERBSV      1300  106  IMODES33      1357  108  SELFERAS
   1007  101  ZREGLP        1072  103  MARK2PAC      1166  104  EBUF2         1301  106  IMUCADR       1357  108  SFAIL
   1010  101  MODREG        1073  103  R1SAVE        1166  104  INTWAK1Q      1301  106  MODECADR      1360  108  ERESTORE
   1011  101  DSPLOCK       1074  103  1/PIPADT      1166  104  UPTEMP        1302  106  OPTCADR       1361  108  SELFRET
   1012  101  REQRET        1075  103  TEMK          1166 1218  INTWAKUQ      1303  106  RADCADR       1362  108  SMODE
   1013  102  LOADSTAT      1076  103  SQ            1167  104  COMPNUMB      1304  106  ATTCADR       1363  108  ALMCADR
   1014  102  CLPASS        1077  103  SAMPLIM       1170  104  UPOLDMOD      1306  106  ATTPRIO       1365  108  ERCOUNT
   1015  102  NOUT          1100  103  RRTARGET      1171  104  UPVERB        1307  106  MARKSTAT      1366  109  SCOUNT
   1016  102  NOUNCADR      1100  103  RSUBC         1172  104  UPCOUNT       1310  106  DSRUPTSW      1371  109  SKEEP1
   1017  102  MONSAVE       1100  103  SAMPLSUM      1173  104  UPBUFF        1311  106  LGYRO         1372  109  SKEEP2
   1020  102  MONSAVE1      1100  577  RRLOSVEC      1217  105  RN            1312  106  RRRET         1373  109  SKEEP3
   1021  102  MONSAVE2      1100  609  LOSSM         1225  105  VN            1313  106  RDES          1374  109  SKEEP4
   1022  102  DSPTAB        1104  103  TIMEHOLD      1233  105  PIPTIME       1314  106  RRINDEX       1375  109  SKEEP5
   1036  102  NVQTEM        1106  103  MODEA         1235  105  GDT/2         1315  106  WIXA          1376  109  SKEEP6
   1037  102  NVBNKTEM      1106  103  TANG          1235  955  CURSOR        1316  106  WIXB          1377  108  END-E
   1040  102  VERBSAVE      1110  103  MODEB         1237  955  SPIRAL        1317  106  ZIXA          1377  109  SKEEP7
   1041  102  CADRSTOR      1111  103  NSAMP         1241  955  POSCODE       1320  107  ZIXB       E3,1400  110  LST1
   1042  102  DSPLIST       1112  103  DESRET        1243  105  MASS          1321  107  AGSWORD    E3,1410  110  LST2
   1043  102  EXTVBACT      1112  103  OLDATAGD      1243  105  WEIGHT/G      1322  107  RATEINDX   E3,1432  110  RSBBQ
   1044  102  DSPTEM1       1113  103  DESCCNT       1245  105  ABDELV        1323  107  DELAYLOC   E3,1434  110  LONGEXIT
   1044  102  NORMTEM1      1114  104  TDEC          1246  105  PGUIDE        1326  107  LEMMASS    E3,1436  110  PHSNAME1
   1047  102  DSPTEM2       1116  104  COLREG        1250  105  DVTHRUSH      1327  107  CSMMASS    E3,1437  110  PHSBB1
   1050  102  DSPTEMX       1117  104  LAT           1251  105  AVEGEXIT      1330  107  DNRRANGE   E3,1440  110  PHSNAME2
   1050  102  OPTIONX       1121  104  LONG          1251  105  AVGEXIT       1331  107  DNRRDOT    E3,1441  110  PHSBB2
   1052  102  TBASE1        1123  104  ALT           1253  105  TEMX          1332  107  DNINDEX    E3,1442  110  PHSNAME3
   1053  102  PHSPRDT1      1125  104  YV            1254  105  TEMY          1333  107  DNLRVELX   E3,1443  110  PHSBB3
   1054  102  TBASE2        1133  104  ZV            1255  105  TEMZ          1334  107  DNLRVELY   E3,1444  110  PHSNAME4
   1055  102  PHSPRDT2      1141  104  P40/RET       1256  105  PIPAGE        1335  107  DNLRVELZ   E3,1445  110  PHSBB4
   1055  823  PIPCTR        1142  104  GENRET        1256  107  W.IND         1336  107  DNLRALT    E3,1446  110  PHSNAME5
   1056  102  TBASE3        1143  104  OPTION1       1257  105  CH5MASK       1337  107  BALLEXIT   E3,1447  110  PHSBB5
   1057  102  PHSPRDT3      1144  104  OPTION2       1257  107  W.IND1        1340  107  DAPDATR1   E3,1450  110  PHSNAME6
   1057  235  MMTEMP        1145  104  OPTION3       1260  105  CH6MASK       1341  107  TEVENT     E3,1451  110  PHSBB6
   1060  102  TBASE4        1146  104  LONGCADR      1261  105  SPNDX         1343  107  DB         E3,1452  110  PBIASX
   1060  235  BASETEMP      1150  104  LONGBASE      1262  105  RCSFLAGS      1343 1498  DBVAL1     E3,1452  110  PIPABIAS
   1061  102  PHSPRDT4      1152  104  LONGTIME      1263  105  T5ADR         1344  108  AZ         E3,1453  110  PIPASCF
   1062  102  TBASE5        1154  104  CDUTEMPX      1265  105  C13QSAV       1345  108  EL         E3,1453  110  PIPASCFX
   1063  102  PHSPRDT5      1155  104  CDUTEMPY      1266  105  C13FSAV       1346  108  WCHPHASE   E3,1454  110  PBIASY
   1064  102  TBASE6        1156  104  CDUTEMPZ      1267  105  RADTIME       1347  108  E3J22R2M   E3,1455  110  PIPASCFY
   1065  102  PHSPRDT6      1157  104  PIPATMPX      1270  106  RADDEL        1350  108  E32C31RM   E3,1456  110  PBIASZ
   1066  102  NVWORD1       1160  104  PIPATMPY      1271  106  TTOTIG        1351  108  RADSKAL    E3,1457  110  PIPASCFZ
   1067  102  EBANKSAV      1161  104  PIPATMPZ      1273  106  PVALVEST      1353  108  SKALSKAL   E3,1460  110  NBDX
   1067 1364  DSPFLG        1162  104  DISPDEX       1274  106  DELPEROR      1354  108  TRUNNCMD   E3,1461  110  NBDY
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 E3,1462  110   NBDZ        E3,1676  112   XKEPLEM     E4,1453  115   PSIV        E4,1600  119   RR-AZ       E4,1670  120   TBUP
 E3,1463  111   ADIAX       E3,1700  112   X789        E4,1461  115   FV          E4,1600  119   RSTACK      E4,1672  120   HBEAMNB
 E3,1464  111   ADIAY       E3,1706  112   TEPHEM      E4,1467  115   ALPHAM      E4,1602  116   RPADTEM     E4,1672  120   RDDTD
 E3,1465  111   ADIAZ       E3,1706  113   TIMSLBD     E4,1471  115   BETAM       E4,1602  116   RRATE       E4,1674  117   DELVEET2
 E3,1466  111   ADSRAX      E3,1711  112   AZO         E4,1473  115   TAU.        E4,1602  116   WWVEL       E4,1674  120   YDDTD
 E3,1467  111   ADSRAY      E3,1713  112   -AYO        E4,1475  115   DT/2        E4,1602  119   BETASB      E4,1676  120   ZDDTD
 E3,1470  111   ADSRAZ      E3,1715  112   AXO         E4,1477  115   H           E4,1602  119   RR-ELEV     E4,1700  120   /R/MAG
 E3,1471  111   COMMAND     E3,1717  112   R-OTHER     E4,1501  115   GMODE       E4,1602  119   YAWANG      E4,1702  117   RACT1
 E3,1471  111   GCDMP       E3,1717  121   R(CSM)      E4,1502  115   IRETURN     E4,1604  116   RTHETA      E4,1702  118   DVLOS
 E3,1474  111   CDUIND      E3,1725  112   V-OTHER     E4,1503  115   NORMGAM     E4,1604  116   TSTART82    E4,1702  120   LAXIS
 E3,1477  111   GCOMPSW     E3,1725  121   V(CSM)      E4,1504  115   RPQV        E4,1604  116   WWBIAS      E4,1710  117   RACT2
 E3,1500  111   DIFEQCNT    E3,1733  112   REFSMMAT    E4,1504  116   BASETHV     E4,1604  119   RLM         E4,1710  118   ULOS
 E3,1501  111   UPSVFLAG    E3,1755  112   ACTCENT     E4,1512  115   KEPRTN      E4,1606  116   RONE        E4,1710  120   YDOT
 E3,1502  111   RRECT       E3,1757  113   LS21X       E4,1512  115   ORIGEX      E4,1606  118   RPASS36     E4,1712  120   ZDOT
 E3,1510  111   VRECT       E3,1760  113   LOSVEL      E4,1513  115   RQVV        E4,1614  116   VONE        E4,1714  120   GEFF
 E3,1516  111   TET         E3,1760  113   VSUBC       E4,1513  116   BASETIME    E4,1614  118   UNP36       E4,1716  118   HAPO
 E3,1520  111   TDELTAV     E3,1763  609   LOSVDT/4    E4,1515  116   ORIG        E4,1615  118   AGSBUFFE    E4,1716  118   NOMTPI
 E3,1526  111   TNUV        E3,1766  113   MLOSV       E4,1516  116   STATEXIT    E4,1622  117   DELVOV      E4,1716  118   RTSR1/MU
 E3,1534  111   RCV         E3,1766  609   SAVECDUT    E4,1517  115   HAPOX       E4,1630  117   E01         E4,1716  121   G(CSM)
 E3,1542  111   VCV         E3,1770  113   RANGEVAR    E4,1517  116   BASEOTV     E4,1630  117   GSAV        E4,1720  118   HPER
 E3,1550  111   TC          E3,1772  113   RATEVAR     E4,1521  115   HPERX       E4,1630  117   KEL         E4,1720  118   RTMU
 E3,1552  111   XKEP        E3,1774  113   RVARMIN     E4,1521  115   RPSV        E4,1630  117   MFI         E4,1722  119   RINIT
 E3,1552  126   XPREV       E3,1775  113   VVARMIN     E4,1527  115   XKEPNEW     E4,1630  117   MFS         E4,1724  121   WM
 E3,1554  111   RRECTCSM    E3,1776  113   TCDH        E4,1531  115   VECTAB      E4,1630  117   VZBEAMNB    E4,1730  119   VINIT
 E3,1554  111   RRECTOTH    E3,1777  113   END-E3      E4,1537  115   VACX        E4,1636  117   E02         E4,1732  121   /LAND/
 E3,1562  111   VRECTCSM    E4,1400  114   AMEMORY     E4,1537  116   BASEOTP     E4,1636  117   VYBEAMNB    E4,1734  120   LRXCDUDL
 E3,1570  112   T-OTHER     E4,1400  114   WRENDPOS    E4,1537  116   VB2FLAGS    E4,1636  117   YNBSAV      E4,1734  120   Y
 E3,1570  112   TETCSM      E4,1400  118   TRANSM1     E4,1540  116   TFF         E4,1644  117   VXBEAMNB    E4,1735  120   LRYCDUDL
 E3,1570  112   TETOTHER    E4,1401  114   WRENDVEL    E4,1541  115   VACY        E4,1644  117   ZNBSAV      E4,1736  119   V1PRIME
 E3,1572  112   DELTACSM    E4,1402  114   WSHAFT      E4,1542  116   -TPER       E4,1652  117   LRVTIME     E4,1736  120   DRDDT
 E3,1600  112   NUVCSM      E4,1403  114   WTRUN       E4,1543  115   VACZ        E4,1652  117   T1TOT2      E4,1736  120   LRZCDUDL
 E3,1606  112   RCVCSM      E4,1404  114   RMAX        E4,1545  115   XNBPIP      E4,1652  118   +MGA        E4,1737  120   LRVTIMDL
 E3,1614  112   VCVCSM      E4,1405  114   VMAX        E4,1553  115   YNBPIP      E4,1654  117   LRXCDU      E4,1740  121   DYDDT
 E3,1622  112   TCCSM       E4,1406  114   WSURFPOS    E4,1561  115   ZNBPIP      E4,1654  117   T2TOT3      E4,1742  121   DZDDT
 E3,1624  112   XKEPCSM     E4,1407  114   WSURFVEL    E4,1567  115   VONE'       E4,1655  117   LRYCDU      E4,1744  119   FDAIX
 E3,1626  112   RRECTHIS    E4,1410  114   SHAFTVAR    E4,1567  116   BASETHP     E4,1656  117   ELEV        E4,1744  121   PCONS
 E3,1626  112   RRECTLEM    E4,1411  114   TRUNVAR     E4,1574  115   VECTABNO    E4,1656  117   LRZCDU      E4,1745  119   FDAIY
 E3,1634  112   VRECTLEM    E4,1412  114   504LM       E4,1575  120   RFAILCNT    E4,1657  117   PIPTEM      E4,1746  119   FDAIZ
 E3,1642  112   TETLEM      E4,1420  114   AGSK        E4,1576  116   EPSILONT    E4,1660  117   UP1         E4,1746  121   YCONS
 E3,1642  112   TETTHIS     E4,1422  114   RLS         E4,1600  116   HPERMIN     E4,1660  118   UNRM        E4,1747  119   DELVTPF
 E3,1644  112   DELTALEM    E4,1422  118   ALFDK       E4,1600  116   RANGE       E4,1662  120   AT          E4,1750  121   PRATE
 E3,1652  112   NUVLEM      E4,1430  114   PBODY       E4,1600  116   WWPOS       E4,1664  120   ANGTERM     E4,1751  119   LMPDS
 E3,1660  112   RCVLEM      E4,1431  115   ALPHAV      E4,1600  118   AGSBUFF     E4,1664  120   VE          E4,1752  121   YRATE
 E3,1666  112   VCVLEM      E4,1437  115   BETAV       E4,1600  119   ALPHASB     E4,1666  117   DELVEET1    E4,1754  121   ATY
 E3,1674  112   TCLEM       E4,1445  115   PHIV        E4,1600  119   PITCHANG    E4,1666  120   TTD         E4,1756  121   ATR
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   DEF    PAGE  SYMBOL         DEF    PAGE  SYMBOL         DEF    PAGE  SYMBOL         DEF    PAGE  SYMBOL         DEF    PAGE  SYMBOL

E4,1757   119   LMVEL       E5,1435   122   TCGIBRAK    E5,1474   129   INTZ        E5,1550   123   J1PARM      E5,1662   126   R2VEC
E4,1760   121   ATP         E5,1436   122   RAPFG       E5,1476   122   RIGNZ       E5,1550   129   DELM        E5,1664   124   XDC
E4,1762   121   YAW         E5,1436   128   CDUTIMEF    E5,1476   129   ANGY        E5,1552   123   K1PARM      E5,1664   124   XNB
E4,1764   121   PITCH       E5,1436   129   WANGI       E5,1500   122   KIGNX/B4    E5,1554   123   J2PARM      E5,1664   127   DELTAX
E4,1765   119   DELVEET3    E5,1440   128   CDUDANG     E5,1500   129   ANGX        E5,1556   123   K2PARM      E5,1664   127   TRIPA
E4,1773   120   RTSTDEX     E5,1440   128   TEMPACC     E5,1502   122   KIGNY/B8    E5,1560   123   THETCRIT    E5,1667   127   TEMPVAR
E4,1774   120   RTSTMAX     E5,1440   129   TCDUNDX     E5,1502   129   DRIFTO      E5,1560   129   WPLATI      E5,1670   126   TDESIRED
E4,1775   120   RTSTBASE    E5,1440   129   WANGT       E5,1504   122   KIGNV/B4    E5,1562   123   RAMIN       E5,1672   124   YDC
E4,1776   120   RTSTLOC     E5,1441   128   CDUREADF    E5,1504   129   DRIFTI      E5,1562   129   GEOCOMPS    E5,1672   124   YNB
E4,1777   120   RSAMPDT     E5,1441   128   TEMP        E5,1506   122   LOWCRIT     E5,1563   129   ERCOMP      E5,1672   126   GEOMSGN
E5,1400   120   END-E4      E5,1442   128   CDUREADI    E5,1507   122   HIGHCRIT    E5,1564   123   YLIM        E5,1673   126   UN
E5,1400   122   TLAND       E5,1442   128   NCBITS      E5,1510   122   V2FG        E5,1566   123   ABTRDOT     E5,1700   124   ZDC
E5,1400   122   W           E5,1442   129   DRIFTT      E5,1510   129   VLAUN       E5,1570   123   COSTHET1    E5,1700   124   ZNB
E5,1400   128   AZIMUTH     E5,1443   128   CDULIMIT    E5,1512   129   ACCWD       E5,1571   129   ZERONDX     E5,1701   126   VTARGTAG
E5,1402   122   RBRFG       E5,1443   128   CHAN        E5,1516   122   TAUVERT     E5,1572   123   COSTHET2    E5,1702   126   VTARGET
E5,1402   128   LATITUDE    E5,1444   122   VAPFG       E5,1520   122   DELQFIX     E5,1572   129   1SECXT      E5,1706   124   GACC
E5,1402   821   RDG         E5,1444   128   LOS1        E5,1520   129   POSNV       E5,1573   129   ASECXT      E5,1706   124   LANDLAT
E5,1404   128   ERVECTOR    E5,1444   129   ALX1S       E5,1522   122   LRALPHA     E5,1574   123   CG          E5,1706   124   STARAD
E5,1410   122   VBRFG       E5,1445   129   CMPX1       E5,1522   129   DPIPAY      E5,1574   129   PERFDLAY    E5,1706   124   VEARTH
E5,1410   821   VDG         E5,1446   129   ALK         E5,1523   123   LRBETA1     E5,1574   848   ASCSAVE     E5,1706   125   CULTRIX
E5,1412   128   LENGTHOT    E5,1452   122   AAPFG       E5,1524   123   LRALPHA2    E5,1576   129   DVFLOWCK    E5,1706   125   XSCI
E5,1413   128   LOSVEC      E5,1452   128   LOS2        E5,1525   123   LRBETA2     E5,1616   123   OUTOFPLN    E5,1706   127   VARIANCE
E5,1414   128   NDXCTR      E5,1452   129   THETAN      E5,1526   123   LRVMAX      E5,1616   123   RANGEDSP    E5,1710   124   LANDLONG
E5,1415   128   PIPINDEX    E5,1460   122   VAPFG*      E5,1526   129   DPIPAZ      E5,1620   123   JPARM       E5,1710   126   RTNAPSE
E5,1416   122   ABRFG       E5,1460   128   CALCDIR     E5,1527   123   LRVF        E5,1620   123   R60VSAVE    E5,1710   126   RTNLAMB
E5,1416   128   POSITON     E5,1460   129   FILDELV     E5,1530   123   LRWVZ       E5,1620   123   VBIAS       E5,1710   126   RTNTR
E5,1416   821   ADG         E5,1461   128   CDUFLAG     E5,1530   129   ALTIM       E5,1622   123   KPARM       E5,1710   126   RTNTT
E5,1417   128   QPLACE      E5,1462   122   AAPFG*      E5,1531   123   LRWVY       E5,1624   123   RP          E5,1711   126   U2
E5,1420   128   QPLACES     E5,1462   128   GYTOBETQ    E5,1531   129   ALTIMS      E5,1626   123   RGU         E5,1711   127   GRP2SVQ
E5,1421   128   SOUTHOR     E5,1462   129   INTVEC      E5,1532   123   LRWVX       E5,1634   123   DLAND       E5,1712   124   LANDALT
E5,1424   122   VBRFG*      E5,1462   129   VLAUNS      E5,1532   129   ALDK        E5,1634   123   DLANDX      E5,1712   127   OMEGAM1
E5,1424   821   VDG2TTF     E5,1463   128   OPTNREG     E5,1533   123   LRWVFZ      E5,1636   123   DLANDY      E5,1714   124   GOUT
E5,1426   122   ABRFG*      E5,1464   122   JAPFG*      E5,1534   123   LRWVFY      E5,1640   123   DLANDZ      E5,1714   124   VSUN
E5,1426   821   ADG2TTF     E5,1464   128   SAVE        E5,1534   128   MASKREG     E5,1642   122   ENDW        E5,1714   125   YSCI
E5,1430   122   JBRFG*      E5,1464   129   WPLATO      E5,1535   123   LRWVFX      E5,1642   124   XSM         E5,1714   125   ZSCI
E5,1430   128   TEMPTIMF    E5,1466   122   GAINAPPR    E5,1536   123   LRWVFF      E5,1642   126   DELX        E5,1717   126   MAGVEC2
E5,1430   821   JDG2TTF     E5,1467   128   SFCONST1    E5,1536   128   CDUNDX      E5,1642   127   ZI          E5,1717   126   R2
E5,1432   122   GAINBRAK    E5,1470   122   TCGFAPPR    E5,1537   123   RODSCALE    E5,1644   124   -COSB       E5,1720   127   OMEGAM2
E5,1432   128   TMARK       E5,1470   128   TIMER       E5,1537   128   RESULTCT    E5,1644   126   DELT        E5,1721   126   UR1
E5,1434   122   TCGFBRAK    E5,1470   129   INTY        E5,1540   123   TAUROD      E5,1646   124   SINB        E5,1722   124   VMOON
E5,1434   128   CDUTIMEI    E5,1471   122   TCGIAPPR    E5,1542   123   LAG/TAU     E5,1646   126   URRECT      E5,1726   127   OMEGAM3
E5,1434   128   GENPL       E5,1472   122   VIGN        E5,1542   128   COUNTPL     E5,1650   124   YSM         E5,1727   126   SNTH
E5,1434   128   RDSP        E5,1472   128   DATAPL      E5,1543   128   CDUANG      E5,1654   126   RVEC        E5,1730   124   STAR
E5,1434   129   AINLA       E5,1472   129   ANGZ        E5,1544   123   MINFORCE    E5,1654   126   R1VEC       E5,1730   125   SAX
E5,1434   129   WANGO       E5,1474   122   RIGNX       E5,1546   123   MAXFORCE    E5,1656   124   ZSM         E5,1731   126   CSTH
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E5,1733  126  1-CSTH       E6,1407  130  LMOMEGAN     E6,1455  131  QLAST        E6,1531  134  1JACCQ       E6,1640  137  DELDCDU1
E5,1734  127  HCLOW        E6,1410  130  LMKAOSN      E6,1456  131  RLAST        E6,1532  134  1JACCR       E6,1641  135  DELCDUZ
E5,1735  126  CSTH-RHO     E6,1411  130  DKDB         E6,1457  131  TCQR         E6,1533  134  1JACCU       E6,1643  137  DELDCDU2
E5,1736  124  GCTR         E6,1412  130  IGNAOSQ      E6,1460  131  OLDPMIN      E6,1534  134  SKIPU        E6,1642  135  OMEGAPD
E5,1737  124  OGC          E6,1413  130  IGNAOSR      E6,1461  131  OLDQRMIN     E6,1535  134  SKIPV        E6,1643  135  OMEGAQD
E5,1737  126  P            E6,1414  130  M11          E6,1462  131  SAVEHAND     E6,1536  134  AOSQ         E6,1644  135  OMEGARD
E5,1741  124  IGC          E6,1415  130  M21          E6,1464  131  PERROR       E6,1540  134  AOSR         E6,1645  135  MIS
E5,1741  126  R1A          E6,1416  130  M31          E6,1465  131  NXT6ADR      E6,1542  134  AOSU         E6,1645  137  ECDUW
E5,1743  124  MGC          E6,1417  130  M22          E6,1466  131  T6NEXT       E6,1543  134  AOSV         E6,1645  137  ECDUWUSR
E5,1743  126  VVEC         E6,1420  130  M32          E6,1470  131  T6FURTHA     E6,1544  134  AOSQTERM     E6,1645  137  VEC1
E5,1745  125  QMIN         E6,1421  130  OMEGAP       E6,1472  131  NEXTP        E6,1545  134  AOSRTERM     E6,1646  137  QCDUWUSR
E5,1746  125  QMAJ         E6,1422  130  OMEGAQ       E6,1473  131  NEXTU        E6,1546  135  ACCSWU       E6,1647  137  NDXCDUW
E5,1747  125  OGCT         E6,1423  130  OMEGAR       E6,1474  131  NEXTV        E6,1546  135  BLOCKTOP     E6,1650  137  FLAGOODW
E5,1751  126  ECC          E6,1424  130  ALPHAQ       E6,1475  131  -2JETLIM     E6,1547  135  ACCSWV       E6,1651  137  FLPAUTNO
E5,1753  126  RTNPRM       E6,1425  130  ALPHAR       E6,1476  131  -RATEDB      E6,1550 1497  1/ANETP      E6,1652  137  UNFC/2
E5,1754  126  SGNRDOT      E6,1426  130  OMEGAU       E6,1476  131  TARGETDB     E6,1552 1497  1/ACDSTP     E6,1653  137  VEC2
E5,1755  125  BESTI        E6,1426  131  URATEDIF     E6,1477  132  RETJADR      E6,1554  135  FLAT         E6,1660  137  UNWC/2
E5,1755  126  RDESIRED     E6,1427  130  OMEGAV       E6,1500  132  SENSETYP     E6,1555  135  ZONE3LIM     E6,1666  137  UNFV/2
E5,1756  125  BESTJ        E6,1427  131  EDOTP        E6,1501  133  NEGUQ        E6,1556 1497  PACCFUN      E6,1666  137  UNFVX/2
E5,1756  127  TDPDS        E6,1427  131  VRATEDIF     E6,1502  135  ALLOWGTS     E6,1560 1497  PDB1         E6,1667  135  CDF
E5,1757  125  STARIND      E6,1427  134  EDOT         E6,1503  133  NEGUR        E6,1561 1497  PDB2         E6,1670  137  UNFVY/2
E5,1757  126  DELDEP       E6,1430  130  TRAPEDP      E6,1504  133  KQ           E6,1562 1497  PDB4         E6,1672  137  UNFVZ/2
E5,1757  126  TERRLAMB     E6,1431  130  TRAPEDQ      E6,1505  133  AXISCTR      E6,1563 1497  PDB3         E6,1674  137  -DELGMB
E5,1760  125  STARSAV1     E6,1432  130  TRAPEDR      E6,1505  133  SAVESR       E6,1564 1497  PAXDIST      E6,1675  136  BCDU
E5,1761  126  DEPREV       E6,1433  130  NPTRAPS      E6,1506  133  KRDAP        E6,1566  135  1/ANET1      E6,1677  137  DGABIAS
E5,1761  126  TPREV        E6,1434  131  NQTRAPS      E6,1507  133  ACCDOTQ      E6,1567  135  1/ANET2      E6,1700  136  KSPNDX
E5,1763  126  EPSILONL     E6,1435  131  NRTRAPS      E6,1510  133  QACCDOT      E6,1572  135  1/ACDAST     E6,1701  136  KDPNDX
E5,1764  127  TDVEL        E6,1436  131  EDOTQ        E6,1511  133  ACCDOTR      E6,1574  135  ACCFCTZ1     E6,1702  136  KV1
E5,1765  126  COGA         E6,1436  131  QRATEDIF     E6,1512  133  RACCDOT      E6,1575  135  ACCFCTZ5     E6,1702  136  K1
E5,1765  126  INDEP        E6,1437  131  EDOTR        E6,1513  133  DOWNTORK     E6,1600  135  FIREDB       E6,1702  136  MFISYM
E5,1766  125  STARSAV2     E6,1437  131  RRATEDIF     E6,1513  133  POSTORKP     E6,1602  135  COASTDB      E6,1702  136  NCDU
E5,1772  127  EGRESS       E6,1440  131  OLDXFORP     E6,1514  133  NEGTORKP     E6,1604  135  AXISDIST     E6,1702  136  P21
E5,1773  127  ORIGIN       E6,1441  131  OLDYFORP     E6,1515  133  POSTORKU     E6,1626  135  COEFFQ       E6,1702  136  TMFI
E5,1773  127  P30EXIT      E6,1442  131  OLDZFORQ     E6,1516  134  NEGTORKU     E6,1627  135  COEFFR       E6,1702  136  TMIS
E5,1774  125  TALIGN       E6,1443  131  CH31TEMP     E6,1517  134  POSTORKV     E6,1630  135  COTROLER     E6,1704  136  Q21
E5,1774  129  END-E5       E6,1444  131  STIKSENS     E6,1520  134  NEGTORKV     E6,1631  135  QGIMTIMR     E6,1705  136  NEXTIME
E5,1776  125  RTX1         E6,1445  131  TCP          E6,1521  134  NO.PJETS     E6,1632  135  INGTS        E6,1706  136  G21
E5,1777  125  RTX2         E6,1446  131  DXERROR      E6,1522  134  NO.UJETS     E6,1633  135  RGIMTIMR     E6,1706  136  TTEMP
E6,1400  130  HIASCENT     E6,1450  131  DYERROR      E6,1523  134  NO.VJETS     E6,1634  135  CDUXD        E6,1710  136  BIASTEMP
E6,1401  130  ROLLTIME     E6,1450  131  QERROR       E6,1524  134  TJP          E6,1634  137  OCDU         E6,1710  136  C2SQP
E6,1402  130  PITTIME      E6,1450  133  QDIFF        E6,1525  134  TJU          E6,1635  135  CDUYD        E6,1710  136  KV2
E6,1403  130  DKTRAP       E6,1452  131  DZERROR      E6,1525  135  TJETU        E6,1636  135  CDUZD        E6,1710  136  K2
E6,1404  130  DKOMEGAN     E6,1452  131  RERROR       E6,1526  134  TJV          E6,1637  135  DELCDUX      E6,1712  136  C2SQM
E6,1405  130  DKKAOSN      E6,1452  133  RDIFF        E6,1527  134  L,PVT-CG     E6,1637  137  DELDCDU      E6,1714  136  C2PP
E6,1406  130  LMTRAP       E6,1454  131  PLAST        E6,1530  134  1JACC        E6,1640  135  DELCDUY      E6,1716  136  C2MP
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E6,1716  136  KV3         E6,1745  133  A2CNTRAL    E7,1425  140  DELTTFAP    E7,1501  149  DELVCTL     E7,1562  151  TABLTTF
E6,1716  136  K3          E6,1745  133  JETRATEQ    E7,1426  140  LEADTIME    E7,1501  149  VGBODY      E7,1565  143  VACT4
E6,1716  136  DGF         E6,1745  133  SCRATCH     E7,1426  141  DELTATM     E7,1501  829  TGO1        E7,1565  144  VTPRIME
E6,1720  136  C1PP        E6,1745  134  ADRSDIF1    E7,1427  140  RPCRTIME    E7,1502  147  OMEGA       E7,1570  149  MASS1
E6,1722  136  C1MP        E6,1745  138  DAPTREG2    E7,1430  140  RPCRTQSW    E7,1505  143  VAPREC      E7,1570  850  1/DVO
E6,1724  136  BRATE       E6,1746  133  HALFARG     E7,1431  140  TNEWA       E7,1505  143  VPASS1      E7,1570  859  DVCNTR1
E6,1724  136  COFSKEW     E6,1746  133  JETRATER    E7,1433  141  DELVLVC     E7,1505  146  VPASS4      E7,1572  149  R1S
E6,1724  136  IG          E6,1746  134  HH          E7,1433  141  DELVSLV     E7,1507  149  DVTOTAL     E7,1573  143  DELVCSI
E6,1724  136  VECQTEMP    E6,1746  138  DAPTREG3    E7,1441  141  TIG         E7,1511  149  GOBLTIME    E7,1573  143  SECMAX
E6,1732  136  CAM         E6,1747  132  DPSBURN     E7,1443  141  RTARG       E7,1513  143  VACT2       E7,1573  143  TDEC2
E6,1732  136  TM          E6,1747  133  QRCNTR      E7,1443  142  ZEPLINA     E7,1513  149  ABDVCONV    E7,1573  151  TPIPOLD
E6,1734  136  AM          E6,1747  138  DAPTREG4    E7,1444  142  ELVIRA      E7,1515  149  DVCNTR      E7,1575  143  DELEL
E6,1736  131  TEMP31      E6,1750  132  UERROR      E7,1445  142  AZINCR1     E7,1516  149  TGO         E7,1575  143  DELVMID
E6,1736  132  ABSEDOTP    E6,1750  133  FUNCTION    E7,1446  142  ELINCR1     E7,1520  149  R           E7,1575  143  DELVTPI
E6,1736  132  ABSTJ       E6,1750  138  DAPTREG5    E7,1451  141  DELLT4      E7,1520  149  UNITGOBL    E7,1575  143  DVPREV
E6,1736  132  RCTEMP1     E6,1751  132  VERROR      E7,1453  141  TFI         E7,1521  143  RPASS2      E7,1575  143  KT
E6,1736  133  GTSTEMPS    E6,1751  134  E           E7,1453  141  TTOGO       E7,1521  143  RPPREC      E7,1577  143  DIFFALT
E6,1736  133  K2THETA     E6,1751  138  DAPTREG6    E7,1455  141  WHICH       E7,1524  147  BVECTOR     E7,1600  149  V1S
E6,1736  134  EDOTSQ      E6,1752  138  DAPARUPT    E7,1456  141  LOSCOUNT    E7,1526  149  DELVREF     E7,1601  143  POSTCSI
E6,1736  138  DAPTEMP1    E6,1753  138  DAPLRLPT    E7,1457  141  AIG         E7,1526  149  V           E7,1603  143  HAFPA1
E6,1737  132  ROTEMP2     E6,1754  138  DAPBQRPT    E7,1460  141  AMG         E7,1527  143  VPASS2      E7,1603  143  POSTCDH
E6,1737  134  ROTSENSE    E6,1756  138  DAPZRUPT    E7,1461  141  AOG         E7,1527  143  VPPREC      E7,1605  143  DELTEEO
E6,1737  138  DAPTEMP2    E6,1760  138  AK          E7,1462  141  MARKCTR     E7,1534  149  HCALC       E7,1605  143  LOOPCT
E6,1740  132  POLYTEMP    E6,1761  138  AK1         E7,1462  141  TRKMKCNT    E7,1535  143  RACT3       E7,1605  143  POSTTPI
E6,1740  133  KCENTRAL    E6,1762  138  AK2         E7,1463  142  /AFC/       E7,1536  149  UNIT/R/     E7,1606  149  XSCREF
E6,1740  133  SHFTFLAG    E6,1763  138  EDRIVEX     E7,1463  142  NORMEX      E7,1543  143  UNVEC       E7,1606  149  XSMD
E6,1740  134  FIREFCT     E6,1764  138  EDRIVEY     E7,1464  142  QSAVED      E7,1543  143  VACT3       E7,1606  151  PIFPSET
E6,1740  138  DAPTEMP3    E6,1765  138  EDRIVEZ     E7,1465  142  FCODD       E7,1544  149  RN1         E7,1607  143  GAMPREV
E6,1741  132  TEMPNUM     E6,1766  138  PJETCTR     E7,1465  142  RTRN        E7,1544  151  LANDTEMP    E7,1607  144  INTIME
E6,1741  133  K2CNTRAL    E6,1767  138  UJETCTR     E7,1466  142  NN          E7,1544  151  DURTEMPS    E7,1607  151  RTNHOLD
E6,1741  134  TTOAXIS     E6,1770  138  VJETCTR     E7,1467  142  FP          E7,1546  147  DELTAQ      E7,1610  151  FWEIGHT
E6,1741  138  DAPTEMP4    E6,1771  138  VELBIAS     E7,1470  142  SUBEXIT     E7,1550  147  MARKCNTR    E7,1611  143  DELDV
E6,1742  132  NUMBERT     E6,1773  138  AZBIAS      E7,1471  142  E7OVERLA    E7,1551  143  RPASS3      E7,1611  143  DELTEE
E6,1742  133  WCENTRAL    E6,1774  139  END-E6      E7,1471  142  WHOCARES    E7,1551  147  XYMARK      E7,1611  143  TSTRT
E6,1742  138  DAPTEMP5    E7,1400  140  ATIGINC     E7,1471  143  VACT1       E7,1552  147  MKDEX       E7,1611  144  X1INPUT
E6,1743  132  ROTINDEX    E7,1402  140  PTIGINC     E7,1471  146  RTARG1      E7,1552  149  VN1         E7,1612  151  PIF
E6,1743  133  ACENTRAL    E7,1404  140  ADTAZ       E7,1471  147  TX789       E7,1552  151  TTF/8TMP    E7,1613  143  CSIALRM
E6,1743  133  ININDEX     E7,1412  140  ACTEL       E7,1471  149  ABVEL       E7,1553  147  PLANVEC     E7,1613  143  TITER
E6,1743  134  ADRSDIF2    E7,1420  140  LRHMAX      E7,1473  120  RDOT        E7,1554  151  ELINCR      E7,1614  149  YSCREF
E6,1743  138  DAPTEMP6    E7,1421  140  LRWH        E7,1473  149  HDOTDISP    E7,1556  151  AZINCR      E7,1614  149  YSMD
E6,1744  133  DEL         E7,1422  140  ZOOMTIME    E7,1475  149  TTFDISP     E7,1557  143  VPASS3      E7,1614  151  PSEUDO55
E6,1744  133  JETRATE     E7,1423  140  TENDBRAK    E7,1477  143  RAPREC      E7,1560  149  PIPTIME1    E7,1615  143  VERBNOUN
E6,1744  134  HOLDQ       E7,1423  141  REPOSCNT    E7,1477  143  RPASS1      E7,1560  151  KEEP-2      E7,1615  151  FC
E6,1744  138  DAPTREG1    E7,1424  140  TENDAPPR    E7,1477  147  GAMMA       E7,1561  147  TSIGHT      E7,1616  143  RDOTV
E6,1744 1501  OLDSENSE    E7,1424  141  REPOSTM     E7,1477  149  SAVET-30    E7,1562  149  GDT1/2      E7,1616  144  ITCTR
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E7,1617  151   TTHROT      E7,1652  150   NEWPOS      E7,1677  152   FORVMETR    E7,1733  148   RRTRUN      E7,1777  154   END-E7.4
E7,1620  143   CENTANG     E7,1652  151   VMEAS       E7,1700  145   VGPREV      E7,1733  153   DELVS          4000   28   FFTAG1
E7,1620  151   FCOLD       E7,1653  154   TX0         E7,1700  145   VGTIG       E7,1734  145   F              4000   28   FFTAG10
E7,1621  151   E2DPS       E7,1654  151   HMEAS       E7,1700  147   E1          E7,1734  146   OMEGAD         4000   28   FFTAG11
E7,1621  151   OURPERMS    E7,1655  144   DELVSIN     E7,1700  152   LATVEL      E7,1734  146   OMEGDISP       4000   28   FFTAG12
E7,1621  151   WCHPHOLD    E7,1655  145   IC          E7,1701  152   FORVEL      E7,1735  148   RRSHAFT        4000   28   FFTAG13
E7,1622  144   DELVIMU     E7,1655  154   END-E7.5    E7,1702  147   E2          E7,1736  145   MDOT           4000   28   FFTAG2
E7,1622  149   ZSMD        E7,1656  151   VN2         E7,1702  152   TRAKLATV    E7,1736  146   NSRCHPNT       4000   28   FFTAG3
E7,1622  150   ZSCREF      E7,1656  152   GNUR        E7,1703  146   VXRCM       E7,1737  146   SAVLEMV        4000   28   FFTAG4
E7,1622  151   FILLER      E7,1656  152   GNUV        E7,1703  150   P21BASEV    E7,1737  148   LRS22.1X       4000   28   FFTAG7
E7,1623  151   FLPASS0     E7,1656  152   LRADRET1    E7,1703  152   TRAKFWDV    E7,1740  145   TDECAY         4000   28   FFTAG8
E7,1624  151   TPIP        E7,1660  150   LNCHTM      E7,1704  147   E3          E7,1740  148   RRBORSIT       4000   28   FFTAG9
E7,1626  151   VGL         E7,1662  150   TRANSTM     E7,1704  147   MY          E7,1741  153   ALTBITS        4000   28   RADAREF
E7,1630  144   TPASS4      E7,1663  144   DELVSAB     E7,1704  152   VHY         E7,1742  145   VEX            4000  154   END-E7.2
E7,1630  150   END-ALIG    E7,1663  144   VGDISP      E7,1705  153   VHZ         E7,1742  767   2VEXHUST       4060  156   UPRPTBB
E7,1630  150   RSUBL       E7,1664  150   NCSMVEL     E7,1706  145   VG          E7,1743  153   RUNIT          4101 1093   OCT60000
E7,1630  154   END-E7.3    E7,1664  152   DELTAH      E7,1706  153   VVECT       E7,1744  145   IRETURN1       4144 1364   VERBMASK
E7,1630  154   RCO         E7,1665  144   QTEMP1      E7,1711  146   LOSDESRC    E7,1745  148   R65CNTR        4201  456   PINSUP8T
E7,1632  144   QTEMP       E7,1665  144   RGEXIT      E7,1711  150   P21VEL      E7,1745  153   LASTLADW       4242  211   VCON34
E7,1632  154   YCO         E7,1665  144   SAVQR52     E7,1711  153   ALTRATE     E7,1745  154   END-E7.0       4303  460   ENDBLEF
E7,1633  144   TCSI        E7,1666  144   QQZY4       E7,1712  147   MZ          E7,1746  147   N49FLAG        4317 1067   FOURTEEN
E7,1634  151   LANC        E7,1666  152   FUELNEED    E7,1712  153   ALTSAVE     E7,1746  148   RDOTMSAV       4317 1067   OCT16
E7,1634  154   1/DV1       E7,1666  152   FUNNYDSP    E7,1713  150   P21GAM      E7,1746  153   RODCOUNT       4320 1089   OCT11
E7,1635  144   TTPI        E7,1666  152   TREDES      E7,1714  145   RMAG        E7,1747  154   END-E7.1       4320 1093   NINE
E7,1636  150   UCSM        E7,1667  152   LOOKANGL    E7,1714  153   LAOQSAVE    E7,1750  148   RODTM          4350 1004   EBANKMSK
E7,1636  154   1/DV2       E7,1670  144   XXXALT      E7,1714  823   PIPCTR1     E7,1750  148   THROISP        4350 1093   BANKMASK
E7,1637  144   TTPI0       E7,1670  152   FOURPERM    E7,1715  150   P21ALT      E7,1752  148   TANGNB         4350 1278   -MAXADRS
E7,1640  154   1/DV3       E7,1670  152   LRLCTR      E7,1715  153   DT          E7,1754  148   MKTIME         4355  220   OCT30000
E7,1641  144   RTIG        E7,1671  152   LRRCTR      E7,1716  145   MUASTEER    E7,1756  148   RM             4355 1093   BIT13-14
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E7,1642  154   XRANGE      E7,1672  145   UT          E7,1717  146   UXVECT      E7,1757  153   LASTTPIP       4356  465   B12-1
E7,1644  150   NEWVEL      E7,1672  146   ERADM       E7,1717  153   QAXIS       E7,1760  148   RANGRDOT       4357 1278   S8BITS
E7,1644  151   ELIDUMMY    E7,1672  152   LRMCTR      E7,1717  153   UHYP        E7,1761  153   THISTPIP       4360 1093   OCT23
E7,1644  152   VDGVERT     E7,1673  152   LRSCTR      E7,1720  145   MU/A        E7,1762  145   TIGSAVE        4361  273   OCT21
E7,1644  154   ENGOFFCT    E7,1674  146   INCORPEX    E7,1720  147   SCALSHFT    E7,1762  148   P21TIME        4361  383   DEC17
E7,1645  151   AZIDUMMY    E7,1674  152   STILBADH    E7,1721  147   RXZ         E7,1763  153   OLDPIPAX       4361  885   170MS
E7,1645  154   VGVECT      E7,1675  146   RLMSRCH     E7,1722  145   RTMAG       E7,1764  145   TIGSAVEP       4362  784   ASTNDEX
E7,1646  151   ZERDUMMY    E7,1675  147   IGRET       E7,1723  147   ULC         E7,1764  148   SCAXIS         4362 1093   OCT25
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E7,1647  144   VTIG        E7,1675  147   RDRET       E7,1725  120   ZAXIS1      E7,1765  153   OLDPIPAZ       4363  503   OCT00012
E7,1647  151   ELVDUMMY    E7,1675  150   P21BASER    E7,1725  146   UYVECT      E7,1766  145   MUSCALE        4363 1093   TEN
E7,1647  152   NGUIDSUB    E7,1675  152   STILBADV    E7,1725  153   UHZP        E7,1766  153   DELVROD        4512  469   ENDPINBF
E7,1647  152   WCHVERT     E7,1676  147   E0          E7,1731  147   SINTHETA    E7,1772  148   POINTVSM       4616  529   ENDRMODF
E7,1650  151   LRADRET     E7,1676  147   MX          E7,1732  145   SS          E7,1774  153   HCALC1         4733 1498   1/.03
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  4735   65  NEED2BIT      4737  792  FEXTRA        4742   81  FLRCSBIT      4745   84  VELDABIT      4750   84  RNGEDBIT
  4735   67  NJETSBIT      4737 1093  PRIO10        4742   84  NDLRPBIT      4745   86  RCDUFBIT      4750   86  RRDATABT
  4735   68  DRFTBIT       4737 1093  CLAFTER       4742   85  DESIGBIT      4745   88  RHCSCALE      4750   88  DBSELECT
  4735   70  POOHBIT       4737 1277  SBIT13        4742   87  ADRBTRAN      4745 1090  SUPER100      4750  234  OCT00010
  4735   72  MRKIDBIT      4740   65  MCDNBIT       4742  132  BBIT          4745 1277  SBIT7         4750  821  TSCALINV
  4735   73  DSKYFBIT      4740   67  RODFLBIT      4742 1093  PRIO1         4746   66  RRNBBIT       4750 1093  EIGHT
  4735   75  S32BIT1       4740   69  LOSCMBIT      4742 1277  SBIT10        4746   68  NDUBFBIT      4750 1277  SBIT4
  4735   77  ITSWBIT       4740   70  LUNABIT       4743   66  B25FLBIT      4746   69  FINALBIT      4750 1411  DSPLYALT
  4735   78  RPQFLBIT      4740   72  PDSPFBIT      4743   69  IMPULBIT      4746   71  ORBWFBIT      4751   66  FREEFBIT
  4735   83  LRBYBIT       4740   74  NCTHRBIT      4743   71  READRBIT      4746   73  BINBRBIT      4751   68  SLDBEBIT
  4735   85  CDESBIT       4740   75  S32BIT3B      4743   71  R04FLBIT      4746   74  3AXISBIT      4751   70  CALC3BIT
  4735   87  PULSES        4740   77  ASTNBIT       4743   72  MRKNVBIT      4746   76  REDFLBIT      4751   71  VINTFBIT
  4735 1093  NEGMAX        4740   79  CMOONBIT      4743   74  DMENFBIT      4746   78  V37FLBIT      4751   73  MKOVBIT
  4735 1093  VLOADCOD      4740   80  FLPCBIT       4743   77  PVSWBIT       4746   79  ORDERBIT      4751   75  SOLNSBIT
  4735 1277  SBIT15        4740   83  VXINHBIT      4743   81  LETABBIT      4746   81  ROTFLBIT      4751   76  NTARGBIT
  4736   65  JSWCHBIT      4740   85  ANTENBIT      4743   84  XORFLBIT      4746   84  LPOS2BIT      4751   78  VERIFBIT
  4736   67  DIDFLBIT      4740   87  CURRCBIT      4743   86  ALTSCBIT      4746   86  LRPOSBIT      4751   81  MID1FBIT
  4736   68  SRCHOBIT      4740  821  TTFSCALE      4743   87  XDVINHIB      4746   88  ULLAGER       4751   84  NO511BIT
  4736   70  GLOKFBIT      4740 1093  PRIO4         4743 1277  SBIT9         4746  816  -AZBIT        4751   86  RFRSBIT
  4736   72  PRIODBIT      4740 1277  SBIT12        4743 1301  SPSCODE       4746 1277  SBIT6         4751   88  ACCSOKAY
  4736   75  S32BIT2       4741   43  MINCSM        4744   66  IMUSEBIT      4747   66  LOKONBIT      4751  618  VLITE
  4736   77  MANUFBIT      4741   65  P21FLBIT      4744   67  VEHUPBIT      4747   68  TRACKBIT      4751 1093  FOUR
  4736   80  FLVRBIT       4741   69  STEERBIT      4744   69  XDELVBIT      4747   69  AVFLBIT       4751 1277  S+4
  4736   82  INTFLBIT      4741   70  NR29FBIT      4744   71  PRECIBIT      4747   71  STATEBIT      4751 1277  SBIT3
  4736   85  REMODBIT      4741   72  MWAITBIT      4744   72  NRMNVBIT      4747   73  MRUPTBIT      4752   37  DELAYNUM
  4736   87  USEQRJTS      4741   74  R77FLBIT      4744   74  ZOOMBIT       4747   74  AORBSYST      4752   66  R10FLBIT
  4736 1093  HALF          4741   77  SWANDBIT      4744   76  MUNFLBIT      4747   78  AVEGFBIT      4752   68  GUESSBIT
  4736 1093  POS1/2        4741   79  LMOONBIT      4744   78  V67FLBIT      4747   79  APSESBIT      4752   70  CALC2BIT
  4736 1093  PRIO20        4741   80  FLPIBIT       4744   79  SURFFBIT      4747   81  QUITBIT       4752   71  06OR9BIT
  4736 1277  SBIT14        4741   84  PSTHIBIT      4744   81  FLAPBIT       4747   84  READVBIT      4752   75  MGLVFBIT
  4737   40  FIRTHROT      4741   85  REPOSBIT      4744   84  LRINHBIT      4747   86  LRALTBIT      4752   76  AUXFLBIT
  4737   65  MIDFLBIT      4741   87  ACC4OR2X      4744   86  LRVFLBIT      4747   88  DBSLECT2      4752   78  V82EMBIT
  4737   67  ERADFBIT      4741  132  CRBIT         4744   87  DRIFTBIT      4747  618  HLITE         4752   80  INITABIT
  4737   68  ACMODBIT      4741 1093  EBANK4        4744 1277  SBIT8         4747  743  OCT20         4752   81  MIDAVBIT
  4737   70  REFSMBIT      4741 1093  PRIO2         4744 1323  IMUSEFLG      4747  746  LSTLIM        4752   85  VFLSHBIT
  4737   72  NRMIDBIT      4741 1093  2K            4745   66  RNDVZBIT      4747  816  +AZBIT        4752   86  AUTOMBIT
  4737   74  SNUFFBIT      4741 1277  SBIT11        4745   67  UPDATBIT      4747 1277  SBIT5         4752   88  AUTRATE2
  4737   75  S32BIT3A      4742   66  FSPASBIT      4745   69  ETPIBIT       4747 1404  CALLGMBL      4752  740  BLANKDEX
  4737   77  IGNFLBIT      4742   67  R61FLBIT      4745   71  CULTBIT       4750   66  NEEDLBIT      4752  816  +ELBIT
  4737   79  NEWIBIT       4742   70  VFLAGBIT      4745   73  PRONVBIT      4750   69  PFRATBIT      4752 1093  TWO
  4737   80  P7071BIT      4742   72  NWAITBIT      4745   74  ENGONBIT      4750   71  INTYBBIT      4752 1277  S+2
  4737   82  ABSFLBIT      4742   74  RNGSCBIT      4745   78  IDLEFBIT      4750   73  NRUPTBIT      4752 1277  SBIT2
  4737   85  RCDU0BIT      4742   76  GMBDRBIT      4745   79  INFINBIT      4750   75  NORRMBIT      4752 1381  UB72
  4737   87  CSMDOCKD      4742   77  NORMSBIT      4745   81  ABTTGBIT      4750   78  UPLOCBIT      4753   67  OLDESBIT
  4737  220  OCT10000      4742   79  FLUNDBIT      4745   82  REINTBIT      4750   80  COGAFBIT      4753   70  NODOBIT
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  4753   71  DIMOBIT     4774 1327  OCT62        6245 1277  S+6        04,2000   28  VERB37     05,2224  203  LMDSAS09
  4753   73  XDSPBIT     4775 1093  OCT120       6250  569  BIN3       04,2040  451  MODROUTB   05,2224  204  LMLSAL08
  4753   75  RENDWBIT    4776 1093  OCT140       6250 1093  LOW2       04,3002   37  LODP1/4    05,2226  204  LMLSAL09
  4753   77  ATTFLBIT    4776 1438  60MS         6250 1093  THREE      04,3005 1179  BEE19      05,2232  200  LMRENDDL
  4753   78  TFFSWBIT    4777  383  1SECX        6250 1277  S+3        04,3011 1179  BEE22      05,2276  204  LMLSAL07
  4753   80  360SWBIT    4777  758  SEC01        6250 1381  UP73       04,3227 1239  2/3        05,2303  202  LMDSASDL
  4753   81  AVEMDBIT    5006  925  VBD5N09      6474 1093  OCT30002   04,3357 1381  UPPART2    05,2357  204  LMLSALDL
  4753   85  HFLSHBIT    5007  225  STARTEB      6744 1019  Q+2        04,3476 1383  UPSTORE    05,2407  195  AGSLIST
  4753   86  TURNONPT    5007 1093  EBANK3       6745 1286  TCQ        04,3540 1384  UPPART3    05,2407  195  UPDNLIST
  4753   88  AUTRATE1    5007 1278  ERASCON6     7666 1093  OCT10001   04,3667 1386  UPOUT      05,2407  206  LMAGSIDL
  4753  211  LAGSLIST    5007 1421  OGIMBITS     7715  556  BIT12,14   04,3670 1383  UPOUT4     06,2000   29  EARTHLOC
  4753  816  -ELBIT      5011   37  ERASID       7721 1433  25/32      05,2000   29  ABORTS1    06,2000   29  IMUCOMP
  4753 1093  ONE         5012 1278  S10BITS      7725 1093  B12T14     05,2000   29  ASENT3     06,2000   29  MIDDGIM
  4753 1277  S+1         5014  600  NR29&RDR     7732  157  100MRUPT   05,2000   29  DOWNTELM   06,2000   29  RCSMONT
  4753 1277  SBIT1       5014 1425  BITS9,11     7732 1405  MS100      05,2000   29  EPHEM1     06,2000   29  T4RUP
  4753 1381  UP71        5015 1093  EBANK6       7734  161  20MRUPT    05,2000   29  FRANDRES   06,2703  182  ICDUFAIL
  4753 1425  1/10SEC     5020  900  BITSET       7743  536  -45DEGSR   05,2066  196  LMORBMDL   06,2703  182  IMUFAIL
  4753 1438  1/10S       5020 1278  SBNK03       7743 1364  PINMASK    05,2127  198  LMCSTAD1   06,3140  189  ENDRRMON
  4754 1278  S-ZERO      5020 1421  RGIMBITS     7744  532  -BIT12     05,2127  200  LMREND01   06,3140  190  DAPT4S
  4755  237  DNLADPOO    5024 1292  OCT14000     7744  989  MINB12     05,2127  204  LMLSAL01   06,3164  193  RCSMONIT
  4755 1277  S+ZERO      5025  183  OCT15000     7750 1278  S-3        05,2136  198  LMCSTA02   06,3250  194  5FAILTAB
  4755 1381  UP70        5026  183  33RDMSK      7751 1278  S-2        05,2136  200  LMREND02   06,3260  194  6FAILTAB
  4756  225  NUMGRPS     5026  225  IN33INIT     7751 1300  MINUS2     05,2136  202  LMDSAS02   07,2000   29  AOTMARK1
  4756 1277  S+5         5155 1376  DDALARM      7752 1093  MINUS1     05,2136  204  LMLSAL02   07,2000   29  ASENT2
  4756 1383  UPDTPHAS    5270  183  GLOCKCK      7752 1093  NEG1       05,2136  206  LMAGSI02   07,2000   29  MODESW
  4757  448  DSPMSK      5270  191  ENDDAPT4     7752 1278  S-1        05,2145  198  LMCSTAD3   07,2666  844  SETXFLAG
  4757 1093  LOW3        5270  192  RCSMONEX  00,2000   28  DLAYJOB    05,2145  200  LMREND03   07,3201 1323  IMUFIN20
  4757 1278  S+7         5464 1365  LINUS     01,2000   28  LOADDAP1   05,2145  202  LMDSAS03   07,3703 1322  OPTSTALL
  4757 1366  OCT7        5472  264  TERMEXTV  01,2000   28  RESTART    05,2145  204  LMLSAL03   10,2000   29  DISPLAYS
  4760  739  VB99DEX     5472  265  ENDEXTVB  01,2000  240  PRDTTAB    05,2145  206  LMAGSI03   10,2000   29  FLESHLOC
  4760 1093  NOUTCON     5472 1364  ENDEXT    01,2001  240  CADRTAB    05,2154  198  LMCSTA04   10,2000   29  PHASETAB
  4761 1067  THIRTEEN    5634 1376  ABORT     01,2016  240  2.2SPOT    05,2154  201  LMREND04   10,2000   29  RTBCODES
  4762  739  CNTDNDEX    5650  235  NEG7      01,2016  241  3.2SPOT    05,2154  202  LMDSAS04   10,2000   29  SLCTMU
  4763  429  OCT30       5650 1278  S-7       01,2016  244  6.2SPOT    05,2154  204  LMLSAL04   10,2330 1364  GOXDSP
  4764 1090  DEC27       5741  183  120MS     01,2337  298  V50N48     05,2154  206  LMAGSI04   10,2334 1364  GOXDSPF
  4765  739  VB97DEX     5741 1323  BITS3&4   01,2517 1088  SW/        05,2157  198  LMCSTAD5   10,2350 1364  GOXDSPR
  4765 1090  DEC29       5741 1476  TWELVE    04,2000   28  AOTMARK2   05,2157  201  LMREND05   10,2353 1364  GOXDSPFR
  4766  281  250MS+1     6000   28  FFTAG5    04,2000   28  CONICS1    05,2157  202  LMDSAS05   10,3051 1364  GOAGIN
  4766 1502  RATELIM1    6000   28  FFTAG6    04,2000   28  E/PROG     05,2157  204  LMLSAL05   10,3071 1364  GOPLAY
  4767 1502  RATEDB1     6001  743  ?         04,2000   28  KEYRUPT    05,2157  206  LMAGSI05   11,2000   29  F2DPS*11
  4771  306  MIXCON      6010  211  V00N25    04,2000   28  ORBITAL3   05,2170  202  LMDSAS06   11,2000   29  INTVEL
  4771 1278  CNTRCON     6077 1300  OCT177    04,2000   28  PINBALL4   05,2170  204  LMLSAL06   11,2000   29  ORBITAL
  4771 1323  BITS4&6     6112 1093  VLOAD*    04,2000   28  R02        05,2172  195  NDMONLST   12,2000   30  CONICS
  4771 1425  40CYC       6115 1278  S-4       04,2000   28  R36LM      05,2172  198  LMCSTADL   12,2000   30  INTPRET2
  4771 1438  40CYCL      6245 1093  SIX       04,2000   28  UPDATE2    05,2224  201  LMREND06   12,2000   30  ORBITAL1
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ERASABLE & EQUALS CROSS-REFERENCE TABLE SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

   DEF   PAGE   SYMBOL         DEF   PAGE   SYMBOL         DEF   PAGE   SYMBOL         DEF   PAGE   SYMBOL         DEF   PAGE   SYMBOL

12,2000   37   LOUNITZ     16,2000   31   DAPS1       23,2513  503   ONE8-2      30,2000   34   ASENT5      36,2057  758   ACADN85
12,2002   37   LOUNITY     16,3576 1432   INOXYZ      23,2513 1275   TFF1/4      30,2000   34   FCDUW       36,2107  743   SERVCADR
12,2004   37   LOOPHALF    17,2000   31   C13BANK     23,2515   37   HIUNITZ     30,2000   34   FLOGSUB     36,2150  727   P12SPOT
12,2004   37   LOUNITX     17,2000   31   DAPS2       23,2515   37   N81N82      30,2000   34   LOWSUPER    36,2150  727   P42SPOT
12,2004 1095   HALFDP      17,2710 1444   ATTSTEER    23,2515   37   THISAXIS    30,2000   34   P12         36,2153  727   P63SPOT
12,2004 1130   DP1/2       17,3136 1438   14MS        23,2517   37   HIUNITY     30,2000   34   V867A       36,3003  739   V99RECYC
12,2004 1142   181         20,2000   31   DAPS3       23,2521   37   HIDPHALF    30,3007  850   T2A         37,2000   36   IMUSUPER
12,2006   37   LO6ZEROS    20,2000   31   LCADDAP     23,2521   37   HIUNITX     30,3760  920   DAZMAX      37,2000   36   IMU2
12,2006 1095   ZERODP      21,2000   31   DAPS4       23,2521  598   COS60DEG    30,3762  920   DELEPLIM    37,2000   36   IMU4
12,2006 1131   20ZERO      21,2000   31   R10         23,2521 1094   DPHALF      31,2000   34   FTHROT      37,2000   36   P05P06
12,2006 1179   KEPZERO     21,2000   31   R11         23,2523   37   HI6ZEROS    31,2000   34   F20PS*31    37,2000   36   R31
12,2006 1239   DPZERO      22,2000   32   KALCMON1    23,2523  598   ZERO/SP     31,2000   34   VB67        37,2000   36   SERV1
12,2017   37   RMM         22,2000   32   KALCMON2    23,2523 1151   ZEROO       31,3431  809   ENDLLJOB    37,3541  957   PIPSRINE
12,2017 1195   LOPOSMAX    22,2000   32   LANDCNST    23,2523 1275   TFFZEROS    32,2000   34   ABORTS      40,2000   36   PINBALL1
12,2021   37   RME         22,2000   32   RENDEZ      24,2000   32   PLANTIN     32,2000   34   F20PS*32    40,2000   36   PINSUPER
12,3765 1239   DQUARTER    22,2000   32   R30LOC      24,2000   32   P20S        32,2000   34   LRS22       40,2000   36   R31LOC
12,3765 1239   POS1/4      22,2000   32   SERV2       24,2000  496   PROG22      32,2000   34   P20S4       40,2000   36   SELFSUPR
13,2000   30   ABTFLGS     22,2744  366   LOCSKIRT    25,2000   32   PLANTIN3    32,2000   34   P66LOC      40,3356  447   ENDECVN
13,2000   30   INTINIT     22,3541   37   DELRSPL     25,2000   32   P20S1       32,2000   34   R47         40,3550  454   ENDRELOS
13,2000   30   LATLONG     22,3541  720   SPLRET      25,2000   32   P20S2       32,2000   34   SERV        40,3577  461   ENDBSUB1
13,2000   3    LEMGEOM     22,3707  859   CUTGCAVE    25,2000   32   RADARUPT    33,2000   34   ASENT6      40,3577 1286   DSPMMJOB
13,2000   3    ORBITAL2    23,2000   32   APOPERI     25,2000   32   RRLEADIN    33,2000   34   R29/SERV    40,3737  475   ENDPINS1
13,2000   30   P76LOC      23,2000   32   ASENT7      25,2000   32   R29S1       33,2000   34   SERVICES    41,2000   36   PINBALL2
13,2660   37   ATOPOTH     23,2000   32   EXTVB1      26,2000   33   BAWLANGS    33,3103  850   100CS       41,2622  419   ENDRTOUT
13,2733   37   ATOPTHIS    23,2000   32   INFLIGHT    26,2000   33   MANUVER     33,3454  882   ENDVDAT     41,3255  434   ENDRUTIN
13,2746   37   MOVATHIS    23,2000   32   INTPRET1    26,2000   33   MANUVER1    34,2000   34   ASCFILT     41,3750  473   ENDPINS2
13,3042   37   OTHPREC     23,2000   32   MEASINC     26,2000   33   PLANTIN1    34,2000   34   ASENT8      42,2000   36   PINBALL3
13,3056   37   THISPREC    23,2000   32   MEASINC1    26,2000   33   PLANTIN2    34,2000   34   CSI/CDH1    42,2000   36   SBAND
14,2000   31   ASENT4      23,2000   32   NORMLIZ     26,2000   33   P20S3       34,2000   34   F20PS*34    42,3606  440   ENDHMSS
14,2000   31   P50S1       23,2000   32   POWFLITE    27,2000   33   ASENT1      34,2000   34   P30S1       43,2000   36   EXTVERBS
14,2000   31   STARTAB     23,2000   32   POWFLIT1    27,2000   33   P40S1       34,2000   34   R12STUFF    43,2000   36   SELFCHEC
14,2500  930   S50         23,2000   32   P12A        27,2000   33   SERV3       34,2000   34   SERV4       43,2002  470   PINTEST
14,2603  932   R56         23,2000   32   RODTRAP     27,2000   33   TOF-FF      35,2000   35   CSI/CDH     43,2235  270   OPTCOARV
14,3250  940   R54         23,2000   32   R61         27,2000   33   TOF-FF1     35,2000   35   P30S        43,2365  273   V50N68
15,2000   31   EPHEM       23,2000   32   R62         27,2000   33   VECPT       35,2000   35   P40S2       43,3066  290   V74
15,2000   31   P50S        23,2103  489   R62DISP     27,3754 1274   TCDANZIG    35,2000   35   P40S3       43,3121  292   GOSHOSUM
15,2465  252   DP1/12      23,2337 1275   RPA01       30,2000   34   ASENT       36,2000   36   P40S        43,3765 1380   CKMOMORE
15,3647  979   LUNPOS      23,2513   37   HIDP1/4
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SUMMARY OF SYMBOL TABLE LISTINGS

          4921  DEFINED NORMALLY

          2200  DEFINED BY EQUALS
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TOTAL:    7121
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MEMORY TYPE & AVAILABILITY DISPLAY

   0000 TO    0057  SPECIAL OR NONEXISTENT MEMORY           30,2000 TO 30,3770  RESERVED SWITCHABLE FIXED MEMORY
                                                            30,3771 TO 30,3777  AVAILABLE SWITCHABLE FIXED MEMORY
              0060  AVAILABLE ERASABLE MEMORY               31,2000 TO 31,3723  RESERVED SWITCHABLE FIXED MEMORY
   0061 TO    1377  RESERVED ERASABLE MEMORY                31,3724 TO 31,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            32,2000 TO 32,3753  RESERVED SWITCHABLE FIXED MEMORY
E3,1400 TO E5,1641  RESERVED SWITCHABLE ERASABLE MEMORY     32,3754 TO 32,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E5,1642 TO E5,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    33,2000 TO 33,3762  RESERVED SWITCHABLE FIXED MEMORY
E6,1400 TO E6,1773  RESERVED SWITCHABLE ERASABLE MEMORY     33,3763 TO 33,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E6,1774 TO E6,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    34,2000 TO 34,3652  RESERVED SWITCHABLE FIXED MEMORY
E7,1400 TO E7,1744  RESERVED SWITCHABLE ERASABLE MEMORY     34,3653 TO 34,3777  AVAILABLE SWITCHABLE FIXED MEMORY
E7,1745 TO E7,1777  AVAILABLE SWITCHABLE ERASABLE MEMORY    35,2000 TO 35,3740  RESERVED SWITCHABLE FIXED MEMORY
                                                            35,3741 TO 35,3777  AVAILABLE SWITCHABLE FIXED MEMORY
   4000 TO    5767  RESERVED FIXED MEMORY                   36,2000 TO 36,3773  RESERVED SWITCHABLE FIXED MEMORY
   5770 TO    5777  AVAILABLE FIXED MEMORY                  36,3774 TO 36,3777  AVAILABLE SWITCHABLE FIXED MEMORY
   6000 TO    7763  RESERVED FIXED MEMORY                   37,2000 TO 37,3773  RESERVED SWITCHABLE FIXED MEMORY
   7764 TO    7777  AVAILABLE FIXED MEMORY                  37,3774 TO 37,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            40,2000 TO 40,3760  RESERVED SWITCHABLE FIXED MEMORY
00,2000 TO 01,3777  RESERVED SWITCHABLE FIXED MEMORY        40,3761 TO 40,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            41,2000 TO 41,3752  RESERVED SWITCHABLE FIXED MEMORY
02,2000 TO 03,3777  SPECIAL OR NONEXISTENT MEMORY           41,3753 TO 41,3777  AVAILABLE SWITCHABLE FIXED MEMORY
                                                            42,2000 TO 42,3772  RESERVED SWITCHABLE FIXED MEMORY
04,2000 TO 04,3751  RESERVED SWITCHABLE FIXED MEMORY        42,3773 TO 42,3777  AVAILABLE SWITCHABLE FIXED MEMORY
04,3752 TO 04,3777  AVAILABLE SWITCHABLE FIXED MEMORY       43,2000 TO 43,3777  RESERVED SWITCHABLE FIXED MEMORY
05,2000 TO 05,3776  RESERVED SWITCHABLE FIXED MEMORY
           05,3777  AVAILABLE SWITCHABLE FIXED MEMORY       44,2000 TO 57,3777  SPECIAL OR NONEXISTENT MEMORY
06,2000 TO 06,3774  RESERVED SWITCHABLE FIXED MEMORY
06,3775 TO 06,3777  AVAILABLE SWITCHABLE FIXED MEMORY       60,2000 TO 67,3777  AVAILABLE SWITCHABLE FIXED MEMORY
07,2000 TO 07,3765  RESERVED SWITCHABLE FIXED MEMORY
07,3766 TO 07,3777  AVAILABLE SWITCHABLE FIXED MEMORY       70,2000 TO 73,3777  SPECIAL OR NONEXISTENT MEMORY
10,2000 TO 11,3776  RESERVED SWITCHABLE FIXED MEMORY
           11,3777  AVAILABLE SWITCHABLE FIXED MEMORY
12,2000 TO 12,3775  RESERVED SWITCHABLE FIXED MEMORY
12,3776 TO 12,3777  AVAILABLE SWITCHABLE FIXED MEMORY
13,2000 TO 13,3762  RESERVED SWITCHABLE FIXED MEMORY
13,3763 TO 13,3777  AVAILABLE SWITCHABLE FIXED MEMORY
14,2000 TO 15,3762  RESERVED SWITCHABLE FIXED MEMORY
15,3763 TO 15,3777  AVAILABLE SWITCHABLE FIXED MEMORY
16,2000 TO 22,3775  RESERVED SWITCHABLE FIXED MEMORY
22,3776 TO 22,3777  AVAILABLE SWITCHABLE FIXED MEMORY
23,2000 TO 23,3773  RESERVED SWITCHABLE FIXED MEMORY
23,3774 TO 23,3777  AVAILABLE SWITCHABLE FIXED MEMORY
24,2000 TO 25,3761  RESERVED SWITCHABLE FIXED MEMORY
25,3762 TO 25,3777  AVAILABLE SWITCHABLE FIXED MEMORY
26,2000 TO 27,3775  RESERVED SWITCHABLE FIXED MEMORY
27,3776 TO 27,3777  AVAILABLE SWITCHABLE FIXED MEMORY
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL        ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

             REF   0 LAST      TO   2E:     0     0     0        04/KEYUP     REF   1 LAST 1330 TC 1346:    68    68  4340
BANKSUM      REF   1 LAST   28 TO   38:    59    59    59        04/LT-LG     PFF   1 LAST   45 TC   45:     4     4  4344
00/DELAY     REF   1 LAST 1369 TC 1371:    32    32    91        04/MARK      REF   1 LAST  250 TO  251:    32    32  4376
00/INTER     REF   1 LAST 1041 TO 1081:   974   974  1065        04/PIN       REF   2 LAST  468 TO  468:     7    16  4392

01/EXEC      REF   1 LAST 1100 TO 1110:   280   280  1345        04/P00       REF   1 LAST  226 TC  238:   318   318  4710
01/INTER     REF   1 LAST 1081 TO 1089:   157   157  1502        04/P07       REF   2 LAST  374 TO  375:     5    32  4742
01/RSROU     RFF   3 LAST 1299 TO 1301:    55   168  1670        04/P27       REF   1 LAST 1381 TC 1389:   248   248  4990
01/RSTAB     REF   1 LAST  240 TO  245:   135   135  1805        04/P57       REF   1 LAST  977 TO  979:    12    12  5002

01/R03       REF   2 LAST  296 TO  299:    92    94  1899        04/R02       REF   1 LAST 1324 TO 1327:    17    17  5019
01/WAIT      REF   2 LAST 1125 TO 1127:    44   189  2088        04/R36       REF   1 LAST  703 TC  705:    77    77  5096
02/ALARM     REF   2 LAST 1374 TO 1376:    79   108  2196        05/ASENT     REF   1 LAST  845 TC  845:     2     2  5098
02/BANK      REF   1 LAST  992 TO  996:    76    76  2272        05/CLIST     REF   1 LAST  195 TO  208:   242   242  5340

02/DAPT6     REF   1 LAST 1396 TO 1397:    18    18  2290        05/DPROG     REF   1 LAST  985 TO  992:   183   183  5523
02/DSPLA     REF   1 LAST 1346 TO 1346:    16    16  2306        05/EPHEM     REF   2 LAST  981 TO  985:     0    52  5575
02/EXEC      REF   2 LAST 1110 TO 1113:     6    65  2371        05/P70       REF   1 LAST  824 TC  826:    56    56  5631
02/EXTV8     REF   1 LAST 1372 TC 1373:     4     4  2375        05/START     REF   2 LAST  213 TO  226:   484   485  6116

02/FCONS     REF   1 LAST 1089 TO 1091:    64    64  2439        06/ICOMP     REF   1 LAST  328 TO  341:   282   282  6398
02/FLAG      REF   1 LAST 1367 TO 1369:    32    32  2471        06/LUROT     RFF   1 LAST 1141 TC 1143:     9     9  6407
02/IMODE     REF   1 LAST 1301 TC 1302:     5     5  2476        06/MIDG      REF   1 LAST  694 TO  695:    30    30  6437
02/INTER     REF   1 LAST 1096 TO 1097:    32    32  2508        06/T4RCS     REF   1 LAST  193 TO  195:    69    69  6506

02/PHASE     REF   1 LAST 1290 TO 1292:    71    71  2579        06/T4RPT     REF   2 LAST  158 TO  193:   618   628  7134
02/PIN       REF   6 LAST  468 TO  471:    37   246  2825        07/ASENT     REF   1 LAST  844 TO  845:    15    15  7149
02/P07       REF   1 LAST  383 TO  385:    18    18  2843        07/IMODE     REF   1 LAST 1302 TC 1324:   558   558  7707
02/RRSL8     REF   1 LAST  524 TC  530:    68    68  2911        07/MARK      REF   2 LAST  252 TO  262:   285   406  8113

02/RSROU     REF   2 LAST 1298 TO 1299:    10    17  2928        07/R59       RFF   1 LAST  262 TO  263:    32    32  8145
02/RUPTS     REF   1 LAST  155 TO  157:    54    54  2982        10/DSPLA     REF   3 LAST 1374 TC 1374:     9   678  8823
02/TRAN      REF   1 LAST 1371 TC 1372:    15    15  2997        10/MIDG      REF   1 LAST  695 TO  697:    24    24  8847
02/T4RPT     REF   1 LAST  157 TO  158:    12    12  3009        10/PHASE     REF   2 LAST 1292 TO 1294:    66    75  8922

02/WAIT      REF   2 LAST 1123 TC 1125:    24    78  3087        10/POWFL     REF   1 LAST 1257 TO 1263:   115   115  9037
03/DAP       REF   1 LAST 1451 TO 1453:     2     2  3089        10/RTB       RFF   1 LAST 1389 TO 1396:   130   130  9167
03/FCONS     REF   1 LAST 1091 TO 1094:    32    32  3121        11/F2DPS     PEF   1 LAST  814 TC  817:    66    66  9233
03/INTER     REF   3 LAST 1008 TO 1041:   732   952  4073        11/INITV     REF   1 LAST  688 TO  694:   194   194  9427

03/KILL      REF   1 LAST  745 TO  745:     8     8  4081        11/CRBIT     REF   1 LAST 1220 TO 1241:   830   830 10257
03/PHASE     REF   1 LAST 1294 TO 1295:     4     4  4085        12/CONIC     REF   3 LAST 1183 TC 1202:   502   986 11243
03/P00       REF   1 LAST  226 TO  226:     8     8  4093        12/ICONS     REF   1 LAST 1095 TO 1096:    19    19 11262
03/P20       REF   1 LAST  598 TO  600:     5     5  4098        12/ALARM     REF   1 LAST 1376 TC 1380:    10    10 11272

03/P40       REF   1 LAST   40 TC   40:     1     1  4099        13/GEOM      REF   1 LAST  322 TO  326:    79    79 11351
03/R24       REF   1 LAST  520 TO  520:     9     9  4108        13/INTIN     REF   4 LAST 1214 TO 1218:   134   603 11954
04/CONIC     REF   3 LAST 1180 TO 1183:    65   110  4218        13/LT-LG     REF   1 LAST 1127 TC 1134:   155   155 12109
04/INTIN     REF   1 LAST 1218 TC 1220:    54    54  4272        13/CRBIT     REF   1 LAST   46 TO   46:    20    20 12129
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL         ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

13/P76       REF    1 LAST  711 TO  715:   96    96 12225       22/SERV      REF    1 LAST  858 TO  860:   24    24 19257
14/ASENT     REF    1 LAST  845 TO  847:   57    57 12282       22/SP30S     REF    1 LAST  722 TO  725:   62    62 19319
14/INFLT     REF    1 LAST  943 TO  944:    0     0 12282       23/EXTV8     REF    1 LAST  272 TO  272:   33    33 19352
14/LOSAM     REF    2 LAST  930 TO  932:   67    75 12357       23/F2ORS     REF    1 LAST  817 TO  817:    6     6 19358

14/P51       REF    1 LAST  944 TO  948:  127   127 12484       23/GEOM      REF    1 LAST  326 TO  328:   34    34 19392
14/R50       REF    1 LAST  942 TO  943:   64    64 12548       23/ICONS     REF    1 LAST 1094 TO 1095:   16    16 19408
14/R51       REF    1 LAST  936 TO  940:  135   135 12683       23/INCOR     REF    2 LAST 1147 TO 1151:  196   334 19742
14/R52       REF    1 LAST  950 TO  952:   68    68 12751       23/INFLT     REF    1 LAST 1243 TO 1251:  184   184 19926

14/R54       REF    1 LAST  941 TO  942:   41    41 12792       23/PERAP     REF    1 LAST  697 TO  703:   78    78 20004
14/R55       REF    1 LAST  940 TO  941:   26    26 12818       23/POWFL     REF    1 LAST 1251 TO 1257:  152   152 20156
14/R56       REF    1 LAST  932 TO  936:  132   132 12950       23/R61       REF    1 LAST  521 TO  524:  145   145 20301
14/STARS     REF    1 LAST   47 TO   51:  223   223 13173       23/R62       REF    1 LAST  489 TO  490:   11    11 20312

14/S52.1     REF    1 LAST  948 TO  949:   25    25 13198       23/SERV      REF    1 LAST  861 TO  862:   24    24 20336
14/S52.3     REF    1 LAST  949 TO  950:   16    16 13214       24/LRS20     REF    1 LAST  571 TO  572:   46    46 20382
15/EPHEM     REF    1 LAST  979 TO  981:   73    73 13287       24/LUROT     REF    1 LAST 1135 TO 1138:   63    63 20445
15/R51       REF    1 LAST  956 TO  959:   65    65 13352       24/P20       REF    2 LAST  499 TO  505:  226   256 20701

15/R52       REF    1 LAST  922 TO  930:  157   157 13509       24/P21       REF    1 LAST  657 TO  663:  122   122 20823
15/P57       REF    2 LAST  962 TO  977:  435   556 14065       24/P22       REF    2 LAST  511 TO  512:    5     5 20828
15/R59       REF    2 LAST  952 TO  956:  149   189 14254       24/P25       REF    1 LAST  506 TO  508:   37    37 20865
16/DAP       REF    1 LAST 1462 TO 1464:   60    60 14314       24/R21       REF    1 LAST  512 TO  517:  162   162 21027

16/DAPIO     REF    1 LAST 1402 TO 1406:  139   139 14453       24/P22       REF    1 LAST  508 TO  511:  147   147 21174
16/DAPP      REF    1 LAST 1413 TO 1434:  794   794 15247       24/R23       REF    1 LAST  517 TO  519:   41    41 21215
17/DAPQR     REF    1 LAST 1434 TO 1451:  624   624 15871       24/R24       REF    2 LAST  520 TO  521:   16    38 21253
17/DAPTJ     REF    1 LAST 1453 TO 1462:  315   315 16186       24/R29       REF    2 LAST  610 TO  613:   69    87 21340

17/DAPT6     REF    2 LAST 1397 TO 1398:    5    39 16225       25/LPS20     REF    1 LAST  572 TO  575:   12    12 21352
20/DAPAO     REF    4 LAST 1489 TO 1500:  355   720 16945       25/LUROT     REF    1 LAST 1138 TO 1140:   68    68 21420
20/DAPIF     REF    1 LAST 1398 TO 1402:   74    74 17019       25/RLEAD     REF    1 LAST  494 TO  496:   56    56 21476
20/NEEDL     REF    1 LAST 1406 TO 1413:  156   156 17175       25/RRUPT     REF    3 LAST  617 TO  619:   33   273 21749

20/R03       REF    1 LAST  294 TO  296:   73    73 17248       25/RSU8      REF    2 LAST  567 TO  571:   76   640 22389
21/DAPAO     REF    1 LAST 1478 TO 1478:    8     8 17256       26/BALL      REF    1 LAST  481 TO  485:   50    50 22439
21/DAP8U     REF    1 LAST 1500 TO 1500:   82    82 17338       26/LRS24     REF    1 LAST  593 TO  598:  172   172 22611
21/DAPGT     REF    1 LAST 1464 TO 1478:  388   388 17726       26/LSR22     REF    1 LAST  581 TO  593:  532   532 23143

21/P70       REF    2 LAST  829 TO  829:   16    30 17756       26/LUROT     REF    3 LAST 1140 TO 1141:   26    65 23208
21/R10       REF    2 LAST  891 TO  904:  473   479 18235       26/P06       REF    1 LAST  477 TO  481:  103   103 23311
21/R11       REF    1 LAST  823 TO  824:   49    49 18284       26/R63       REF    1 LAST  341 TO  353:   65    65 23376
21/SERV      REF    1 LAST  867 TO  868:   16    16 18300       27/ASENT     REF    2 LAST  849 TO  850:   21    37 23413

22/F2DPS     REF    1 LAST  822 TO  823:   10    10 18310       27/KILL      REF    1 LAST  745 TO  748:   38    38 23451
22/INCCR     REF    1 LAST 1151 TO 1168:   50    50 18360       27/P12       REF    1 LAST   44 TO   44:    4     4 23455
22/KALC      REF    1 LAST  353 TO  372:  670   670 19030       27/P40       REF    2 LAST  748 TO  750:   83    93 23548
22/R30       REF    2 LAST  715 TO  722:  199   203 19233       27/P70       REF    1 LAST   39 TO   39:    8     8 23556
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ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL          ROUTINE: COUNT DATA FOR ROUTINE'S LAST REACH:TOTAL:CUMUL

27/SERV       REF    1 LAST   860 TO   861:     31     31 23587    34/P6567      REF    1 LAST   786 TO   788:     42     42 29379
27/S40.1      REF    1 LAST   760 TO   764:    101    101 23688    34/SERV       REF    2 LAST   887 TO   887:     14     47 29426
27/S40.2      REF    1 LAST   764 TO   765:     28     28 23716    34/S30S       REF    1 LAST   621 TO   626:     47     47 29473
27/S40.6      REF    1 LAST   776 TO   779:     40     40 23756    35/P30        REF    1 LAST   619 TO   621:     28     28 29501

27/S40.8      REF    1 LAST   765 TO   768:     57     57 23813    35/P3272      REF    1 LAST   626 TO   632:    119    119 29620
27/S40.9      REF    2 LAST   771 TO   776:    200    202 24015    35/P3373      REF    1 LAST   632 TO   637:    140    140 29760
27/S41.1      REF    1 LAST   779 TO   780:      4      4 24019    35/P3474      REF    1 LAST   663 TO   668:    112    112 29872
27/TFF        REF    2 LAST  1263 TO  1277:    266    268 24287    35/P3575      REF    2 LAST   668 TO   688:    529    543 30415

27/VECPT      REF    1 LAST   485 TO   499:    136    136 24423    35/P40        REF    2 LAST   742 TO   743:     23     48 30463
27/40.13      REF    1 LAST   768 TO   771:    103    103 24526    36/P40        REF    6 LAST   754 TO   760:    163    782 31245
30/ASENT      REF    2 LAST   838 TO   844:    312    314 24840    36/P41        REF    1 LAST   750 TO   752:     78     78 31323
30/EXTVB      REF    1 LAST   615 TO   617:     47     47 24887    36/P42        REF    1 LAST   752 TO   753:     22     22 31345

30/FCDUW      REF    1 LAST   904 TO   922:    445    445 25332    36/P47        REF    1 LAST   753 TO   754:     52     52 31397
30/P12        REF    1 LAST   831 TO   834:    156    156 25488    37/P05        REF    1 LAST  1328 TO  1330:     32     32 31429
31/EXTVB      REF    1 LAST   613 TO   615:     93     93 25581    37/P06        REF    1 LAST  1327 TO  1328:     47     47 31476
31/F2DPS      REF    4 LAST   817 TO   822:    135    679 26260    37/P07        REF    3 LAST   385 TO   400:    267    587 32063

31/R13        REF    1 LAST   795 TO   796:     59     59 26319    37/R31        REF    1 LAST   705 TO   711:    189    189 32252
31/THROT      REF    2 LAST   788 TO   793:    141    146 26465    37/SERV       REF    2 LAST   864 TO   867:     76    162 32414
32/F2DPS      REF    2 LAST   811 TO   814:    166    167 26632    40/EXTVB      REF    1 LAST   301 TO   306:     63     63 32477
32/LRS22      REF    2 LAST   575 TO   581:    133    137 26769    40/PIN        REF   10 LAST   474 TO   477:     57    928 33405

32/P20        REF    1 LAST   497 TO   499:    103    103 26872    40/R31        REF    1 LAST   705 TO   705:     15     15 33420
32/P63        REF    1 LAST   780 TO   786:    181    181 27053    41/PIN        REF    8 LAST   471 TO   474:     82   1000 34420
32/P70        REF    2 LAST   829 TO   831:     24    139 27192    42/EXTVB      REF    2 LAST   289 TO   290:     23     38 34458
32/R29        REF    1 LAST   605 TO   610:    152    152 27344    42/NOUNS      REF    1 LAST   306 TO   322:    597    597 35055

32/R47        REF    1 LAST   208 TO   213:    138    138 27482    42/PIN        REF    2 LAST   437 TO   441:     92    238 35293
32/SERV       REF    1 LAST   861 TO   861:      3      3 27485    42/R05        REF    2 LAST   490 TO   494:    114    116 35409
33/ASENT      REF    1 LAST   850 TO   852:     44     44 27529    42/R33        REF    1 LAST   277 TO   278:     27     27 35436
33/R29        REF    1 LAST   600 TO   604:     97     97 27626    43/EXTVB      REF    6 LAST   299 TO   301:     60    511 35947

33/SERV       REF    8 LAST   887 TO   891:     88    911 28537    43/PHASE      REF    1 LAST  1286 TO  1286:     14     14 35961
34/ASENT      REF    3 LAST   847 TO   849:     77    127 28664    43/P27        REF    1 LAST  1380 TO  1381:     21     21 35982
34/CSI        REF    1 LAST   637 TO   655:    650    650 29314    43/R0477      REF    1 LAST   278 TO   282:    176    176 36158
34/P12        REF    1 LAST   834 TO   836:     23     23 29337    43/SELF       REF    1 LAST  1277 TO  1286:    314    314 36472
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

     4000  TO     4377      PARAGRAPH # 010        ROPE MODULE 1, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
     4400  TO     4777      PARAGRAPH # 011        ROPE MODULE 1, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
     5000  TO     5377      PARAGRAPH # 012        ROPE MODULE 1, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
     5400  TO     5777      PARAGRAPH # 013        ROPE MODULE 1, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
     6000  TO     6377      PARAGRAPH # 014        ROPE MODULE 1, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
     6400  TO     6777      PARAGRAPH # 015        ROPE MODULE 1, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
     7000  TO     7377      PARAGRAPH # 016        ROPE MODULE 1, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
     7400  TO     7777      PARAGRAPH # 017        ROPE MODULE 1, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
  00,2000  TO  00,2377      PARAGRAPH # 020        ROPE MODULE 1, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
  00,2400  TO  00,2777      PARAGRAPH # 021        ROPE MODULE 1, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
  00,3000  TO  00,3377      PARAGRAPH # 022        ROPE MODULE 1, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
  00,3400  TO  00,3777      PARAGRAPH # 023        ROPE MODULE 1, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
  01,2000  TO  01,2377      PARAGRAPH # 024        ROPE MODULE 1, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
  01,2400  TO  01,2777      PARAGRAPH # 025        ROPE MODULE 1, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
  01,3000  TO  01,3377      PARAGRAPH # 026        ROPE MODULE 1, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
  01,3400  TO  01,3777      PARAGRAPH # 027        ROPE MODULE 1, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)

  04,2000  TO  04,2377      PARAGRAPH # 040        ROPE MODULE 1, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
  04,2400  TO  04,2777      PARAGRAPH # 041        ROPE MODULE 1, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
  04,3000  TO  04,3377      PARAGRAPH # 042        ROPE MODULE 1, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
  04,3400  TO  04,3777      PARAGRAPH # 043        ROPE MODULE 1, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
  05,2000  TO  05,2377      PARAGRAPH # 044        ROPE MODULE 1, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
  05,2400  TO  05,2777      PARAGRAPH # 045        ROPE MODULE 1, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
  05,3000  TO  05,3377      PARAGRAPH # 046        ROPE MODULE 1, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
  05,3400  TO  05,3777      PARAGRAPH # 047        ROPE MODULE 1, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
  06,2000  TO  06,2377      PARAGRAPH # 050        ROPE MODULE 2, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
  06,2400  TO  06,2777      PARAGRAPH # 051        ROPE MODULE 2, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
  06,3000  TO  06,3377      PARAGRAPH # 052        ROPE MODULE 2, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
  06,3400  TO  06,3777      PARAGRAPH # 053        ROPE MODULE 2, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
  07,2000  TO  07,2377      PARAGRAPH # 054        ROPE MODULE 2, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
  07,2400  TO  07,2777      PARAGRAPH # 055        ROPE MODULE 2, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
  07,3000  TO  07,3377      PARAGRAPH # 056        ROPE MODULE 2, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
  07,3400  TO  07,3777      PARAGRAPH # 057        ROPE MODULE 2, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
  10,2000  TO  10,2377      PARAGRAPH # 060        ROPE MODULE 2, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
  10,2400  TO  10,2777      PARAGRAPH # 061        ROPE MODULE 2, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
  10,3000  TO  10,3377      PARAGRAPH # 062        ROPE MODULE 2, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
  10,3400  TO  10,3777      PARAGRAPH # 063        ROPE MODULE 2, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
  11,2000  TO  11,2377      PARAGRAPH # 064        ROPE MODULE 2, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
  11,2400  TO  11,2777      PARAGRAPH # 065        ROPE MODULE 2, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
  11,3000  TO  11,3377      PARAGRAPH # 066        ROPE MODULE 2, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
  11,3400  TO  11,3777      PARAGRAPH # 067        ROPE MODULE 2, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
  12,2000  TO  12,2377      PARAGRAPH # 070        ROPE MODULE 2, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
  12,2400  TO  12,2777      PARAGRAPH # 071        ROPE MODULE 2, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
  12,3000  TO  12,3377      PARAGRAPH # 072        ROPE MODULE 2, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

12,3400  TO 12,3777     PARAGRAPH # 073       ROPE MODULE 2, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
13,2000  TO 13,2377     PARAGRAPH # 074       ROPE MODULE 2, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
13,2400  TO 13,2777     PARAGRAPH # 075       ROPE MODULE 2, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
13,3000  TO 13,3377     PARAGRAPH # 076       ROPE MODULE 2, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
13,3400  TO 13,3777     PARAGRAPH # 077       ROPE MODULE 2, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
14,2000  TO 14,2377     PARAGRAPH # 100       ROPE MODULE 3, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
14,2400  TO 14,2777     PARAGRAPH # 101       ROPE MODULE 3, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
14,3000  TO 14,3377     PARAGRAPH # 102       ROPE MODULE 3, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
14,3400  TO 14,3777     PARAGRAPH # 103       ROPE MODULE 3, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
15,2000  TO 15,2377     PARAGRAPH # 104       ROPE MODULE 3, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
15,2400  TO 15,2777     PARAGRAPH # 105       ROPE MODULE 3, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
15,3000  TO 15,3377     PARAGRAPH # 106       ROPE MODULE 3, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
15,3400  TO 15,3777     PARAGRAPH # 107       ROPE MODULE 3, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
16,2000  TO 16,2377     PARAGRAPH # 110       ROPE MODULE 3, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
16,2400  TO 16,2777     PARAGRAPH # 111       ROPE MODULE 3, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
16,3000  TO 16,3377     PARAGRAPH # 112       ROPE MODULE 3, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
16,3400  TO 16,3777     PARAGRAPH # 113       ROPE MODULE 3, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
17,2000  TO 17,2377     PARAGRAPH # 114       ROPE MODULE 3, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
17,2400  TO 17,2777     PARAGRAPH # 115       ROPE MODULE 3, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
17,3000  TO 17,3377     PARAGRAPH # 116       ROPE MODULE 3, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
17,3400  TO 17,3777     PARAGRAPH # 117       ROPE MODULE 3, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
20,2000  TO 20,2377     PARAGRAPH # 120       ROPE MODULE 3, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
20,2400  TO 20,2777     PARAGRAPH # 121       ROPE MODULE 3, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
20,3000  TO 20,3377     PARAGRAPH # 122       ROPE MODULE 3, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
20,3400  TO 20,3777     PARAGRAPH # 123       ROPE MODULE 3, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
21,2000  TO 21,2377     PARAGRAPH # 124       ROPE MODULE 3, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
21,2400  TO 21,2777     PARAGRAPH # 125       ROPE MODULE 3, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
21,3000  TO 21,3377     PARAGRAPH # 126       ROPE MODULE 3, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
21,3400  TO 21,3777     PARAGRAPH # 127       ROPE MODULE 3, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
22,2000  TO 22,2377     PARAGRAPH # 130       ROPE MODULE 4, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
22,2400  TO 22,2777     PARAGRAPH # 131       ROPE MODULE 4, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
22,3000  TO 22,3377     PARAGRAPH # 132       ROPE MODULE 4, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
22,3400  TO 22,3777     PARAGRAPH # 133       ROPE MODULE 4, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
23,2000  TO 23,2377     PARAGRAPH # 134       ROPE MODULE 4, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
23,2400  TO 23,2777     PARAGRAPH # 135       ROPE MODULE 4, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
23,3000  TO 23,3377     PARAGRAPH # 136       ROPE MODULE 4, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
23,3400  TO 23,3777     PARAGRAPH # 137       ROPE MODULE 4, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
24,2000  TO 24,2377     PARAGRAPH # 140       ROPE MODULE 4, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
24,2400  TO 24,2777     PARAGRAPH # 141       ROPE MODULE 4, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
24,3000  TO 24,3377     PARAGRAPH # 142       ROPE MODULE 4, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
24,3400  TO 24,3777     PARAGRAPH # 143       ROPE MODULE 4, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
25,2000  TO 25,2377     PARAGRAPH # 144       ROPE MODULE 4, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
25,2400  TO 25,2777     PARAGRAPH # 145       ROPE MODULE 4, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
25,3000  TO 25,3377     PARAGRAPH # 146       ROPE MODULE 4, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
25,3400  TO 25,3777     PARAGRAPH # 147       ROPE MODULE 4, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
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4000 FF 2048

44x 2000

$4000_8 = 2048$

46K

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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

26,2000   TO 26,2377      PARAGRAPH # 150         ROPE MODULE 4, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
26,2400   TO 26,2777      PARAGRAPH # 151         ROPE MODULE 4, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
26,3000   TO 26,3377      PARAGRAPH # 152         ROPE MODULE 4, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
26,3400   TO 26,3777      PARAGRAPH # 153         ROPE MODULE 4, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
27,2000   TO 27,2377      PARAGRAPH # 154         ROPE MODULE 4, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
27,2400   TO 27,2777      PARAGRAPH # 155         ROPE MODULE 4, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
27,3000   TO 27,3377      PARAGRAPH # 156         ROPE MODULE 4, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
27,3400   TO 27,3777      PARAGRAPH # 157         ROPE MODULE 4, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
30,2000   TO 30,2377      PARAGRAPH # 160         ROPE MODULE 5, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
30,2400   TO 30,2777      PARAGRAPH # 161         ROPE MODULE 5, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
30,3000   TO 30,3377      PARAGRAPH # 162         ROPE MODULE 5, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
30,3400   TO 30,3777      PARAGRAPH # 163         ROPE MODULE 5, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
31,2000   TO 31,2377      PARAGRAPH # 164         ROPE MODULE 5, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
31,2400   TO 31,2777      PARAGRAPH # 165         ROPE MODULE 5, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
31,3000   TO 31,3377      PARAGRAPH # 166         ROPE MODULE 5, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
31,3400   TO 31,3777      PARAGRAPH # 167         ROPE MODULE 5, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
32,2000   TO 32,2377      PARAGRAPH # 170         ROPE MODULE 5, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
32,2400   TO 32,2777      PARAGRAPH # 171         ROPE MODULE 5, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
32,3000   TO 32,3377      PARAGRAPH # 172         ROPE MODULE 5, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
32,3400   TO 32,3777      PARAGRAPH # 173         ROPE MODULE 5, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
33,2000   TO 33,2377      PARAGRAPH # 174         ROPE MODULE 5, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
33,2400   TO 33,2777      PARAGRAPH # 175         ROPE MODULE 5, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
33,3000   TO 33,3377      PARAGRAPH # 176         ROPE MODULE 5, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
33,3400   TO 33,3777      PARAGRAPH # 177         ROPE MODULE 5, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
34,2000   TO 34,2377      PARAGRAPH # 200         ROPE MODULE 5, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
34,2400   TO 34,2777      PARAGRAPH # 201         ROPE MODULE 5, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
34,3000   TO 34,3377      PARAGRAPH # 202         ROPE MODULE 5, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
34,3400   TO 34,3777      PARAGRAPH # 203         ROPE MODULE 5, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
35,2000   TO 35,2377      PARAGRAPH # 204         ROPE MODULE 5, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
35,2400   TO 35,2777      PARAGRAPH # 205         ROPE MODULE 5, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
35,3000   TO 35,3377      PARAGRAPH # 206         ROPE MODULE 5, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
35,3400   TO 35,3777      PARAGRAPH # 207         ROPE MODULE 5, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
36,2000   TO 36,2377      PARAGRAPH # 210         ROPE MODULE 6, SIDE A, SENSE LINE SET  1 (WIRES   1- 16)
36,2400   TO 36,2777      PARAGRAPH # 211         ROPE MODULE 6, SIDE B, SENSE LINE SET  1 (WIRES   1- 16)
36,3000   TO 36,3377      PARAGRAPH # 212         ROPE MODULE 6, SIDE A, SENSE LINE SET  2 (WIRES  17- 32)
36,3400   TO 36,3777      PARAGRAPH # 213         ROPE MODULE 6, SIDE B, SENSE LINE SET  2 (WIRES  17- 32)
37,2000   TO 37,2377      PARAGRAPH # 214         ROPE MODULE 6, SIDE A, SENSE LINE SET  3 (WIRES  33- 48)
37,2400   TO 37,2777      PARAGRAPH # 215         ROPE MODULE 6, SIDE B, SENSE LINE SET  3 (WIRES  33- 48)
37,3000   TO 37,3377      PARAGRAPH # 216         ROPE MODULE 6, SIDE A, SENSE LINE SET  4 (WIRES  49- 64)
37,3400   TO 37,3777      PARAGRAPH # 217         ROPE MODULE 6, SIDE B, SENSE LINE SET  4 (WIRES  49- 64)
40,2000   TO 40,2377      PARAGRAPH # 220         ROPE MODULE 6, SIDE A, SENSE LINE SET  5 (WIRES  65- 80)
40,2400   TO 40,2777      PARAGRAPH # 221         ROPE MODULE 6, SIDE B, SENSE LINE SET  5 (WIRES  65- 80)
40,3000   TO 40,3377      PARAGRAPH # 222         ROPE MODULE 6, SIDE A, SENSE LINE SET  6 (WIRES  81- 96)
40,3400   TO 40,3777      PARAGRAPH # 223         ROPE MODULE 6, SIDE B, SENSE LINE SET  6 (WIRES  81- 96)
41,2000   TO 41,2377      PARAGRAPH # 224         ROPE MODULE 6, SIDE A, SENSE LINE SET  7 (WIRES  97-112)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH

41,2400  TO 41,2777     PARAGRAPH # 225        ROPE MODULE 6, SIDE B, SENSE LINE SET  7 (WIRES  97-112)
41,3000  TO 41,3377     PARAGRAPH # 226        ROPE MODULE 6, SIDE A, SENSE LINE SET  8 (WIRES 113-128)
41,3400  TO 41,3777     PARAGRAPH # 227        ROPE MODULE 6, SIDE B, SENSE LINE SET  8 (WIRES 113-128)
42,2000  TO 42,2377     PARAGRAPH # 230        ROPE MODULE 6, SIDE A, SENSE LINE SET  9 (WIRES 129-144)
42,2400  TO 42,2777     PARAGRAPH # 231        ROPE MODULE 6, SIDE B, SENSE LINE SET  9 (WIRES 129-144)
42,3000  TO 42,3377     PARAGRAPH # 232        ROPE MODULE 6, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
42,3400  TO 42,3777     PARAGRAPH # 233        ROPE MODULE 6, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
43,2000  TO 43,2377     PARAGRAPH # 234        ROPE MODULE 6, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
43,2400  TO 43,2777     PARAGRAPH # 235        ROPE MODULE 6, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
43,3000  TO 43,3377     PARAGRAPH # 236        ROPE MODULE 6, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
43,3400  TO 43,3777     PARAGRAPH # 237        ROPE MODULE 6, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
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OCTAL LISTING FOR PARAGRAPH # 010,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

   4000         00004 0      34054 1      56006 1      12665 1      52011 0      00006 1      34056 0      52006 0
   4010         52011 0      00006 1      31264 0      52006 0      52011 0      34057 1      56006 1      13410 0
   4020         52011 0      34064 1      56006 1      12000 1      52011 0      34060 0      56006 1      13253 1
   4030         52011 0      34061 1      56006 1      12332 0      52011 0      34060 0      56006 1      13276 0

   4040         52011 0      34062 1      56006 1      13505 0      52011 0      34063 0      56006 1      13157 0
   4050         52011 0      34065 0      56006 1      12302 0   C: 12103 0   C: 02117 1   C: 36106 0   C: 02103 1
   4060      C: 10100 1   C: 16107 0   C: 12100 0   C: 52107 0   C: 14106 0   C: 22107 1   C: 04025 1   C: 10003 0
   4070      C: 14031 0   C: 20033 0   C: 24017 1   C: 30036 1   C: 34034 1   C: 40023 1   C: 44035 1   C: 50037 0

   4100      C: 54000 0   C: 60000 1      00004 0      00006 1      00004 0      54001 1      00006 1      06004 0
   4110         00006 1      14115 1      00006 1      00004 0      54001 1      44733 0      60001 0      00006 1
   4120         14103 0      00006 1      00003 1      00002 0      34144 1      71021 1      00006 1      14131 1
   4130         04132 0      31017 0      54023 1      30023 0      04616 1   C: 62341 0      34755 1      55012 1

   4140         31021 0      04255 1      04143 0      05155 0   C: 37600 0      04364 1      41040 0      55012 1
   4150         04616 1   C: 62341 0      04635 0   C: 62002 1      22007 0      54123 0      34736 1      71020 0
   4160         61011 0      10000 0      00002 0      34753 1      60002 0      55036 1      23021 0      04204 0
   4170         34201 0      56006 1      00006 1      04007 1      55037 0      34201 0      00006 1      01007 1

   4200         02000 0   C: 62101 0      53037 0      05165 0      34735 1      55020 0      00002 0      22002 0
   4210         04220 0      04224 1      30001 0      75012 0      60004 0      55041 1      05133 0      05155 0
   4220         11041 1      04227 1      00002 0      04227 1      11042 1      04227 1      00002 0      05624 1
   4230      C: 31206 1      34201 0      00006 1      01007 1      34242 1      55012 1      44360 1      54776 0

   4240         04635 0   C: 61504 1   C: 00042 1      34201 0      00006 1      01007 1      34254 0      55012 1
   4250         44360 1      54776 0      04635 0   C: 61476 0   C: 00041 1      74757 1      54123 0      34736 1
   4260         71020 0      61011 0      10000 0      00002 0      24002 0      10123 0      14270 1      00002 0
   4270         22002 0      34302 1      56006 1      00006 1      04007 1      52131 0      34201 0      00006 1

   4300         01007 1      03550 1   C: 60101 1      55016 0      54003 0      74357 0      65007 0      54145 0
   4310         00002 0      31016 1      14304 0      54003 0      74357 0      65007 0      00002 0   C: 00016 0
   4320      C: 00011 1   C: 00004 0      54020 1      40020 1      40020 1      40020 1      40020 1      56020 0
   4330         00002 0      54022 0      40022 0      40022 0      40022 0      40022 0      56022 1      00002 0

   4340         60000 1      60000 1      60000 1      60000 1      60000 1      00002 0   C: 00037 0   C: 01740 0
   4350      C: 76000 0      05072 1      05203 0      05261 1      05105 0   C: 30000 1   C: 03777 0   C: 00377 1
   4360      C: 00023 0   C: 00021 1   C: 00025 0   C: 00012 1      34745 0      00006 1      05011 1      00002 0
   4370         44745 1      00006 1      03011 1      00002 0      34747 1      00006 1      05011 1      00002 0
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OCTAL LISTING FOR PARAGRAPH # 011,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  4400        00006 1     30025 0     52014 0     00002 0     00006 1     30156 0     20156 1     60154 1
  4410        26154 0     54007 1     00002 0     54162 0     00002 0     54135 1     10000 0     30135 0
  4420        17313 0     14417 0     44755 0     54154 0     54155 1     54156 1     00002 0     34746 0
  4430        00006 1     05011 1     00002 0     44746 1     00006 1     03011 1     00002 0     44444 0

  4440        60002 0     60004 0     04635 0  C: 10633 0  C: 02003 0     22007 0     54123 0     34736 1
  4450        71020 0     61011 0     10000 0     14455 0     14164 1     24002 0     14437 1     56002 0
  4460        54144 1     44736 0     00004 0     71020 0     55020 0     11042 1     04470 0     04473 0
  4470        34755 1     57042 0     05137 1     00003 1     44747 0     00006 1     03011 1     34755 1

  4500        55011 1     00144 0     56002 0     54144 1     11042 1     04507 1     04473 0     34755 1
  4510        55011 1     00144 0     00006 1     64515 1     14516 0     40000 0     50002 0     60000 1
  4520        00006 1     66744 0     16742 1     00006 1     50002 0     50000 1     30001 0     24002 0
  4530        52062 1     22002 0     34740 0     70110 0     10000 0     14550 1     30061 0     04512 0

  4540     C: 66161 1     00001 0     34562 1     60062 0     04512 0  C: 64420 0     00001 0     04560 0
  4550        34563 0     60062 0     04512 0  C: 65673 0     00001 0     30061 0     04512 0  C: 51615 1
  4560        50001 0     00001 0  C: 00765 0  C: 16450 1     34753 1     71300 1     10000 0     00002 0
  4570        34744 1     54001 1     34615 1     70110 0     00006 1     14601 0     34750 1     70110 0

  4600        10000 0     30001 0     61035 0     70001 1     00006 1     16745 0     31035 0     00006 1
  4610        06001 0     74733 0     64735 1     55035 1     00002 0  C: 10102 0     52134 0     50002 0
  4620        30000 1     24002 0     54001 1     22004 0     75012 0     56002 0     52134 0     50002 0
  4630        02000 0     56134 1     56004 0     56134 1     00133 0     56002 0     50000 1     30000 1

  4640        54004 1     75012 0     56002 0     50002 0     12000 1     35012 1     70133 1     60134 1
  4650        00002 0     54135 1     56004 0     00006 1     04007 1     56135 0     75012 0     56001 0
  4660        00004 0     00006 1     01007 1     50001 0     32000 0     56135 0     00006 1     01007 1
  4670        00003 1     54004 1     30135 0     00002 0     52073 1     50002 0     30000 1     24002 0

  4700        54001 1     22004 0     75012 0     56002 0     52073 1     50002 0     02000 0     56073 0
  4710        56004 0     56073 0     00072 1     54164 0     34744 1     54023 1     30006 1     54165 1
  4720        50002 0     30010 1     54004 1     75012 0     56002 0     56164 1     14643 0     00006 1
  4730        01007 1     00002 0  C: 37777 1  C: 37777 1  C: 57777 1  C: 40000 0  C: 20000 0  C: 10000 0

  4740     C: 04000 0  C: 02000 0  C: 01000 0  C: 00400 0  C: 00200 0  C: 00100 0  C: 00040 0  C: 00020 0
  4750     C: 00010 0  C: 00004 0  C: 00002 0  C: 00001 0  C: 77777 0  C: 00000 1  C: 00005 1  C: 00007 0
  4760     C: 00013 0  C: 00015 0  C: 00017 1  C: 00030 1  C: 00033 1  C: 00035 1  C: 00032 0  C: 00045 0
  4770     C: 00046 0  C: 00050 1  C: 00055 1  C: 00060 1  C: 00062 0  C: 00120 1  C: 00140 1  C: 00144 0
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OCTAL LISTING FOR PARAGRAPH # 012,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

   5000      C: 00310 0    C: 00401 1    C: 00454 1    C: 00620 0    C: 00777 0    C: 01124 1    C: 01211 1    C: 01400 1
   5010      C: 01426 0    C: 01776 0    C: 01777 1    C: 02177 1    C: 02400 1    C: 03000 1    C: 03400 0    C: 05000 1
   5020      C: 06000 1    C: 07000 0    C: 11000 1    C: 13000 0    C: 14000 1    C: 15000 0    C: 16000 0    C: 17000 1
   5030      C: 17770 1    C: 21000 1       64736 1       55075 0       15036 0       41075 0       60000 1       55075 0

   5040         15051 1       57075 1       51075 1       64734 0       40000 0       61075 1       55075 0       15051 1
   5050         15067 1       00006 1       71075 0       55076 0       00006 1       75005 0       67742 1       00006 1
   5060         71076 0       67722 1       00006 1       71075 0       20001 1       55075 0       00002 0       50000 1
   5070         44734 1       00002 0       00004 0       65164 1       54063 0       00006 1       50002 0       30001 0

   5100         52066 0       35163 0       56004 0       54061 1       12626 0       00004 0       54063 0       00006 1
   5110         50002 0       30001 0       52066 0       35163 0       56004 0       12602 0       56002 0       67751 0
   5120         56002 0       15112 1       22002 0       35163 0       56006 1       12707 1       40164 0       54001 1
   5130         35163 0       54006 0       12706 0       54164 0       35163 0       54004 1       12777 0       00004 0

   5140         54065 0       44752 1       26002 1       35163 0       56004 0       13024 0       00004 0       54063 0
   5150         35163 0       56006 1       54165 1       30002 0       13073 1       35163 0       54004 1       13104 0
   5160         30061 0       54004 1       16744 1    C: 02602 1    C: 00110 1       56001 0       00006 1       01007 1
   5170         54006 0       00001 0    C: 77677 1       00004 0       54001 1       34733 1       26002 1       30006 1

   5200         00006 1       04007 1       56001 0       00004 0       56002 0       54061 1       00006 1       50061 0
   5210         30001 0       54063 0       35220 1       56006 1       13232 0       52062 1       64752 0       52006 0
   5220      C: 02063 0       50002 0       30000 1       24002 0       56002 0       54063 0       30006 1       00006 1
   5230         04007 1       54001 1       35235 0       54061 1       15212 1       15257 0    C: 72537 0    C: 73714 1

   5240         10076 1       15261 0       15261 0       15244 1       11301 0       15256 1       15251 0       15256 1
   5250         15256 1       37726 0       05072 1    C: 03563 1    C: 14063 1       15261 0       05221 0    C: 00764 1
   5260         05240 1       10332 1       35220 1       54006 0       13415 0       30016 0       00006 1       01007 1
   5270         00006 1       22012 1       30016 0       56006 1       52011 0       00003 1       50017 1       53153 0

   5300         30006 1       50002 0       30001 0       53147 0       00006 1       35310 0       52006 0    C: 03453 0
   5310      C: 02063 0       50002 0       30000 1       24002 0       55010 0       35320 0       22006 1       14640 0
   5320      C: 20213 0       50002 0       40000 0       61010 1       00006 1       16744 1       16742 1       00004 0
   5330         50002 0       30000 1       24002 0       54072 0       74757 1       60000 1       54071 0       30072 1

   5340         75030 0       00006 1       74740 1       56072 1       74735 0       54066 0       50002 0       30000 1
   5350         24002 0       54065 0       15363 0       00004 0       50002 0       30000 1       24002 0       00004 0
   5360         54065 0       34753 1       54066 0       00006 1       35367 0       52006 0    C: 02224 1    C: 20103 1
   5370         22073 0       22006 1       22073 0       75024 0       10000 0       17753 0       30062 0       74745 1
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OCTAL LISTING FOR PARAGRAPH # 013,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

 5400        10000 0      15423 0      50061 0      31051 1      54070 1      30062 0      74744 0      10000 0
 5410        15427 1      30002 0      54063 0      30006 1      00006 1      04007 1      54064 1      35422 0
 5420        22073 0      52[illegible]6 0   C: 02312 0      50002 0      30000 1      24002 0      15404 0      00006 1
 5430        50002 0      30001 0      52064 1      34752 0      26002 1      15417 1      22706 0      22006 1

 5440        50000 1      30001 0      22006 1      22706 0      13602 1      22706 0      22006 1      22706 0
 5450        00006 1      50000 1      30001 0      22706 0      22006 1      22706 0      13710 0      34755 1
 5460        54032 1      54033 0      54034 1      00002 0      54162 0      40160 1      70162 0      50161 1
 5470        26160 1      00002 0      04635 0   C: 20326 1      34755 1      55043 0      00004 0      44753 0

 5500        70100 1      54100 1      00003 1      00002 0      30002 0      05522 1      40000 0      00006 1
 5510        04001 1      50061 0      54074 0      22063 1      00003 1      00001 0      30002 0      05522 1
 5520        70001 1      15511 0      64753 1      00004 0      54063 0      34762 0      54061 1      50063 1
 5530        27777 0      54001 1      34755 1      00006 1      10061 1      52062 1      50061 0      30074 1

 5540        54001 1      50062 0      44735 0      00002 0      00004 0      54061 1      50002 0      60000 1
 5550        50000 1      30000 1      54001 1      30061 0      50002 0      60001 0      50000 1      22000 1
 5560        10061 1      15545 1      16744 1      44747 0      71043 0      55043 0      05155 0      00004 0
 5570        30002 0      55363 1      50002 0      30000 1      54001 1      30006 1      00006 1      04007 1

 5600        55364 0      30002 0      54061 1      10375 1      15610 1      30001 0      54375 1      15614 0
 5610        10376 1      15614 0      30001 0      54376 1      22377 1      41035 1      75632 1      27035 1
 5620        56061 0      00003 1      50000 1      00001 0      00004 0      30002 0      55363 1      50002 0
 5630        30000 1      05574 1   C: 40400 1      00004 0      34752 0      60005 1      54017 0      50017 1

 5640        04635 0   C: 12763 0      00004 0      30002 0      55363 1      50002 0      30000 1      05574 1
 5650     C: 77770 1      34765 1      54001 1      40000 0      52760 1      00004 0      04616 1   C: 27746 1
 5660        30103 0      74746 1      10000 0      15671 0      04616 1   C: 12650 1      04616 1   C: 12641 1
 5670        15634 1      35733 0      04727 1      04616 1   C: 57322 0      00004 0      30002 0      05644 1

 5700     C: 21103 0      00004 0      30002 0      05571 1   C: 00217 0      01363 0      00004 0      53364 0
 5710        35732 1      54061 1      50002 0      30000 1      54001 1      15603 0      00004 0      53364 0
 5720        35731 1      15711 1      00004 0      53364 0      00004 0      50002 0      30000 1      54001 1
 5730        15601 1      15650 0      15632 1   C: 56067 0      00004 0      54001 1      30002 0      55363 1

 5740        05575 0   C: 00014 1      01363 0      31472 1      00006 1      01006 0      00002 0      31473 0
 5750        54001 1      45764 0      00006 1      02005 0      60001 0      00006 1      01005 0      00002 0
 5760        31474 1      54001 1      35764 1      15752 0   C: 00314 1   C: 05765 0   C: 05766 0 CKSM 71575 0
 5770           @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 014,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

   6000      C: 00464 1     34764 0     54001 1     40000 0     52760 1     04635 0  C: 10024 0  C: 00024 1
   6010      C: 00031 0     46021 0     00004 0     70110 0     54110 0     44752 1     00006 1     03012 1
   6020         00002 0  C: 41000 1     37727 1     56004 0     12022 1     00006 1     36031 0     15165 1
   6030      C: 03045 0  C: 66107 1     36041 1     00004 0     22000 1     50002 0     30000 1     22006 1

   6040         12200 0  C: 56063 1     00003 1     00006 1     22164 1     30006 1     54165 1     74735 0
   6050         54115 0     54023 1     16073 1     22006 1     16045 1     00006 1     50116 1     30001 0
   6060         52155 1     34755 1     54156 1     54163 1     30165 0     54006 0     10023 1     16102 0
   6070         10067 1     15126 0     24164 1     50164 1     30000 1     10000 0     16365 0  C: 00177 0

   6100         54023 1     76077 0     54020 1     10020 1     16252 0     16746 0     74753 0     10000 0
   6110         16151 0     50164 1     40001 1     10000 0     16220 0  C: 77773 1     24164 1     54116 0
   6120         66254 1     10000 0     67746 0     16130 1     30120 1     26116 0     50020 0     76276 0
   6130         00006 1     66141 0     75012 0     65012 1     56116 1     60115 1     54004 1     50020 0

   6140         76276 0     74357 0     65007 0     56116 1     54003 0     50020 0     76276 0     37736 1
   6150         54020 1     30120 1     54130 1     24164 1     50164 1     40000 0     10000 0     24130 0
   6160         16161 0     54116 0     77745 1     00006 1     16167 0     30115 1     26116 0     50130 0
   6170         40046 1     26115 0     77747 0     00006 1     16207 0     77745 1     00006 1     16211 1

   6200         30116 1     54004 1     75012 0     64741 1     54116 0     50020 0     36276 1     30120 1
   6210         16215 0     35007 0     56116 1     54003 0     74357 0     26116 0     50020 0     36276 1
   6220         34360 0     70020 1     66225 1     10000 0     16236 1  C: 77767 1     66115 1     10000 0
   6230         50000 1     46247 1     16240 0     50163 0     46245 0     16240 0     50163 0     46247 1

   6240         26166 1     54116 0     50020 0     76276 0  C: 00002 0  C: 00006 1  C: 00006 1  C: 00002 0
   6250      C: 00003 1  C: 00006 1     10020 1     16266 1  C: 77722 0     24164 1     50164 1     30000 1
   6260         54117 1     35013 0     54004 1     70020 1     50000 1     16337 1     54004 1     10020 1
   6270         50000 1     12000 1     10163 1     12017 1     12017 1     12121 0  C: 00122 0     16510 1

   6300         17074 1     17660 1     17404 1     16706 1     16473 0     16055 0     17627 1     16504 1
   6310         16623 1     16526 1     17337 0     16562 1     16631 1     17342 1     17621 1     17577 1
   6320         17602 0     17606 1     17624 1     16754 0     16752 0     17041 1     17334 0     17463 0
   6330         17430 0     17010 0     17065 1     17000 1     16334 1     17575 0     17616 0     12345 0

   6340         12352 0     12355 1     12361 0     12365 1     12373 0     12407 1     12416 1     12401 1
   6350         12412 0     12470 1     12475 1     12450 0     12510 0     12517 1     12460 0     30165 0
   6360         54004 1     24164 1     50164 1     40000 0     67752 0     54116 0     74356 1     56116 1
   6370         77725 1     20006 1     74747 0     50000 1     16375 1     06425 1     16064 1     06417 0
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OCTAL LISTING FOR PARAGRAPH # 015,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" OENOTES UNUSEO FIXEO MEMORY

ALL VALIO WURDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WOROS) OR "C" (CONSTANTS)

  6400      16064 1     06422 0     16064 1     06425 1     16463 1     06425 1     16147 1     06425 1
  6410      16466 1     06425 1     16471 1     06425 1     34766 1     54020 1     16255 1     50120 1
  6420      40046 1     16424 1     50120 1     40047 0     26116 0     40116 0     64772 1     10000 0
  6430      30120 1     16436 1     35007 0     56116 1     54003 0     74357 0     26116 0     00006 1

  6440      30155 0     50116 1     52001 1     10163 1     16457 0     00002 0     00006 1     30160 0
  6450      50116 1     52003 0     00006 1     30162 1     50116 1     52005 0     00002 0     30156 0
  6460      50116 1     54002 1     00002 0     37735 1     54020 1     16111 1     34735 1     54020 1
  6470      16111 1     36112       16150 1     50116 1     30002 0     54156 1     00006 1     50116 1

  6500      30001 0     52155 1     34753 1     16063 0     22007 0     50116 1     30000 1     16060 0
  6510      00006 1     50116 1     30001 0     52155 1     00006 1     50116 1     30003 1     52160 1
  6520      00006 1     50116 1     30005 1     52162 0     44753 0     16063 0     00006 1     50116 1
  6530      30001 0     52155 1     50166 0     52001 1     50163 0     36247 0     26166 1     10163 1

  6540      16555 0     16553 0     54163 1     54156 1     52160 1     50166 0     51775 0     52162 0
  6550      50166 0     51777 1     16064 1     54156 1     16064 1     54163 1     56156 0     50166 0
  6560      53777 0     16064 1     00006 1     50116 1     30001 0     52155 1     50166 0     52001 1
  6570      50163 0     36247 0     26166 1     10163 1     16613 1     16514 0     00006 1     50116 1

  6600      30003 1     52160 1     50166 0     51775 0     00006 1     50116 1     30005 1     52162 0
  6610      50166 0     51777 1     16064 1     00006 1     50116 1     30003 1     52160 1     30156 0
  6620      50166 0     53777 0     16520 1     24164 1     50164 1     30000 1     50116 1     54000 0
  6630      16064 1     24164 1     50164 1     30000 1     50116 1     60000 1     54004 1     75012 0

  6640      50000 1     32000 0     54117 1     30165 0     74350 1     64350 0     60164 1     50120 1
  6650      54052 1     30117 0     77745 1     00006 1     16665 0     30165 0     54006 0     30117 0
  6660      54004 1     75012 0     64741 1     54164 0     16045 1     30117 0     66254 1     10000 0
  6670      30117 0     16700 1     30120 1     60117 0     50000 1     30000 1     54117 1     16652 1

  6700      54003 0     74357 0     50000 1     31400 1     54117 1     16652 1     50164 1     30001 0
  6710      50116 1     60000 1     54004 1     75012 0     50000 1     32000 0     54117 1     16652 1
  6720      30165 0     540 4 1     50164 1     30001 0     54117 1     16652 1     10154 0     00002 0
  6730      16732 0     16744 1     10155 1     00002 0     16736 1     16744 1     10156 1     00002 0

  6740      16742 1     16744 1     50002 0     00001 0     50002 0     00002 0     30165 0     54006 0
  6750      50164 1     00001 0     34735 1     16755 1     34355 0     26116 0     00006 1     50116 1
  6760      00003 1     20160 1     00006 1     16765 1     07017 0     00006 1     50116 1     00005 1
  6770      20162 0     00006 1     16774 1     07014 0     00006 1     50116 1     00001 0     17003 1
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OCTAL LISTING FOR PARAGRAPH # 016,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  7000        00006 1     50116 1     30001 0     20155 1     00006 1     16064 1     07022 0     16064 1
  7010        00006 1     50116 1     40001 1     17003 1     54001 1     34756 1     17021 1     54001 1
  7020        36250 0     56001 0     50000 1     44734 1     54130 1     00006 1     24000 1     50001 0
  7030        26155 1     54007 1     34755 1     60130 0     50001 0     26154 0     54007 1     00002 0

  7040        17155 0     00006 1     50116 1     30003 1     52160 1     00006 1     40001 1     20160 1
  7050        00006 1     17053 1     07017 0     00006 1     50116 1     30005 1     52162 0     00006 1
  7060        40001 1     20162 0     00006 1     17065 1     07014 0     00006 1     50116 1     30001 0
  7070        52155 1     00006 1     40001 1     17003 1     00006 1     50116 1     30002 0     20156 1

  7100        50116 1     60006 1     60154 1     54154 0     16064 1     17006 1     50002 0     30000 1
  7110        24002 0     54116 0     50116 1     30001 0     54156 1     34755 1     56155 0     54135 1
  7120        00006 1     70156 1     56156 0     00006 1     70154 0     20156 1     50116 1     30000 1
  7130        56135 0     00006 1     70135 1     20156 1     56154 1     00006 1     70135 1     20155 1

  7140        00002 0     34755 1     54163 1     56156 0     60000 1     54001 1     00002 0     60155 0
  7150        54155 1     00002 0     60154 1     54154 0     00002 0     54121 1     00002 0     34752 0
  7160        54136 1     00006 1     22137 1     07112 1     52160 1     52155 1     52131 0     30156 0
  7170        54132 0     30136 0     26116 0     07112 1     52156 1     20132 0     60154 1     60130 0

  7200        54130 1     17203 0     54121 1     52162 0     52155 1     30136 0     26116 0     07112 1
  7210        52132 0     20156 1     60154 1     60130 0     54154 0     00137 1     07022 0     00137 1
  7220        00006 1     22141 0     54117 1     22140 1     17235 0     50002 0     30000 1     54140 0
  7230        60000 1     60002 0     54117 1     64756 1     54141 1     36276 1     54116 0     00006 1

  7240        50117 0     30004 0     52155 1     52123 0     17250 0     54140 0     44752 1     26117 1
  7250        07112 1     00006 1     50117 0     30002 0     20155 1     10140 0     17245 1     00141 0
  7260        34755 1     54156 1     22002 0     06726 1     17270 1     17310 0     44733 0     17271 0
  7270        34733 1     54002 1     00006 1     24000 1     60156 0     54156 1     34755 1     60002 0

  7300        60155 0     54155 1     34755 1     60002 0     60154 1     54154 0     54155 1     00001 0
  7310        54156 1     17305 1     54135 1     00006 1     70156 1     54156 1     34755 1     56155 0
  7320        17131 1     54135 1     00006 1     70155 1     52155 1     00006 1     70135 1     30001 0
  7330        26154 0     00006 1     30155 0     00002 0     07157 0     34755 1     16063 0     34752 0

  7340        54140 0     17345 0     44363 1     54140 0     36245 1     54136 1     07535 0     07161 0
  7350        00006 1     30123 1     52155 1     52134 0     00006 1     30125 1     52160 1     00006 1
  7360        30127 0     52162 0     30140 1     26116 0     07161 0     52123 0     52155 1     52125 0
  7370        52160 1     52127 1     52162 0     30140 1     26116 0     07161 0     52134 0     52155 1
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OCTAL LISTING FOR PARAGRAPH # 017, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

  7400         52162 0     52125 0     52160 1     16064 1     10163 1     17433 0     17433 0     07112 1
  7410         07143 0     52160 1     52155 1     52160 1     07112 1     07143 0     52162 0     52155 1
  7420         52162 0     07112 1     07143 0     52155 1     52162 0     52160 1     52155 1     16064 1
  7430         07157 0     44751 1     26116 0     00006 1     30155 0     52160 1     07112 1     07143 0

  7440         34752 0     26116 0     00006 1     30160 0     52155 1     52162 0     07112 1     07143 0
  7450         34752 0     26116 0     52160 1     52155 1     52160 1     07112 1     07143 0     52155 1
  7460         52162 0     52155 1     16524 0     00006 1     30162 1     52155 1     52123 0     07112 1
  7470         00006 1     40160 1     52155 1     52125 0     07112 1     34752 0     26116 0     00006 1

  7500         40162 0     52155 1     52162 0     07112 1     00006 1     30123 1     52155 1     52127 1
  7510         07112 1     34752 0     26116 0     00006 1     40123 0     52155 1     20162 0     00006 1
  7520         17522 1     07014 0     07112 1     52125 0     52160 1     52155 1     20160 1     00006 1
  7530         17532 0     07017 0     07112 1     52127 1     17003 1     00006 1     30155 0     52123 0

  7540         00006 1     30160 0     52125 0     00006 1     30162 1     52127 1     00002 0     10000 0
  7550         17554 0     30002 0     17564 0     00002 0     56001 0     64736 1     64736 1     54000 0
  7560         17562 0     24001 0     56001 0     00002 0     56001 0     64735 1     67752 0     54000 0
  7570         17572 1     24001 0     56001 0     40000 0     00002 0     07112 1     16064 1     07112 1

  7600         07142 1     16064 1     00006 1     50116 1     30001 0     17612 1     00006 1     50116 1
  7610         30001 0     52155 1     52131 0     34755 1     54004 1     12353 1     30116 1     54166 1
  7620         16066 0     34755 1     54004 1     12172 0     36077 1     54004 1     12214 0     10163 1
  7630         17641 1     17641 1     00006 1     50116 1     30001 0     52131 0     34755 1     54004 1

  7640         12654 0     00006 1     50116 1     30003 1     52160 1     00006 1     50116 1     30005 1
  7650         52162 0     44753 0     54163 1     00006 1     50116 1     30001 0     52155 1     17635 1
  7660         50116 1     10000 0     16064 1     17665 1     17673 0     50116 1     10001 1     16064 1
  7670         16064 1     17673 0     16064 1     00006 1     40155 1     52155 1     10163 1     17710 1

  7700         17710 1     00006 1     40160 1     52160 1     00006 1     40162 0     52162 0     16064 1
  7710         40156 1     54156 1     16064 1  C: 22000 1  C: 23000 0  C: 24000 1  C: 25000 0  C: 26000 0
  7720      C: 27000 1  C: 31000 0  C: 31103 1  C: 32000 0  C: 33000 1  C: 34000 0  C: 35000 1  C: 36000 1
  7730      C: 37000 0  C: 37401 0  C: 37766 1  C: 37774 1  C: 37776 0  C: 40014 0  C: 40015 1  C: 40040 1

  7740      C: 40200 1  C: 57777 1  C: 65552 0  C: 70000 0  C: 73777 1  C: 74000 1  C: 74056 1  C: 77700 0
  7750      C: 77774 0  C: 77775 1  C: 77776 1     74740 1     10000 0     15423 0     15402 0     00006 1
  7760         07757 0  C: 07761 0  C: 07762 0  CKSM 70442 1        @           @           @           @
  7770            @           @           @           @           @           @           @           @
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OCTAL LISTING FOR PARAGRAPH # 020,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2000        13207 0     13530 0     13517 0     13610 1     13612 0     13174 1     12116 1     17673 0
00,2010        13232 0     13023 1     13176 0     13245 0     16357 1     13274 1     13247 1     36245 1
00,2020        70020 1     54021 0     10020 1     12101 1  C: 00024 1     50021 1     34736 1     54135 1
00,2030        10020 1     02050 0     16063 0     30135 0     00006 1     70156 1     54156 1     30135 0

00,2040        00006 1     70154 0     52155 1     30135 0     00006 1     70001 1     20156 1     16064 1
00,2050        30156 0     00006 1     70135 1     56155 0     00006 1     70135 1     56155 0     60001 0
00,2060        60000 1     54156 1     12064 0     26155 1     34755 1     54156 1     56154 1     00006 1
00,2070        70135 1     20135 1     00002 0     30135 0     00006 1     70155 1     54155 1     56001 0

00,2100        12060 1     30021 1     54135 1     00006 1     30156 0     20156 1     60154 1     60154 1
00,2110        54154 0     12113 1     54121 1     10135 1     12102 1     10020 1     07141 1     16064 1
00,2120        16064 1     34757 0     70020 1     54135 1     10020 1     12145 1  C: 00176 1     50135 0
00,2130        34736 1     54135 1     02073 1     52155 1     52160 1     52155 1     02073 1     52155 1

00,2140        52162 0     52155 1     02073 1     17423 1     54135 1     00006 1     30155 0     20155 1
00,2150        00006 1     12153 0     07022 0     00006 1     30160 0     20160 1     00006 1     12161 1
00,2160        07017 0     00006 1     30162 1     20162 0     00006 1     12167 1     07014 0     10135 1
00,2170        12144 0     16064 1     54135 1     06726 1     12176 1     12212 0     07262 0     30154 1

00,2200        12207 1     24135 0     00006 1     30156 0     20156 1     60154 1     26154 0     60000 1
00,2210        54000 0     12201 1     40135 1     16626 1     70116 0     10000 0     12224 0     34742 1
00,2220        70116 0     10000 0     07141 1     16064 1     54135 1     34744 1     00006 1     70116 0
00,2230        76250 1     50000 1     12233 0     12332 0     12342 1     12336 1     10163 1     12277 0

00,2240        12277 0     30135 0     63733 0     00006 1     62127 1     67752 0     54135 1     34755 1
00,2250        54001 1     56154 1     56155 0     02272 1     20155 1     56157 1     56160 0     02272 1
00,2260        20160 1     56161 1     56162 1     02272 1     20162 0     10135 1     54135 1     12242 0
00,2270     C: 04604 1     16064 1     60000 1     54156 1     34755 1     56001 0     00002 0     30135 0

00,2300        63733 0     00006 1     62322 0     67752 0     54135 1     34755 1     56154 1     56155 0
00,2310        54156 1     10135 1     54135 1     02300 0  C: 22650 1     34742 1     70116 0     10000 0
00,2320        07141 1     16064 1     50135 0     34736 1     54135 1     34742 1     70116 0     10000 0
00,2330        12031 0     12033 1     40135 1     62126 0     54135 1     12236 0     42126 1     60135 0

00,2340        40000 0     54135 1     10163 1     12346 0     12346 0     12145 1     40116 0     00006 1
00,2350        74746 1     54020 1     12103 0     44753 0     54136 1     54137 0     54140 0     10130 1
00,2360        12516 0     12363 1     12531 0     54156 1     07262 0     10154 0     12414 0     12371 1
00,2370        12413 1     56131 1     56130 0     56155 0     56154 1     10130 1     12422 0     12401 1
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OCTAL LISTING FOR PARAGRAPH # 021,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "1" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,2400        12416 1     40154 0     00006 1     62405 1     24136 0     34733 1     54154 0     02630 0
00,2410        34753 1     54121 1     06064 0     24136 0     40131 0     12402 1     00006 1     40131 0
00,2420        52131 0     24136 0     10154 0     12437 1     12426 1     12433 0     10155 1     12437 1
00,2430        16064 1     12433 0     16064 1     00006 1     40155 1     52155 1     24136 0     40154 0

00,2440        67752 0     60130 0     10000 0     12505 1  C: 60001 0     12446 1     34736 1     60000 1
00,2450        60155 0     54155 1     34755 1     64733 1     26154 0     34736 1     60000 1     60131 1
00,2460        54131 0     34755 1     64733 1     26130 1     40154 0     60130 0     10000 0     12505 1
00,2470     C: 10133 0     12405 0     54140 0     40155 1     60131 1     00006 1     62405 1     12505 1

00,2500        00006 1     24137 1     00006 1     30131 1     20131 0     30130 0     60000 1     54000 0
00,2510        12500 1     52155 1     50137 1     02565 0     54156 1     16064 1     10000 0     12422 0
00,2520        40131 0     00006 1     62422 1     34736 1     60000 1     26131 0     34755 1     54130 1
00,2530        12363 1     10000 0     12416 1     30131 1     00006 1     62416 0     44736 0     12524 1

00,2540        22021 1     00006 1     74736 0     56001 0     60021 1     56001 0     12571 1     20001 1
00,2550        20001 1     20001 1     20001 1     20001 1     20001 1     20001 1     20001 1     20001 1
00,2560        20001 1     20001 1     20001 1     20001 1     52155 1     10140 0  C: 06552 0     12642 1
00,2570        52155 1     00006 1     10130 1     52155 1     40154 0     00006 1     70131 0     60155 0

00,2600        54000 0     12606 1     00006 1     60130 0     24154 1     12610 0     00006 1     62620 1
00,2610        00006 1     60130 0     00006 1     12616 0     00006 1     62624 0     24154 1     12625 0
00,2620        00006 1     12630 1     00006 1     26154 0     60130 0     22007 0     00006 1     10130 1
00,2630        54155 1     10136 1     00002 0     00002 0     00002 0     00006 1     40155 1     52155 1

00,2640        34755 1     00002 0     40154 0     60130 0     00006 1     12647 1     12570 0     34733 1
00,2650        54154 0     40131 0     60155 0     12624 1     44753 0     54137 0     54127 1     03010 0
00,2660        52131 0     07547 0     52131 0     10130 1     12721 0     12667 0     12715 1     56131 1
00,2670        56130 0     56155 0     56154 1     00006 1     12676 0     12405 0     56160 0     56157 1

00,2700        00006 1     12703 0     12405 0     56162 1     56161 1     00006 1     12710 1     12405 0
00,2710        10130 1     12721 0     12405 0     12715 1     12405 0     00006 1     40131 0     52131 0
00,2720        24127 0     00006 1     30131 1     52134 0     12732 1     00006 1     24137 1     00006 1
00,2730        30131 1     20131 0     30130 0     60000 1     54000 0     12725 1     02750 1     52160 1

00,2740        52155 1     52160 1     02750 1     52162 0     52155 1     52162 0     02750 1     17423 1
00,2750        30127 0     54136 1     10154 0     12767 1     12756 0     12763 0     10155 1     12767 1
00,2760        00002 0     12763 0     00002 0     00006 1     40155 1     52155 1     24136 0     44753 0
00,2770        54140 0     40154 0     60133 0     10000 0     13004 1     12777 0     12405 0     54140 0
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OCTAL LISTING FOR PARAGRAPH # 022,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3000       40155 1     60134 1     00006 1     62405 1     52155 1     50137 1     12565 1  C: 32506 0
00,3010       56002 0     52155 1     07547 0     52155 1     52160 1     07547 0     52160 1     52162 0
00,3020       07547 0     52162 0     00000 1     03010 0     07535 0     34755 1     56121 0     54141 1
00,3030       03317 1     30141 0     56121 0     00006 1     13036 0     12405 0     00006 1     30155 0

00,3040       50120 1     52043 1     03343 0     10154 0     13051 1     54001 1     50120 1     52045 1
00,3050       12405 0     44317 1     60135 0     10000 0     40000 0     13133 1     13065 0     44761 1
00,3060       54135 1     30154 1     54001 1     34755 1     13112 1     10135 1     13074 0     42024 1
00,3070       54135 1     00006 1     30155 0     13112 1     40000 0     54135 1     40000 0     50000 1

00,3100       34736 1     54130 1     00006 1     70155 1     56130 0     00006 1     70154 0     56001 0
00,3110       60130 0     56001 0     50120 1     52045 1     44753 0     54140 0     52123 0     52155 1
00,3120       52131 0     03151 1     52125 0     52155 1     52160 1     03151 1     52127 1     52155 1
00,3130       52162 0     03151 1     17423 1     54135 1     34755 1     56123 1     56122 0     56125 1

00,3140       56124 0     56127 0     56126 1     40135 1     50000 1     34736 1     00006 1     70154 0
00,3150       13062 1     10154 0     13170 0     13155 1     13162 0     10155 1     13170 0     00002 0
00,3160       13162 0     00002 0     44755 0     54136 1     00006 1     40155 1     50135 0     12564 0
00,3170       54136 1     52155 1     50135 0     12564 0     03300 1     16064 1     10163 1     13226 0

00,3200       13226 0     03317 1     22163 0     00006 1     30155 0     50120 1     52043 1     03343 0
00,3210       10135 1     13213 0     16064 1     63733 0     00006 1     63221 0     22007 0     22116 1
00,3220       12303 1     50135 0     34735 1     54135 1     34755 1     12036 1     06726 1     16064 1
00,3230       16064 1     17673 0     44751 1     26166 1     00006 1     50000 1     30003 1     52160 1

00,3240       00006 1     50166 0     30001 0     52162 0     16524 0     03317 1     17335 1     00006 1
00,3250       30155 0     50166 0     52001 1     50163 0     36247 0     26166 1     10163 1     13272 1
00,3260       16064 1     00006 1     30160 0     50166 0     51775 0     00006 1     30162 1     50166 0
00,3270       51777 1     16064 1     30156 0     16557 1     50120 1     30052 0     54117 1     16655 0

00,3300       30155 0     00006 1     70000 0     54156 1     34755 1     56155 0     00006 1     70154 0
00,3310       20001 1     20156 1     56154 1     00006 1     70000 0     20155 1     00002 0     00006 1
00,3320       22137 1     03300 1     52160 1     52155 1     52131 0     30156 0     54132 0     03300 1
00,3330       52156 1     20132 0     60154 1     60130 0     54130 1     13337 1     54121 1     52162 0

00,3340       52155 1     03300 1     17210 1     34755 1     54135 1     10154 0     13405 1     13351 1
00,3350       13373 1     56156 0     56155 0     54154 0     34757 0     54135 1     10154 0     13405 1
00,3360       13362 1     13376 1     56155 0     54154 0     34757 0     26135 1     10154 0     13405 1
00,3370       00002 0     13376 1     13453 1     10000 0     13402 0     10155 1     34755 1     13453 1
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OCTAL LISTING FOR PARAGRAPH # 023,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

00,3400        13402 0     13453 1     52165 1     05716 1  C: 21302 0     62444 1     00006 1     63456 0
00,3410        52155 1     22021 1     00006 1     74736 0     52155 1     56021 1     26155 1     32314 0
00,3420        00006 1     70154 0     62566 0     54130 1     30154 1     22007 0     00006 1     10130 1
00,3430        00006 1     74736 0     26130 1     00006 1     74736 0     52155 1     00006 1     10130 1

00,3440        54131 0     34755 1     56001 0     00006 1     10130 1     54001 1     30131 1     20155 1
00,3450        00006 1     13455 1     34733 1     54154 0     54155 1     00002 0     64737 0     00006 1
00,3460        63502 0     52155 1     22021 1     00006 1     74736 0     52155 1     56021 1     26155 1
00,3470        33007 0     00006 1     70154 0     62270 0     13423 0     00006 1     30156 0     20156 1

00,3500        60154 1     26154 0     24135 0     00006 1     30156 0     20156 1     60154 1     26154 0
00,3510        60000 1     54022 0     10022 0     10022 0     13475 0     13417 1     13470 0     06726 1
00,3520        13523 1     13526 1     13526 1     00006 1     40155 1     52155 1     34737 0     26154 0
00,3530        52155 1     20001 1     54000 0     13536 0     00006 1     40001 1     52155 1     30154 1

00,3540        60000 1     54001 1     13553 0     50000 1     34735 1     60000 1     00006 1     60154 1
00,3550        54154 0     40155 1     54155 1     00006 1     30155 0     52134 0     03300 1     07225 0
00,3560     C: 00003 1  C: 14441 0  C: 37325 1  C: 53250 0  C: 60764 1  C: 12146 1  C: 21276 1  C: 75466 1
00,3570     C: 71471 0  C: 00236 0  C: 32757 0     32470 0     07111 1     00006 1     30156 0     20156 1

00,3600        60154 1     26154 0     00006 1     30156 0     20156 1     60154 1     26154 0     16064 1
00,3610        33631 0     13613 1     33713 1     54136 1     06726 1     13625 1     13731 0     00006 1
00,3620        40155 1     52155 1     33734 1     56136 0     54137 0     44736 0     60154 1     10000 0
00,3630        13721 1     13707 0     13642 0     10155 1     34755 1     13637 1     13642 0     54155 1

00,3640        54154 0     00136 0     00006 1     40155 1     64736 1     52155 1     52134 0     03343 0
00,3650        10135 1     13714 1     52155 1     52134 0     52155 1     07225 0  C: 00006 1  C: 13240 0
00,3660     C: 23630 0  C: 74721 0  C: 47775 1  C: 02440 0  C: 20237 0  C: 75067 1  C: 70742 1  C: 03436 0
00,3670     C: 26756 1  C: 74037 0  C: 57640 1  C: 03046 0  C: 07143 0  C: 76654 1  C: 42244 0     32470 0

00,3700        07111 1     00136 0     00006 1     40155 1     64736 1     52155 1     00137 1     00006 1
00,3710        40155 1     64737 0     52155 1     16064 1     50000 1     34736 1     54135 1     02073 1
00,3720        13652 1     00006 1     13637 1     00006 1     30165 0     05722 0  C: 01301 1     34755 1
00,3730        13637 1     34737 0     13640 1  C: 77763 0     13702 0     35000 1     00004 0     54002 1

00,3740        34752 0     54070 1     50000 1     31323 1     00006 1     13753 1     10070 1     13741 1
00,3750        52134 0     05706 0  C: 31104 0     33773 1     54061 1     30004 0     60070 0     54001 1
00,3760        33774 0     15211 1     04645 1     50070 0     55323 0     05133 0     34755 1     50006 1
00,3770        57323 1     05137 1     05261 1  C: 03760 0  C: 03766 0  C: 03775 1  C: 03776 1  CKSM 72464 1
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OCTAL LISTING FOR PARAGRAPH # 024,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2000      C: 76466 1   C: 76731 0      00010 0      00020 0      00010 0      00026 0      00010 0      00056 1
01,2010         00062 0      00072 1      00145 1      00163 0      00010 0      00174 0   C: 21000 1   C: 05155 0
01,2020      C: 04060 0   C: 00144 0   C: 05261 1   C: 04060 0   C: 76300 0   C: 75427 1   C: 03710 1   C: 32000 0
01,2030      C: 03630 1   C: 66067 0   C: 02627 0   C: 75175 0   C: 26063 0   C: 05000 1   C: 02611 0   C: 26063 0

01,2040      C: 02734 0   C: 75533 0   C: 27710 1   C: 14000 1   C: 02414 1   C: 50067 0   C: 10000 0   C: 02223 0
01,2050      C: 54067 1   C: 26000 0   C: 02654 1   C: 50067 0   C: 77777 0   C: 75436 1   C: 03710 1   C: 00031 0
01,2060      C: 75771 1   C: 35710 1   C: 76355 0   C: 74110 1   C: 05710 1   C: 20000 0   C: 02540 1   C: 56067 0
01,2070      C: 04704 0   C: 75423 0   C: 03710 1   C: 77777 0   C: 75433 1   C: 03710 1   C: 25000 0   C: 03533 1

01,2100      C: 64067 1   C: 00062 0   C: 75211 1   C: 03710 1   C: 00764 1   C: 75370 1   C: 03710 1   C: 76260 1
01,2110      C: 74231 1   C: 03710 1   C: 12000 1   C: 03227 0   C: 74067 0   C: 00764 1   C: 75477 1   C: 03710 1
01,2120      C: 77777 0   C: 75423 0   C: 03710 1   C: 13000 0   C: 03012 1   C: 30065 1   C: 77777 0   C: 75345 1
01,2130      C: 03710 1   C: 01477 1   C: 75535 0   C: 74067 0   C: 52777 1   C: 02070 1   C: 42067 0   C: 52777 1

01,2140      C: 02073 1   C: 42067 0   C: 46777 1   C: 02024 0   C: 10067 1   C: 46777 1   C: 05655 1   C: 04067 1
01,2150      C: 52777 1   C: 02575 1   C: 74067 0   C: 22000 1   C: 02463 1   C: 46067 1   C: 00310 0   C: 74166 0
01,2160      C: 01710 0   C: 00310 0   C: 74166 0   C: 01710 0   C: 20000 0   C: 02206 1   C: 66067 0   C: 00310 0
01,2170      C: 74166 0   C: 01710 0   C: 77777 0   C: 74326 0   C: 01710 0   C: 77777 0   C: 74361 0   C: 01710 0

01,2200      C: 00144 0   C: 75054 1   C: 03710 1   C: 30000 1   C: 03557 0   C: 10063 0   C: 17000 1   C: 03354 0
01,2210      C: 74067 0      35015 0      54003 0      34745 0      70111 1      10000 0      32340 1      62341 0
01,2220         55444 0      32343 1      55476 1      34737 0      70111 1      00006 1      12235 0      31444 1
01,2230         00006 1      72342 1      55444 0      32344 0      55476 1      00003 1      32336 0      04616 1

01,2240      C: 20353 0      12247 0      12253 0      12236 0      34751 0      05464 1      15155 1      00004 0
01,2250         04674 0   C: 40115 0      15472 1      40106 1      74737 1      10000 0      32000 0      62001 1
01,2260         61326 1      00006 1      62236 1      30111 0      74737 1      00006 1      12274 0      44741 0
01,2270         61327 0      00006 1      62236 1      31327 0      61326 1      22007 0      53244 0      00004 0

01,2300         04674 0   C: 40115 0      00003 1      40106 1      74737 1      00006 1      15472 1      32337 1
01,2310         04616 1   C: 20353 0      05472 0      12320 0      12307 0      34751 0      05464 1      15155 1
01,2320         34753 1      05203 0   C: 03217 0   C: 56066 1      15155 1      32337 1      04616 1   C: 20361 1
01,2330         05472 0      05472 0      05472 0      36007 0      05464 1      15155 1   C: 01457 0   C: 01460 1

01,2340      C: 25101 0   C: 05220 1   C: 03146 1   C: 77445 1   C: 77622 1      02442 1      30117 0      50130 0
01,2350         54046 1      16064 1      02442 1      40117 1      02347 0      02430 1      50117 0      30000 1
01,2360         12347 1      02430 1      50117 0      40000 0      12347 1      02430 1      50130 0      30046 0
01,2370         50117 0      54000 0      16064 1      02430 1      50117 0      30000 1      50130 0      56046 0
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OCTAL LISTING FOR PARAGRAPH # 025,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,2400        12370 0     02430 1     50117 0     30000 1     50130 0     26046 1     16064 1     02442 1
01,2410        30117 0     12404 1     02430 1     50117 0     40000 0     12404 1     02442 1     50130 0
01,2420        40050 0     50130 0     60046 0     00006 1     66064 0     50130 0     56046 0     16651 1
01,2430        40117 1     64772 1     10000 0     30120 1     12441 0     35007 0     56117 0     54003 0

01,2440        74357 0     26117 1     30120 1     54130 1     10020 1     24130 0     00002 0     00002 0
01,2450        10020 1     30117 0     04621 0     10154 0     16064 1     16651 1     16064 1     16651 1
01,2460        10121 1     12463 0     16064 1     54121 1     10020 1     12451 1  C: 00360 1     16651 1
01,2470        10020 1     06726 1     16064 1     16651 1     16064 1     10020 1     12504 0  C: 12000 1

01,2500        06726 1     16064 1     16064 1     16651 1     06726 1     16651 1     16651 1     16064 1
01,2510        10020 1     16643 1     05675 0     02430 1     50120 1     30052 0     12370 0     34762 0
01,2520        70117 1     50000 1     34735 1     54131 0     34745 0     00006 1     70117 1     54130 1
01,2530        00004 0     50000 1     30074 1     54002 1     34741 1     00006 1     70117 1     72577 1

01,2540        50000 1     12542 1     30131 1     00006 1     04002 1     12554 0     30131 1     00006 1
01,2550        06002 0     12554 0     40131 0     70002 1     50130 0     54074 0     00003 1     34737 0
01,2560        00006 1     70117 1     72577 1     50000 1     12565 1     40002 1     70131 0     10000 0
01,2570        12600 1     16720 0     12600 1     05675 0     05675 0     30002 0     12566 1  C: 00014 1

01,2600        24164 1     16064 1     54061 1     10400 1     12621 1     10454 0     12621 1     10530 0
01,2610        12621 1     10604 1     12621 1     10660 0     12621 1     22061 0     30002 0     05706 0
01,2620     C: 31201 0     64752 0     22007 0     50000 1     21777 0     26063 0     34755 1     54064 1
01,2630        32635 0     54062 1     50064 0     10167 0     12675 0  C: 00007 0     12675 0     30063 1

01,2640        50064 0     54167 0     75004 1     50064 0     54166 1     10064 1     12662 0     54121 1
01,2650        30166 0     54120 0     10067 1     12662 0     05675 0     05675 0     54067 1     52066 0
01,2660        52165 1     15160 1     52066 0     50064 0     52165 1     50067 0     40167 0     60063 1
01,2670        00006 1     65160 0     30064 0     54067 1     15160 1     33034 0     26064 1     10062 1

01,2700        12631 0     22061 0     30002 0     05706 0  C: 31202 0     22164 1     30165 0     00004 0
01,2710        00006 1     04007 1     56001 0     50067 0     52165 1     52165 1     30165 0     00006 1
01,2720        01007 1     52155 1     50067 0     52155 1     52155 1     52157 0     50067 0     52157 0
01,2730        52157 0     52161 0     50067 0     52161 0     52161 0     52163 1     50067 0     52163 1

01,2740        52163 1     34755 1     56121 0     00006 1     12747 0     40166 1     54166 1     52167 0
01,2750        50067 0     52167 0     52167 0     35004 0     70167 0     54120 0     10166 1     34755 1
01,2760        12765 0     40166 1     54166 1     34753 1     56121 0     54067 1     00003 1     52165 1
01,2770        00006 1     62773 0     52006 0     40000 0     64753 1     54164 0     16053 0     00004 0
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OCTAL LISTING FOR PARAGRAPH # 026,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3000        40167 0     54167 0     36077 1     70006 0     00006 1     04007 1     54165 1     44755 0
01,3010        54131 0     13121 1     00004 0     10067 1     13017 0     00003 1     13217 1     34752 0
01,3020        00006 1     05011 1     52165 1     12713 1     54061 1     34755 1     54064 1     32635 0
01,3030        54062 1     50064 0     10167 0     13036 0  C: 00014 1     13045 1     33034 0     26064 1

01,3040        10062 1     13030 0     44753 0     54064 1     15160 1     40065 0     50064 0     60164 1
01,3050        00006 1     13053 0     13036 0     50064 0     40167 0     54063 0     50064 0     54167 0
01,3060        44350 1     70065 0     64741 1     56065 1     74350 1     50064 0     60165 0     54066 0
01,3070        10064 1     12662 0     12652 0     54164 0     34755 1     54130 1     35004 0     70167 0

01,3100        60063 1     54167 0     40000 0     13010 1     00004 0     44755 0     54131 0     56167 1
01,3110        75004 1     54001 1     45164 0     60001 0     00006 1     63121 0     10001 1     50000 1
01,3120        54000 0     10203 1     03172 0     05675 0     13125 0     10217 1     03172 0     05675 0
01,3130        13131 0     10233 1     03172 0  C: 67610 1     13135 1     10247 1     03172 0     05675 0

01,3140        13141 1     10263 1     03172 0     05675 0     13145 0     10277 1     03172 0     05675 0
01,3150        13151 0     10313 1     03172 0     05675 0     13155 1     10131 0     05675 0     05675 0
01,3160        13162 0     13207 0     10130 1     13165 1     12765 0     50000 1     27777 0     63133 0
01,3170        54067 1     12705 0     54132 0     60131 1     10000 0     40132 0     13202 0     13200 1

01,3200        50002 0     00002 0     54131 0     00006 1     22130 0     50130 0     00002 0     44755 0
01,3210        54067 1     00003 1     44752 1     00006 1     03011 1     10067 1     13012 0     34752 0
01,3220        13226 0     31361 1     54001 1     33225 1     15166 1  C: 66102 1     00006 1     05011 1
01,3230        52165 1     15165 1     54062 1     30002 0     00006 1     63524 1     40026 1     64744 1

01,3240        10000 0     66112 0     40000 0     63371 1     60002 0     10000 0     61400 1     13311 0
01,3250        13251 0     40002 1     64736 1     64736 1     56026 0     64735 1     60002 0     00006 1
01,3260        22007 0     57400 1     57401 0     57402 0     57403 1     57404 0     57405 1     57406 1
01,3270        57407 0     30063 1     50002 0     13274 1     53411 0     53413 1     53415 1     53417 0

01,3300        53421 0     53423 1     53425 1     53427 0     53431 1     65236 0     00006 1     15215 0
01,3310        13364 1     10000 0     61401 0     13317 0     64753 1     03375 0  C: 00001 0     10000 0
01,3320        61402 0     13325 1     64753 1     03375 0  C: 00002 0     10000 0     61403 1     13333 0
01,3330        64753 1     03375 0  C: 00003 1     10000 0     61404 0     13341 0     64753 1     03375 0

01,3340     C: 00004 0     10000 0     61405 1     13347 0     64753 1     03375 0  C: 00005 1     10000 0
01,3350        61406 1     13355 0     64753 1     03375 0  C: 00006 1     10000 0     61407 0     13363 0
01,3360        64753 1     03375 0  C: 00007 0     10000 0     03372 1     13366 0     64753 1     03375 0
01,3370     C: 00010 0  C: 40201 0     52062 1     05706 0  C: 31203 1     54064 1     50002 0     30000 1
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OCTAL LISTING FOR PARAGRAPH # 027,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

01,3400        54002 1     34753 1     60064 0     50002 0     27377 1     40064 1     50002 0     13261 0
01,3410        00006 1     04007 1     54016 1     00006 1     22012 1     34734 0     57407 0     57406 1
01,3420        57405 1     57404 0     57403 1     57402 0     57401 0     57400 1     64733 1     26026 1
01,3430        54332 1     44755 0     54332 1     00006 1     45237 0     53431 1     53427 0     53425 1

01,3440        53423 1     53421 0     53417 0     53415 1     53413 1     53411 0     56001 0     00006 1
01,3450        01007 1     56001 0     52006 0     23435 1     34752 0     26002 1     55434 1     31152 0
01,3460        10000 0     13467 0     13464 0     13522 0     31153 1     00006 1     63522 1     00006 1
01,3470        43501 1     21153 0     11153 0     13512 0     13475 0     13476 0     11152 1     13512 0

01,3500     C: 00000 1  C: 20000 0     34736 1     27153 0     05203 0  C: 03517 1  C: 02063 0     33521 1
01,3510        53435 0     52006 0     34736 1     05203 0  C: 03467 1  C: 02063 0     13507 1     53147 0
01,3520        52006 0  C: 05261 1     53435 0     13525 1     52062 1     05716 1  C: 21204 1     30161 1
01,3530        60000 1     54155 1     33771 0     54157 0     33566 1     54707 0     30154 1     75007 1

01,3540        10000 0     13552 1     10154 0     10000 0     13652 1     35024 1     05105 0  C: 03040 0
01,3550     C: 20103 1     03566 1     75007 1     10000 0     13623 1     00006 1     50155 0     31437 0
01,3560        52706 1     30154 1     74757 1     67751 0     10000 0     13735 1     04631 1     13571 0
01,3570        13636 0     33775 1     54704 0     50155 0     31053 0     10000 0     24000 1     13602 1

01,3600        15436 1     13621 0     40000 0     54001 1     50155 0     41052 0     00006 1     60025 0
01,3610        10000 0     40000 0     67734 0     64753 1     60001 0     10000 0     34755 1     13621 0
01,3620        13621 0     64753 1     00704 1     33566 1     54157 0     33772 0     54707 0     30154 1
01,3630        76077 0     54154 0     00006 1     50155 0     31437 0     52706 1     50155 0     31053 0

01,3640        54704 0     00006 1     63646 0     33774 0     56704 1     00704 1     33776 1     56704 1
01,3650        40000 0     00704 1     54020 1     10020 1     13655 0     13753 1     33566 1     54707 0
01,3660        30154 1     54021 0     60021 1     50155 0     62003 0     54156 1     00006 1     50156 0
01,3670        32002 1     22706 0     10000 0     24000 1     13747 1     24000 1     54705 1     33775 1

01,3700        54704 0     30706 0     74742 0     10000 0     13742 1     50156 0     32000 0     15445 0
01,3710        53153 0     00006 1     40025 1     21153 0     00006 1     31151 0     21153 0     11152 1
01,3720        13730 1     13723 0     13616 1     11153 0     13730 1     13726 0     13616 1     13621 0
01,3730        33773 1     54704 0     00006 1     31153 1     00704 1     33775 1     54704 0     50155 0

01,3740        41053 1     15445 0     40706 1     54706 1     50156 0     32000 0     13575 1     56705 0
01,3750        50156 0     32100 0     13640 1     30157 1     54707 0     50155 0     32002 1     60154 1
01,3760        60154 1     60154 1     54156 1     13666 0     36250 0     26156 1     33566 1     54707 0
01,3770        13666 0  C: 03764 1  C: 03542 1  C: 05277 0  C: 05105 0  C: 05203 0  C: 05072 1  CKSM 60423 1
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OCTAL LISTING FOR PARAGRAPH # 040,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2000    C: 00302 0   C: 17755 0   C: 00065 1   C: 01265 1   C: 22437 1   C: 16067 1   C: 15625 1   C: 21042 1
04,2010    C: 30276 1   C: 04773 0   C: 25004 1   C: 06702 1   C: 16471 1   C: 01352 1   C: 21412 0   C: 20500 0
04,2020    C: 25477 1   C: 03367 0   C: 27533 1   C: 07571 0      05516 0   C: 00311 1      05516 0   C: 00314 1
04,2030       05476 1      32037 1      04616 1   C: 20477 1      12031 0      12031 0      12031 0   C: 11343 0

04,2040       54774 1      34355 0      54366 0      31277 1      74746 1      10000 0      12065 1      40774 1
04,2050       62403 1      00006 1      12376 0      64753 1      00006 1      12375 0      30774 0      00006 1
04,2060       12107 1      40076 1      74753 0      10000 0      12072 1      05567 0   C: 01520 1      04457 0
04,2070       04635 0   C: 21051 0      32470 0      54155 1      50155 0      32437 0      76077 0      40000 0

04,2100       60774 0      10000 0      10155 1      12073 0      12326 0      30155 0      54773 0      40103 1
04,2110       74746 1      10000 0      12132 1      05516 0   C: 00163 0      15155 1      40074 0      74745 1
04,2120       10000 0      12123 1      12130 0      40074 0      74743 1      10000 0      32372 0      64747 1
04,2130       62373 1      05357 0      34755 1      00006 1      01007 1      32371 0      54374 0      05353 1

04,2140    C: 00014 1      06042 1   I: 77624 1   C: 27410 1   I: 77776 1      05516 0   C: 00124 0      05516 0
04,2150    C: 00055 1      34735 1      54107 0      05516 0   C: 00063 1      05516 0   C: 00056 1      05516 0
04,2160    C: 00141 0      05516 0   C: 00217 0      05516 0   C: 00311 1      10774 1      12314 1      04457 0
04,2170       35017 1      55055 1      06011 1      44753 0      70076 1      54076 1      34756 1      54001 1

04,2200       40000 0      52754 0      42374 1      70074 0      54074 0      34755 1      54333 0      55321 1
04,2210       04674 0   C: 75561 1      04674 0   C: 40205 1      44775 1      55071 1      70075 1      54075 1
04,2220       04674 0   C: 12650 1      10774 1      12232 1      04674 0   C: 12645 0      30774 0      55010 0
04,2230       04635 0   C: 12766 0      41010 0      62332 1      00006 1      12254 1      40774 1      62332 1

04,2240       00006 1      12254 1      67751 0      00006 1      12266 0      64756 1      00006 1      12266 0
04,2250       32330 0      70074 0      10000 0      12263 0      42374 1      70074 0      54074 0      06011 1
04,2260       00006 1      34755 1      52754 0      32370 1      54374 0      12230 0      41010 0      66007 0
04,2270       00006 1      12260 0      64756 1      00006 1      12260 0      32330 0      70074 0      60774 0

04,2300       40000 0      62333 0      00006 1      12310 0      62331 1      00006 1      12310 0      12260 0
04,2310       40075 1      74775 1      26075 1      12224 0      32330 0      70074 0      10000 0      12322 1
04,2320       05516 0   C: 00007 0      50773 1      32471 1      00004 0      12206 0      04364 1      12067 0
04,2330    C: 00500 1   C: 00305 1   C: 00026 0   C: 00124 0      00004 0      50773 1      32437 0      55057 0

04,2340       54020 1      30020 0      77730 0      55061 0      54063 0      31057 1      00006 1      74744 0
04,2350       74757 1      54001 1      50773 1      32406 1      55060 1      74350 1      26001 1      31060 0
04,2360       75012 0      64741 1      05116 1      31057 1      76077 0      05314 1      04457 0      05155 0
04,2370    C: 10337 1   C: 10144 1   C: 37667 1   C: 40072 0   C: 00700 0      36250 0      54002 1      00006 1
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OCTAL LISTING FOR PARAGRAPH # 041,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,2400        32405 1      60002 0      52006 0   C: 00106 0   C: 02067 1   C: 42067 0   C: 26207 0   C: 72641 1
04,2410     C: 72457 1   C: 72225 1   C: 72036 1   C: 71271 0   C: 65100 1   C: 33277 0   C: 32050 0   C: 31421 1
04,2420     C: 75442 1   C: 75414 1   C: 75276 0   C: 75153 1   C: 72635 1   C: 72455 0   C: 72223 1   C: 72034 0
04,2430     C: 72000 1   C: 50400 0   C: 50000 1   C: 51506 0   C: 50000 1   C: 60061 0   C: 77652 0   C: 27714 0

04,2440     C: 27713 1   C: 27712 0   C: 27711 0   C: 27710 1   C: 27704 1   C: 27677 1   C: 27271 0   C: 27264 1
04,2450     C: 27263 0   C: 27657 0   C: 27652 0   C: 27651 0   C: 27650 1   C: 27643 0   C: 27642 1   C: 27641 1
04,2460     C: 27640 0   C: 27636 1   C: 27631 0   C: 27626 0   C: 27625 0   C: 27624 1   C: 27614 1   C: 27006 1
04,2470     C: 00030 1   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00004 0   C: 00004 0

04,2500     C: 00005 1   C: 00000 1   C: 01000 1   C: 00003 1   C: 00003 1   C: 00003 1   C: 00003 1   C: 00002 0
04,2510     C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00005 1   C: 00002 0   C: 00002 0
04,2520     C: 00004 0   C: 00000 1   I: 44001 0   C: 00001 0   C: 02736 1   I: 47135 0   C: 00012 1   C: 21577 1
04,2530     I: 71406     I: 73525 1   I: 77626 0   C: 60012 1   C: 00011 1   I: 77634 0   C: 21577 1   I: 71406 0

04,2540     C: 00025 0   I: 73525 1   I: 57406 1   C: 14027 1   C: 24007 0   C: 14023 0   I: 72405 0   C: 00001 0
04,2550     C: 17767 1   I: 72405 0   I: 77626 0   C: 50006 1   C: 00023 0   I: 53435 0   C: 03765 0   C: 00031 0
04,2560     I: 77650 1   C: 02736 1      52134 0      53167 1      25166 1      30006 1      75012 0      27167 1
04,2570        51166 1      27777 0      04622 0      02577 0      02576 1      25166 1      25166 1      53167 1

04,2600        52006 0      22164 1      50001 0      30001 0      24001 0      24001 0      53167 1      06042 1
04,2610     I: 77624 1   C: 01166 1   I: 77776 1      23167 0      16044 0      05137 1      44741 0      50064 0
04,2620        26164 0      00072 1      56002 0      54154 0      00004 0      34355 0      05072 1   C: 03577 1
04,2630     C: 60101 1      00003 1      00154 1      54001 1      04220 0      04224 1      04374 0      30001 0

04,2640        55042 1      05133 0      00006 1      31442 1      53051 0      32755 1      04616 1   C: 20334 1
04,2650        15472 1      12653 1      12645 0      06042 1   I: 53145 1   C: 01051 1   C: 10752 0   C: 34041 0
04,2660     C: 27042 1   I: 63375 0   C: 00007 0   C: 00001 0   C: 02207 0   I: 63256 0   I: 53435 0   I: 77626 0
04,2670     C: 61562 1   C: 00015 0   C: 34041 0   C: 27056 1   I: 63375 0   C: 00007 0   C: 00001 0   I: 41406 0

04,2700     I: 63245 1   C: 02207 0   I: 72441 0   C: 02215 0   C: 26201 0   C: 00001 0   I: 72441 0   C: 02215 0
04,2710     C: 26203 1   C: 00007 0   I: 41456 0   I: 47235 0   C: 00001 0   C: 00023 0   I: 53552 0   I: 77656 1
04,2720     C: 24001 0   C: 00023 0   I: 74241 0   C: 00015 0   I: 77752 1   I: 53445 1   I: 77656 1   I: 50206 0
04,2730     C: 00001 0   I: 65552 0   C: 26205 1   I: 50235 0   C: 00001 0   I: 71244 0   C: 10743 0   C: 24020 0

04,2740     I: 77625 0   C: 02205 1   C: 02205 1   I: 77776 1      32756 1      04616 1   C: 20334 1      15472 1
04,2750        15472 1      12642 1   I: 52034 1   C: 21574 1   C: 10657 1   C: 01420 0   C: 01532 1   I: 77220 1
04,2760     C: 02746 0   C: 01555 0   I: 47235 0   C: 01563 0   C: 03607 0   I: 77656 1   C: 03623 0   I: 53435 0
04,2770     C: 03607 0   C: 37615 1   C: 02746 0   C: 00000 1   C: 04000 0   C: 00000 1   C: 00200 0   C: 00000 1
```

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OCTAL LISTING FOR PARAGRAPH # 042,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3000     C: 00400 0   C: 00000 1   C: 10000 0   C: 00000 1   C: 02000 0   C: 00000 1   C: 01000 0   C: 00000 1
04,3010     C: 00020 0   C: 00000 1   C: 00100 0   C: 00000 1   C: 34631 1   C: 23146 0   C: 77467 1   C: 77777 0
04,3020     C: 03110 1   C: 17665 1   C: 00000 1   C: 00001 0   C: 37767 0   C: 37737 0   C: 40010 1   C: 40040 1
04,3030     I: 43020 1   C: 02753 1   C: 03665 1   I: 77614 1   C: 04273 0   I: 45131 0   C: 02673 1   C: 27777 0

04,3040     C: 11074 1   C: 14045 0   I: 56261 1   C: 20606 0   C: 00045 0   C: 32766 1   C: 10005 0   C: 14017 1
04,3050     C: 02720 0   I: 60316 0   C: 00047 1   I: 41275 1   C: 00017 1   C: 00041 1   I: 77657 0   C: 21576 0
04,3060     I: 44206 0   C: 11007 0   C: 16742 1   I: 60205 0   C: 00045 0   C: 00047 1   I: 53605 1   C: 00045 0
04,3070     C: 20575 1   C: 02740 0   I: 77650 1   C: 02753 1   I: 77656 1   C: 16712 1   C: 00045 0   C: 26720 0

04,3100     I: 77656 1   C: 02722 1   I: 72441 0   C: 02712 1   I: 77725 1   C: 00045 0   C: 24041 1   C: 02722 1
04,3110     I: 76435 1   C: 02712 1   I: 75214 1   C: 03705 0   C: 11126 1   C: 02673 1   I: 40056 0   C: 11124 0
04,3120     C: 16674 0   C: 00045 0   I: 43565 0   C: 02673 1   I: 52162 0   C: 11120 1   I: 75246 0   C: 02673 1
04,3130     I: 77616 0      00003 1      00006 1      23166 1      06042 1   I: 53135 0   C: 01502 1   C: 11176 1

04,3140     I: 77775 1   C: 01503 0   C: 25535 0   C: 01511 0   I: 77624 1   C: 27706 0   I: 51535 0   C: 01502 1
04,3150     I: 53025 0   C: 11207 1   C: 11157 1   I: 43174 1   C: 00000 1   C: 00223 1   C: 11162 1   I: 43174 1
04,3160     C: 00002 0   C: 00063 1   I: 50135 0   C: 01502 1   C: 11172 0   I: 77624 1   C: 26660 0   I: 52014 0
04,3170     C: 01671 0   C: 11174 0   I: 77624 1   C: 26733 1   I: 77614 1   C: 02676 1   I: 45131 0   C: 01502 1

04,3200     C: 00000 1   C: 27417 0   I: 77776 1      05353 1   C: 04026 1      01166 1   C: 00002 0   C: 00000 1
04,3210     I: 77420 1   C: 02711 1      05353 1   C: 04022 0      06042 1   I: 77650 1   C: 02711 1   C: 30000 1
04,3220     C: 00000 1   C: 22525 0   C: 12525 0   C: 22000 1   C: 00000 1   C: 01200 1   C: 00000 1   C: 25252 0
04,3230     C: 25253 1   C: 00027 1   C: 00063 1      34737 0      70077 0      10000 0      03247 0      31277 1

04,3240        74743 1      00006 1      13244 1      44750 0      63252 1      05734 1      06001 0      05504 0
04,3250     C: 00007 0      14631 0   C: 00220 1      54016 1      56002 0      54012 0      04400 1      34346 1
04,3260        00006 1      02015 1      54073 1      40101 0      74735 0      26101 0      34355 0      05072 1
04,3270     C: 02077 0   C: 60101 1      30073 0      50064 0      54154 0      05270 1      54016 1      56002 0

04,3300        54012 0      04400 1      34755 1      56045 0      54073 1      34751 0      00006 1      05011 1
04,3310        34346 1      70073 1      56073 0      00006 1      74742 0      54332 1      74346 0      63353 1
04,3320        03350 1      34742 1      00006 1      70332 1      74346 0      40000 0      03350 1      43356 0
04,3330        60073 0      00006 1      13340 1      34750 1      70103 1      10000 0      05270 1      03266 0

04,3340        44750 0      70103 1      54103 1      03266 0      40103 1      74750 0      26103 1      05270 1
04,3350        60073 0      10000 0      03344 1   C: 77740 1      03344 1      00002 0   C: 00022 1      05353 1
04,3360     C: 07026 1   C: 30000 1   C: 03670 0   C: 10102 0      34753 1      54333 0      05311 1   C: 00033 1
04,3370        51171 1      13372 0      13375 1      13400 1      13400 1      34752 0      55167 1      13423 0
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OCTAL LISTING FOR PARAGRAPH # 043,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

04,3400      33473 1     54156 1     33474 0     04616 1  C: 20334 1     13670 1     13402 0     03464 1
04,3410      44752 1     61173 0     00006 1     63402 1     41173 1     64362 1     00006 1     63402 1
04,3420      31173 0     55167 1     25172 1     33640 0     61172 1     54156 1     33474 0     04616 1
04,3430   C: 20334 1     13670 1     13426 0     03464 1     41172 0     61167 0     00006 1     63441 0

04,3440      13422 1     33472 0     54156 1     33475 1     04616 1  C: 20334 1     13670 1     13476 0
04,3450      03464 1     31166 1     00006 1     63441 0     41166 0     61167 0     64753 1     00006 1
04,3460      63441 0     33640 0     61166 1     13425 0     40154 0     74746 1     10000 0     00002 0
04,3470      50002 0     77771 0  C: 01166 1  C: 01173 0  C: 05201 1  C: 05202 1     00004 0     30103 0

04,3500      56001 0     34751 0     00006 1     06001 0     54103 1     05353 1  C: 04026 1     00004 0
04,3510      44752 1     61171 1     00006 1     63522 1     00006 1     31174 1     53204 1     03545 0
04,3520      04364 1     03670 0     34355 0     05105 0  C: 03527 1  C: 10103 1     05155 0     06042 1
04,3530   I: 77624 1  C: 27410 1  I: 77776 1     05353 1  C: 04026 1     05504 0  C: 00236 0     00004 0

04,3540      51171 1     13542 0     13701 0     13610 1     13642 0     00006 1     23166 1     34755 1
04,3550      22007 0     52025 1     53216 1     34756 1     54001 1     40000 0     52764 0     00004 0
04,3560      34755 1     22007 0     54156 1     53204 1     52155 1     00006 1     31216 0     20155 1
04,3570      00006 1     13606 0     34755 1     53216 1     20025 1     05353 1  C: 04026 1     01166 1

04,3600      07262 0     52155 1     20025 1     05353 1  C: 04026 1     00004 0     51166 1     00001 0
04,3610      31174 1     54103 0     74357 0     55166 0     67750 1     61167 0     00006 1     13625 1
04,3620      74743 1     10000 0     13736 1     37750 1     61167 0     54154 0     50000 1     31175 0
04,3630      54001 1     30154 1     61166 1     50000 1     23400 1     10154 0     13625 1     13667 1

04,3640   C: 01172 1     13667 1     34753 1     71167 1     10000 0     13647 0     13736 1     44752 1
04,3650      61167 0     54154 0     50000 1     31174 1     22000 1     10154 0     54154 0     50000 1
04,3660      31174 1     54003 0     74357 0     50000 1     23400 1     10154 0     13651 1     03131 1
04,3670      31170 0     05314 1     34755 1     54333 0     03743 1     00006 1     34755 1     52764 0

04,3700      05472 0     00006 1     41174 0     53204 1     03545 0     03736 0     00006 1     41174 0
04,3710      53206 0     00006 1     41174 0     53210 1     05353 1  C: 04026 1     34755 1     22007 0
04,3720      53206 0     21571 1     34755 1     22007 0     53210 1     21643 0     34755 1     22007 0
04,3730      53174 0     21710 1     27706 0     05353 1  C: 04026 1     03667 0     04364 1     13667 1

04,3740      04364 1     03743 1     05472 0     44751 1     00006 1     03011 1     00002 0  C: 03747 0
04,3750   C: 03750 0  CKSM 04127 1      @           @           @           @           @           @
04,3760         @           @           @           @           @           @           @           @
04,3770         @           @           @           @           @           @           @           @
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OCTAL LISTING FOR PARAGRAPH # 044,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2000      C: 02357 1   C: 20030 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
05,2010      C: 00000 1   C: 16533 0   C: 30007 0   C: 77333 1   C: 56654 0   C: 00000 1   C: 00000 1   C: 06273 1
05,2020      C: 03275 1   C: 01242 1   C: 24467 1   C: 00020 0   C: 17260 0   C: 00002 0   C: 00000 1   C: 22572 1
05,2030      C: 27214 0   C: 01315 1   C: 26177 1   C: 77731 1   C: 55217 0   C: 32055 0   C: 22576 0   C: 10624 0

05,2040      C: 10605 0   C: 37436 1   C: 01635 0   C: 01065 0   C: 31323 1   C: 20770 0   C: 13725 0   C: 02245 0
05,2050      C: 06475 1   C: 00162 1   C: 33431 1   C: 22566 1   C: 24130 0   C: 02000 0   C: 00000 1   C: 00256 0
05,2060      C: 17752 1   C: 77512 1   C: 67453 1   C: 00131 1   C: 26730 1   C: 77340 0   C: 32127 1   C: 24340 0
05,2070      C: 03451 1   C: 13443 0   C: 02256 1   C: 01341 0   C: 25733 1   C: 03633 1   C: 12266 0   C: 13700 1

05,2100      C: 01335 0   C: 03630 1   C: 32136 1   C: 00024 1   C: 32145 0   C: 24340 0   C: 32154 0   C: 07115 0
05,2110      C: 00007 0   C: 01776 0   C: 12274 0   C: 03635 1   C: 12365 1   C: 01330 0   C: 05333 1   C: 03577 1
05,2120      C: 01326 1   C: 01277 1   C: 03441 0   C: 32157 0   C: 32170 0   C: 00007 0   C: 74261 1   C: 76056 0
05,2130      C: 01723 0   C: 01725 0   C: 01727 1   C: 01731 0   C: 01570 1   C: 76060 0   C: 04320 1   C: 01432 0

05,2140      C: 07021 0   C: 07234 0   C: 04032 1   C: 24074 1   C: 52755 1   C: 76556 0   C: 01223 0   C: 01225 0
05,2150      C: 01227 1   C: 01231 0   C: 01233 1   C: 76560 0   C: 07242 1   C: 10372 0   C: 77667 0   C: 07021 0
05,2160      C: 07234 0   C: 04032 1   C: 03024 1   C: 03113 1   C: 34011 0   C: 34013 1   C: 34030 0   C: 43745 0
05,2170      C: 03560 1   C: 67453 1   C: 32127 1   C: 24340 0   C: 02020 1   C: 02774 1   C: 07115 0   C: 01330 0

05,2200      C: 01341 0   C: 25733 1   C: 00734 1   C: 12022 1   C: 05333 1   C: 13700 1   C: 32136 1   C: 00024 1
05,2210      C: 32145 0   C: 24340 0   C: 32154 0   C: 32226 0   C: 05333 1   C: 04036 0   C: 00112 0   C: 01326 1
05,2220      C: 01277 1   C: 03441 0   C: 32157 0   C: 52755 1   C: 05700 0   C: 77665 1   C: 12737 1   C: 02755 1
05,2230      C: 12760 0   C: 65011 1   C: 32127 1   C: 24340 0   C: 32276 0   C: 14340 0   C: 03451 1   C: 13443 0

05,2240      C: 13433 1   C: 03633 1   C: 12266 0   C: 00007 0   C: 03630 1   C: 32224 1   C: 32136 1   C: 00024 1
05,2250      C: 32145 0   C: 24340 0   C: 32154 0   C: 07115 0   C: 00007 0   C: 01776 0   C: 12274 0   C: 03635 1
05,2260      C: 12365 1   C: 02256 1   C: 04036 0   C: 00112 0   C: 01326 1   C: 01277 1   C: 03441 0   C: 32157 0
05,2270      C: 00007 0   C: 03620 0   C: 03466 0   C: 03577 1   C: 02347 0   C: 77770 1   C: 74320 0   C: 03461 1

05,2300      C: 03752 1   C: 03754 1   C: 74017 1   C: 32341 0   C: 32355 0   C: 01341 0   C: 13252 0   C: 13645 1
05,2310      C: 03642 1   C: 03664 0   C: 12022 1   C: 02276 0   C: 32224 1   C: 32136 1   C: 00024 1   C: 32145 0
05,2320      C: 24340 0   C: 32154 0   C: 07115 0   C: 12626 0   C: 13626 1   C: 13634 1   C: 02262 0   C: 02400 1
05,2330      C: 03615 0   C: 00112 0   C: 01326 1   C: 01277 1   C: 03441 0   C: 32157 0   C: 32170 0   C: 03614 1

05,2340      C: 74324 1   C: 75441 1   C: 03651 0   C: 02337 1   C: 03652 0   C: 03754 1   C: 03654 0   C: 03756 0
05,2350      C: 03457 1   C: 03461 1   C: 03752 1   C: 03754 1   C: 75443 0   C: 24340 0   C: 57423 0   C: 32127 1
05,2360      C: 24340 0   C: 32276 0   C: 14340 0   C: 02774 1   C: 25733 1   C: 26236 1   C: 32224 1   C: 32136 1
05,2370      C: 00024 1   C: 32145 0   C: 24340 0   C: 32154 0   C: 32226 0   C: 12230 0   C: 02020 1   C: 00112 0
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OCTAL LISTING FOR PARAGRAPH # 045,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,2400    C: 01326 1   C: 01277 1   C: 03441 0   C: 32157 0   C: 32170 0   C: 00007 0   C: 77770 1   C: 12200 0
05,2410    C: 02214 1   C: 12201 1   C: 02215 0   C: 12206 0   C: 02214 1   C: 12207 1   C: 02215 0   C: 25167 0
05,2420    C: 25203 1   C: 32136 1   C: 00024 1   C: 32145 0   C: 24340 0   C: 32154 0   C: 07115 0   C: 00007 0
05,2430    C: 00007 0   C: 02020 1   C: 25173 0   C: 15207 0   C: 01326 1   C: 01277 1   C: 00007 0   C: 32157 0

05,2440    C: 52755 1   C: 02172 1   C: 02407 0   C: 02232 0   C: 02066 0   C: 02303 0   C: 02357 1      00004 0
05,2450       03105 0      12456 0      34736 1      05105 0   C: 77777 0   C: 77777 0      31035 0      74771 0
05,2460       64735 1      55035 1      34755 1      55365 1      54375 1      54376 1      54377 0      54320 1
05,2470       44644 1      55310 0      34736 1      00006 1      01011 0      44755 0      54055 0      34751 0

05,2500       55262 1      34355 0      54366 0      34755 1      55245 1      54371 0      55071 1      55257 1
05,2510       55260 0      55273 1      55360 1      55362 0      54333 0      55321 1      55501 0      00006 1
05,2520       01005 0      00006 1      01006 0      00006 1      01012 0      00006 1      01013 1      00006 1
05,2530       01014 0      41035 1      74771 0      10000 0      02540 1      34771 1      00006 1      05012 1

05,2540       02641 0      44755 0      55010 0      33373 0      55277 0      33065 1      55343 0      34751 0
05,2550       55322 1      33061 0      54111 1      35015 0      54003 0      33056 1      55444 0      33057 0
05,2560       55476 1      32000 0      55400 0      33062 0      55403 0      55406 0      33063 1      55405 0
05,2570       55410 1      34755 1      55407 1      34363 0      55404 1      34744 1      55411 0      35026 0

05,2600       64746 0      55300 1      00006 1      33400 0      52075 1      33401 1      54076 1      34737 0
05,2610       70077 0      63402 1      54077 0      00006 1      33404 1      52101 0      00006 1      33406 0
05,2620       52103 1      34744 1      64740 0      64741 1      70104 0      63407 1      54104 0      33410 1
05,2630       54105 1      34737 0      70106 1      63411 0      54106 1      33412 0      54107 0      04635 0

05,2640    C: 03211 0      00004 0      00006 1      34755 1      52754 0      00006 1      34755 1      52760 1
05,2650       00006 1      34755 1      52762 0      00006 1      34755 1      52756 1      00006 1      34755 1
05,2660       52752 0      00006 1      34755 1      52764 0      00302 0      24320 0      22002 0      00006 1
05,2670       04007 1      53433 0      31035 0      74750 0      00006 1      12701 1      64746 0      00006 1

05,2700       05012 1      03066 1      34350 0      71360 1      00006 1      12707 1      13103 1      41360 1
05,2710       00006 1      12726 1      61377 0      00006 1      12716 1      13103 1      31374 0      54003 0
05,2720       00006 1      31376 1      51377 0      52001 1      34755 1      55360 1      03105 0      44736 0
05,2730       70106 1      54106 1      33375 0      71035 1      64735 1      57035 0      33361 0      71277 0

05,2740       63374 1      55277 0      31321 0      54333 0      34750 1      00006 1      05014 1      40101 0
05,2750       74745 1      10000 0      12757 1      34737 0      00006 1      05011 1      12773 1      34736 1
05,2760       00006 1      05011 1      12773 1      00004 0      03114 0      12767 1      03157 1      03066 1
05,2770       43064 1      70106 1      54106 1      34756 1      54161 0      60000 1      00006 1      50000 1
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OCTAL LISTING FOR PARAGRAPH # 046,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3000        30752 1      00006 1      06001 0      10000 0      13052 1      13052 1      13052 1      10161 0
05,3010        12774 0      54162 0      05215 0      00004 0      44736 0      70075 1      54075 1      44740 1
05,3020        70075 1      54075 1      44741 0      70074 0      54074 0      34756 1      54161 0      60000 1
05,3030        50000 1      10752 0      13034 1      13041 0      54154 0      24154 1      24162 1      33060 1

05,3040        04622 0      10161 0      13026 1      10162 0      12637 0      34735 1      71010 0      00006 1
05,3050        16001 1      12637 0      05567 0   C: 01107 0      12477 0   C: 07777 1   C: 32321 0   C: 77445 1
05,3060     C: 03527 1   C: 21322 1   C: 77001 0   C: 00074 1   C: 20100 1   C: 03434 1      34747 1      00006 1
05,3070        02016 1      00006 1      13100 1      00006 1      00015 0      63372 1      00006 1      13101 0

05,3100        00002 0      03105 0      12472 0      03105 0      12477 0      33362 0      54335 0      34746 0
05,3110        00006 1      02033 0      63376 0      54110 0      34733 1      54026 1      67751 0      54027 0
05,3120        67752 0      54030 0      35015 0      54003 0      44737 1      71262 1      55262 1      34733 1
05,3130        55466 0      00006 1      03013 0      34755 1      55465 0      55472 0      44751 1      70111 1

05,3140        54111 1      00006 1      33360 1      53264 1      40107 0      74735 0      00006 1      13157 0
05,3150        24006 1      11674 1      13154 0      25674 0      11675 0      13157 0      25675 1      33371 1
05,3160        00006 1      03011 1      44743 1      70077 0      54077 0      40077 0      74741 0      00006 1
05,3170        13172 1      34742 1      63365 1      40000 0      70110 0      54110 0      33367 0      00006 1

05,3200        03012 1      44750 0      70101 0      54101 0      44741 0      70101 0      54101 0      33370 0
05,3210        00006 1      03013 0      34740 0      00006 1      05013 0      34746 0      00006 1      03014 1
05,3220        35007 0      54003 0      34734 0      55407 1      55406 0      55405 0      55404 1      55403 0
05,3230        55402 1      55401 1      55400 0      45236 1      55410 1      55412 0      55414 0      55416 1

05,3240        55420 1      55422 0      55424 0      55426 1      55430 0      45237 0      55411 0      55413 1
05,3250        55415 1      55417 0      55421 0      55423 1      55425 1      55427 0      55431 1      44755 0
05,3260        54167 0      54203 1      54217 1      54233 1      54247 1      54263 1      54277 1      54313 1
05,3270        55310 0      54067 1      33364 0      54400 1      63366 1      54454 0      63366 1      54530 0

05,3300        63366 1      54604 1      63366 1      54660 0      34363 0      54154 0      44740 1      50154 1
05,3310        55022 1      10154 0      13305 0      55323 0      55324 1      55325 0      55073 0      54045 1
05,3320        54775 0      55041 1      55012 1      55014 1      55011 1      55017 1      55020 0      55000 1
05,3330        55001 0      55042 1      55307 0      55043 0      55301 0      55302 0      55303 1      55304 0

05,3340        55311 1      54100 1      34760 1      55015 0      44753 0      55077 1      34746 0      71300 1
05,3350        65026 0      55300 1      33363 1      55361 0      44360 1      54776 0      00002 0   C: 02024 0
05,3360     C: 34066 0   C: 00435 0   C: 03522 1   C: 03363 1   C: 00400 0   C: 32001 1   C: 00054 0   C: 27470 1
05,3370     C: 74160 0   C: 30001 0   C: 77755 0   C: 37411 1   C: 37000 0   C: 00450 0   C: 00102 1   C: 00000 1
```

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OCTAL LISTING FOR PARAGRAPH # 047,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

05,3400    C: 00000 1   C: 00000 1   C: 02000 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00100 0   C: 00000 1
05,3410    C: 00000 1   C: 00000 1   C: 40000 0      33416 1      54017 0      50017 1      13417 1      33477 0
05,3420       60002 0      54001 1      40000 0      52760 1      50002 0      33476 1      55010 0      55162 1
05,3430       10002 1      40106 1      74737 1      26106 1      43501 1      70111 1      54111 1      33502 0

05,3440       55343 0      40101 0      74745 1      26101 0      44355 1      00006 1      02013 0      64737 0
05,3450       00006 1      01011 0      34735 1      54107 0      40074 0      74752 1      26074 0      00006 1
05,3460       30025 0      53342 1      00006 1      33475 1      53252 1      02653 0      36250 0      54001 1
05,3470       40000 0      52760 1      04635 0   C: 12763 0   C: 03746 1   C: 64067 1   C: 00106 0   C: 00027 1

05,3500    C: 00107 1   C: 40640 1   C: 00554 0   C: 00017 1   C: 23305 0      54016 1      00006 1      22012 1
05,3510       34745 0      00006 1      02013 1      10000 0      00335 1      06022 1      34745 0      00006 1
05,3520       05013 0      00335 1      37752 0      54337 1      54336 0      33652 0      54335 0      13543 1
05,3530       10336 0      03665 1   C: 77753 0      13534 1      10337 1      13700 1   C: 74001 0      30334 0

05,3540       00006 1      63543 0      13550 0      50333 1      32441 1      54334 1      40333 0      13767 0
05,3550       50334 0      30000 1      10000 0      24334 0      13560 0      56334 0      40000 0      56334 0
05,3560       24000 1      54336 0      63532 0      10000 0      13570 1   C: 47777 0      13570 1      03612 1
05,3570       30336 1      63565 1      00006 1      63665 1      67744 1      00006 1      63623 0      00006 1

05,3600       50336 1      44000 1      54001 1      00006 1      50336 1      43777 1      54336 0      37752 0
05,3610       56336 1      13713 0      00006 1      23265 1      22070 0      06022 1      22070 0      44745 1
05,3620       00006 1      03013 0      01265 1      50336 1      00000 1      10000 0      30336 1      13677 0
05,3630       56336 1      54337 1      34755 1      56336 1      54003 0      74357 0      00006 1      50000 1

05,3640       31402 0      50336 1      52341 0      24336 1      24336 1      24337 0      50337 0      00000 1
05,3650       10000 0      13634 1   C: 03530 1      54337 1      37752 0      54336 0      56337 0      54003 0
05,3660       74357 0      00006 1      50000 1      31402 0      13713 0      30336 1      54003 0      74357 0
05,3670       54001 1      33536 1      26336 0      00006 1      50001 0      31401 0      13713 0      54337 1

05,3700       50337 0      00000 1      10000 0      24337 0      13710 0      54337 1      37752 0      56337 0
05,3710       24000 1      54336 0      13571 0      00006 1      01034 1      30001 0      00006 1      01035 0
05,3720       15270 0      34755 1      54336 0      03764 1      33733 0      54335 0      30025 0      56001 0
05,3730       30336 1      13713 0   C: 03734 1   C: 03746 1      34752 0      26336 0      74357 0      10000 0

05,3740       13750 1      30336 1      74737 1      00006 1      13723 0      13522 0      33732 1      54335 0
05,3750       30336 1      54003 0      74357 0      54002 1      34754 0      54001 1      50002 0      71401 1
05,3760       56001 0      50002 0      71400 0      13713 0      00006 1      22335 1      35011 1      54001 1
05,3770       03612 1      32065 0      56001 0      13713 0   C: 03774 0   C: 03775 1   CKSM 75613 1         @
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OCTAL LISTING FOR PARAGRAPH # 050,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2000        54016 1      00006 1      22012 1      11310 0      12010 0      12007 0      12134 1      34757 0
06,2010        54070 1      55310 0      11035 1      02063 0      02063 0      57035 0      74356 1      55035 1
06,2020        64101 0      00006 1      01010 1      02071 0      55015 0      44755 0      54073 1      56775 1
06,2030        64754 0      54775 0      50775 1      11022 1      10775 0      12030 1      12047 1   C: 00012 1

06,2040        10073 1   C: 37764 0      55015 0      00002 0      54073 1      32037 1      12031 0      64753 1
06,2050        50775 1      55022 1      74356 1      54073 1      34350 0      50775 1      74066 1      60073 0
06,2060        00006 1      01010 1      16742 1      10101 0      34755 1      12130 0      11015 0      02024 0
06,2070        12130 0      42171 0      27310 0      37734 0      54027 0      31300 0      00006 1      06032 0

06,2100        74736 0      00006 1      12116 1      23300 0      00006 1      06001 0      55300 1      74736 0
06,2110        10000 1      12116 1      34355 0      05072 1   C: 03506 1   C: 60101 1      50070 0      12120 1
06,2120        03164 1      13006 0      12172 0      13140 0      03164 1      13006 0      12172 0      13140 0
06,2130        00006 1      01010 1      32041 0      12074 1      34736 1      71310 0      00006 1      12165 0

06,2140        11015 0      02024 0      12152 1      44736 0      27310 0      37734 0      54027 0      34743 0
06,2150        27310 0      05270 1      00006 1      01010 1      37734 0      26027 0      34743 0      27310 0
06,2160        11310 0      05270 1   C: 37737 0      02154 0      05270 1      00006 1      01010 1      34736 1
06,2170        12144 0   C: 22400 0      31277 1      00006 1      06030 1      72761 1      00006 1      12227 0

06,2200        54070 1      23277 1      00006 1      06001 0      55277 0      44753 0      56070 0      00006 1
06,2210        62514 0      12213 1      64753 1      24070 0      60000 1      54000 0      12213 1      56071 1
06,2220        50070 0      34736 1      71277 0      50070 0      02755 1      10071 0      12212 0      41277 0
06,2230        74745 1      10000 0      12374 1      34744 1      71277 0      10000 0      12242 0      34744 1

06,2240        27277 0      12374 1      42777 0      71277 0      55277 0      74736 0      10000 0      12347 1
06,2250        41277 0      74743 1      10000 0      12256 0      05567 0   C: 00213 1      02735 1      33005 1
06,2260        05203 0   C: 02266 1   C: 14106 0      12374 1      33005 1      05224 0      44752 1      71277 0
06,2270        57277 1      74752 1      00006 1      12306 1      34736 1      71277 0      00006 1      12264 1

06,2300        40074 0      74744 0      10000 0      15261 0      04635 0   C: 17630 1      34735 1      00006 1
06,2310        05012 1      04674 0   C: 17257 1      05457 1      44763 0      00006 1      03012 1      34741 1
06,2320        05224 0      42774 0      71277 0      55277 0      44746 1      71300 1      55300 1      40076 1
06,2330        74735 0      00006 1      12336 1      26076 1      30025 0      57074 0      02703 1      44735 0

06,2340        00006 1      03012 1      35003 1      05203 0   C: 03245 1   C: 16103 1      15261 0      34750 1
06,2350        00006 1      02012 0      10000 0      12374 1      34744 1      70074 0      10000 0      12374 1
06,2360        02746 0      04674 0   C: 17257 1      34747 1      00006 1      05012 1      05457 1      34746 0
06,2370        05203 0   C: 02313 1   C: 14106 0      12374 1      31300 0      75026 1      54001 1      35026 0
```

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OCTAL LISTING FOR PARAGRAPH # 051,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,2400        00006 1     03033 1     00006 1     06001 0     00006 1     12434 1     54070 1     23300 0
06,2410        00006 1     06001 0     55300 1     34755 1     56070 0     60000 1     12421 0     64753 1
06,2420        24070 0     60000 1     54000 0     12420 1     56071 1     50070 0     34737 0     71300 1
06,2430        50070 0     02763 1     10071 0     12417 0     10034 1     12441 0     12465 0     12441 0

06,2440        12465 0     62512 0     00006 1     62464 0     62513 1     00006 1     62462 0     34750 1
06,2450        00006 1     02012 0     10000 0     12462 1     04674 0  C: 17135 0     36245 1     05203 0
06,2460     C: 03131 1  C: 16103 1     34746 0     12465 0     34755 1     61035 0     74746 1     00006 1
06,2470        15270 0     71035 1     10000 0     12507 0     34746 0     71277 0     10000 0     15270 0

06,2500        41035 1     74746 1     64735 1     57035 0     72162 1     27035 1     15270 0     02766 1
06,2510        15270 0     12500 1  C: 63434 1  C: 75252 0     74733 0     54071 0     11277 0     12525 0
06,2520        12525 0     34750 1     00006 1     05011 1     12225 1     02766 1     12225 1     44750 0
06,2530        00006 1     03011 1     12225 1     34752 0     71277 0     10000 0     12225 1     34736 1

06,2540        71277 0     00006 1     12556 1     34735 1     00006 1     02012 0     00006 1     12551 0
06,2550        12225 1     34752 0     27277 0     05567 0  C: 00207 1     12225 1     41277 0     74745 1
06,2560        27277 0     32564 1     54110 0     12225 1  C: 00102 1     10000 0     12361 0     43002 1
06,2570        00006 1     03014 1     42776 1     00006 1     03012 1     44745 1     70101 0     54101 0

06,2600        44355 1     00006 1     02011 0     64736 1     00006 1     01011 0     02743 0     04674 0
06,2610     C: 17166 0     44755 0     54050 0     54051 1     54052 1     54047 0     43001 1     00006 1
06,2620        03014 1     12225 1     00006 1     12643 0     41300 1     74746 1     27300 1     04674 0
06,2630     C: 17166 0     42777 0     70074 0     56074 1     40000 0     74744 0     10000 0     12225 1

06,2640        05567 0  C: 00214 0     12225 1     34752 0     71277 0     10000 0     12225 1     12556 1
06,2650        10000 0     34742 1     57277 1     73004 1     27277 0     02703 1     41277 0     74753 0
06,2660        10000 0     12432 1     31277 1     73000 0     10000 0     12432 1     05567 0  C: 00212 0
06,2670        12432 1     10000 0     12432 1     05567 0  C: 01105 1     12432 1     10000 0     12432 1

06,2700        05567 0  C: 01106 1     12432 1     34761 0     71277 0     00006 1     74742 0     31277 1
06,2710        00006 1     04001 1     40000 0     75025 1     10000 0     12726 1     34753 1     71300 1
06,2720        10000 0     00002 0     44753 0     00006 1     03011 1     00002 0     00006 1     22066 1
06,2730        05734 1     34753 1     00006 1     05011 1     00066 1     43003 0     00006 1     03012 1

06,2740        34763 1     00006 1     05012 1     41035 1     72773 1     27035 1     41277 0     72775 1
06,2750        27277 0     41300 1     74746 1     27300 1     00002 0     12533 1     12703 0     12703 0
06,2760        12565 1  C: 76400 1     12622 1     12650 1     12671 1     12676 0     41300 1     74753 0
06,2770        10000 0     24002 0     00002 0  C: 40010 1  C: 00054 0  C: 00075 0  C: 00272 0  C: 00300 1
```

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OCTAL LISTING FOR PARAGRAPH # 052,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3000     C: 01720 0   C: 00740 1   C: 77000 1   C: 40040 1   C: 76777 1   C: 21450 0      30110 1      00006 1
06,3010        06033 1      74752 1      00006 1      13037 1      22110 1      00006 1      06001 0      73033 0
06,3020        54110 0      74752 1      10000 0      13034 1      37666 0      26110 0      34753 1      05203 0
06,3030     C: 02073 1   C: 52107 0      13126 0   C: 05776 1      44752 1      00006 1      03012 1      30110 1

06,3040        00006 1      06030 1      74745 1      00006 1      13071 0      34752 0      70110 0      10000 0
06,3050        13126 0      34745 0      22110 1      00006 1      06001 0      54110 0      30110 1      74615 0
06,3060        10000 0      13070 1      40074 0      74745 1      10000 0      13070 1      05567 0   C: 00515 0
06,3070        04564 1      30101 1      74750 0      10000 0      13126 0      40103 1      74747 0      10000 0

06,3100        13105 1      30102 1      74744 0      10000 0      13126 0      33135 0      70110 0      10000 0
06,3110        13126 0      04523 1   C: 00035 1      13115 0      13126 0      34741 1      26110 0      43136 1
06,3120        00006 1      03012 1      34752 0      05203 0   C: 02140 0   C: 52107 0      30110 1      74752 1
06,3130        10000 0      13132 0      00006 1      05012 1      13140 0   C: 32002 1   C: 20002 1   C: 02100 1

06,3140        30034 0      05033 1      55414 0      30034 0      05032 0      54061 1      30032 0      05033 1
06,3150        55417 0      41417 0      00006 1      70061 1      55416 1      30032 0      05032 0      55420 1
06,3160        00006 1      70061 1      55415 1      05270 1      44755 0      00006 1      06032 0      74357 0
06,3170        54002 1      41273 1      70002 1      54001 1      40002 1      71273 1      26001 1      00006 1

06,3200        15270 0      00006 1      74745 1      56001 0      24001 0      60000 1      54000 0      13204 0
06,3210        50001 0      34743 0      54002 1      71273 1      10000 0      13231 0      41257 1      50001 0
06,3220        73250 1      27257 1      41260 0      50001 0      73260 1      27260 0      30002 0      27273 1
06,3230        13244 1      50001 0      43250 1      71257 1      55257 1      50001 0      43260 1      71260 0

06,3240        55260 0      40002 1      71273 1      55273 1      37720 0      05072 1   C: 03652 0   C: 42106 0
06,3250        15270 0   C: 00040 0   C: 00020 0   C: 00100 0   C: 00200 0   C: 00010 0   C: 00001 0   C: 00004 0
06,3260     C: 00002 0   C: 00010 0   C: 00020 0   C: 00004 0   C: 00200 0   C: 00001 0   C: 00002 0   C: 00040 0
06,3270     C: 00100 0      33537 0      56003 1      54163 1      11477 0      13300 0      13300 0      13361 1

06,3300        34751 0      54132 0      50132 1      31453 1      00006 1      50132 1      70324 0      54002 1
06,3310        30001 0      00006 1      74746 1      50132 1      54325 1      30002 0      00006 1      74746 1
06,3320        50132 1      20325 1      50132 1      41452 1      00006 1      71074 1      00006 1      74746 1
06,3330        50132 1      20325 1      10132 0      67752 0      13301 1      13336 0      55477 0      54130 1

06,3340        03364 0      41460 0      03462 1      03401 1      41461 1      03462 1      03416 1      31462 0
06,3350        03462 1      11477 0      13354 1      13361 1      35031 0      05072 1   C: 03515 0   C: 14063 1
06,3360        00003 1      30163 0      54003 0      14631 0      00006 1      22156 0      00006 1      40325 1
06,3370        52155 1      31463 1      03433 0      00006 1      40327 0      52155 1      41466 0      03433 0
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OCTAL LISTING FOR PARAGRAPH # 053,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

06,3400        00156 0      00006 1      22156 0      00006 1      40327 0      52155 1      31464 0      03433 0
06,3410        00006 1      40331 1      52155 1      41467 1      03433 0      00156 0      00006 1      22156 0
06,3420        00006 1      40327 0      52155 1      31470 0      03433 0      00006 1      40331 1      52155 1
06,3430        31465 1      03433 0      00156 0      56154 1      00006 1      70154 0      52123 0      30155 0

06,3440        00006 1      70154 0      54001 1      34755 1      20123 0      30122 0      00006 1      74743 1
06,3450        50130 0      21472 0      30123 1      00006 1      74743 1      54001 1      34755 1      50130 0
06,3460        21472 0      00002 0      00006 1      22131 1      00006 1      71074 1      22155 0      00006 1
06,3470        74750 0      50130 0      21472 0      30155 0      00006 1      74750 0      54001 1      34755 1

06,3500        50130 0      21472 0      34752 0      60130 0      56130 0      50000 1      11471 0      13511 0
06,3510        00131 1      73561 1      10000 0      55477 0      00131 1      34751 0      54130 1      50130 0
06,3520        31472 1      00006 1      74744 0      50130 0      55472 0      34755 1      50130 0      57471 1
06,3530        00006 1      74744 0      50130 0      21472 0      10130 1      67752 0      13516 1   C: 01471 1

06,3540        33537 0      04616 1   C: 17314 1      04616 1   C: 17707 1      15155 1      34751 0      54130 1
06,3550        50130 0      31472 1      00006 1      74744 0      50130 0      23472 1      10130 1      67752 0
06,3560        13547 0   C: 77776 1      15155 1      11477 0      13567 1      13567 1      15155 1      00004 0
06,3570        10076 1      15155 1      15155 1      13574 0      30104 1      74744 0      54141 1      00006 1

06,3600        13603 0      04674 0   C: 77541 1      30025 0      57074 0      00003 1      40000 0      61074 0
06,3610        64736 1      64736 1      56001 0      56001 0      00006 1      74742 0      52125 0      34755 1
06,3620        55477 0      54130 1      10141 1      03364 0      00006 1      30125 1      52155 1      41460 0
06,3630        03652 0      10141 1      03401 1      00006 1      40125 0      52155 1      31461 0      03652 0

06,3640        10141 1      03416 1      00006 1      40125 0      52155 1      41462 1      03652 0      11477 0
06,3650        13515 1      15155 1      56002 0      54131 0      30002 0      00006 1      70154 0      50130 0
06,3660        21472 0      30002 0      00006 1      70155 1      54001 1      34755 1      50130 0      21472 0
06,3670        13502 1      34616 1   C: 17270 1      11477 0      13677 0      13677 0      15155 1      30104 1

06,3700        74744 0      54141 1      37721 1      57074 0      40000 0      61234 0      13610 1      33537 0
06,3710        56003 1      54163 1      34755 1      55477 0      55471 0      55472 0      55473 1      55474 0
06,3720        55475 1      55476 1      13361 1   C: 20000 0   C: 00000 1   I: 53575 0   I: 77656 1   I: 72441 0
06,3730     C: 01742 1   I: 51136 1   C: 15736 1   I: 43215 0   C: 15724 1   C: 15724 1   C: 02253 1   I: 43414 1

06,3740     C: 02675 1   I: 53575 0   C: 02323 1   I: 77676 0   C: 00023 0   I: 53435 0   C: 02331 1   C: 00015 0
06,3750     I: 53435 0   C: 00023 0   C: 24007 0   C: 00001 0   I: 76521 0   C: 00007 0   C: 03434 1   I: 43414 1
06,3760     C: 02475 0   I: 57545 1   C: 01716 0   C: 14017 1   C: 01714 1   C: 14021 1   C: 24007 0   C: 24023 0
06,3770     C: 00017 1   I: 77616 0   C: 03772 0   C: 03773 1 CKSM 63402 1         @            @            @
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OCTAL LISTING FOR PARAGRAPH # 054,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2000        30004 0      11307 0      02004 1      02006 0      05642 1   C: 20105 1      36245 1      71043 0
07,2010        10000 0      12044 1      34752 0      27043 0      10400 1      12031 0      10454 0      12031 0
07,2020        10530 0      12031 0      10604 1      12031 0      10660 0      12031 0      52134 0      05706 0
07,2030     C: 31207 0      64752 0      55307 0      34755 1      51307 1      53777 0      35025 0      05105 0

07,2040     C: 02063 0   C: 16067 1      00003 1      14631 0      52134 0      05706 0   C: 31211 1      34755 1
07,2050        57307 1      75004 1      10000 0      50000 1      54000 0      34753 1      04674 0   C: 17656 1
07,2060        34755 1      55043 0      06001 0      41307 0      74740 1      27307 0      32330 0      04616 1
07,2070     C: 20334 1      12060 1      12074 1      12063 1      37747 1      70734 0      00006 1      74743 1

07,2100        55551 0      00006 1      62063 0      65650 1      00006 1      12107 1      12123 1      32331 1
07,2110        04616 1   C: 20334 1      12060 1      12115 1      12107 1      00006 1      31345 1      50120 1
07,2120        52011 0      34755 1      12137 1      51551 1      31411 1      50120 1      54011 0      51551 1
07,2130        31403 1      50120 1      54010 1      31405 1      00006 1      50120 1      20010 1      50120 1

07,2140        54012 0      06042 1   I: 77624 1   C: 10522 0   I: 70535 0   C: 00013 0   I: 73406 1   I: 71525 0
07,2150     I: 74206 0   C: 00023 0   I: 74325 0   C: 00001 0   C: 00031 0   I: 45445 0   C: 63762 1   I: 65361 0
07,2160     C: 00031 0   I: 53361 0   C: 00023 0   I: 77626 0   C: 53754 1   C: 24007 0   C: 02715 0   I: 77776 1
07,2170        12202 1   I: 53133 0   C: 00004 0   C: 16177 1   I: 52145 0   C: 00031 0   C: 32011 0   I: 52175 0

07,2200     C: 03765 0   C: 32042 0      34755 1      55551 0      55550 1      35004 0      71307 0      55307 0
07,2210        32620 1      04616 1   C: 20345 1      12060 1      12216 1      12063 1      41307 0      74740 1
07,2220        27307 0      75004 1      55551 0      34755 1      55552 0      31307 1      75015 1      54001 1
07,2230        35015 0      00006 1      06001 0      00006 1      12241 0      11550 1      12240 1      12325 0

07,2240        55550 1      34740 0      27552 0      41550 1      00006 1      76245 0      41551 0      60001 0
07,2250        50120 1      54046 1      30120 1      54166 1      06042 1   I: 76614 0   C: 04307 1   C: 32000 0
07,2260     C: 00002 0   C: 24766 0   C: 00015 0   I: 77624 1   C: 47666 1   I: 76606 0   C: 00001 0   C: 24766 0
07,2270     C: 00023 0   I: 77624 1   C: 47666 1   I: 53435 0   I: 77626 0   C: 77746 1   I: 63335 1   C: 03553 1

07,2300     C: 00031 0   I: 70322 0   C: 00001 0   C: 14031 0   C: 00001 0   I: 56225 1   C: 16622 0   I: 53361 0
07,2310     C: 02715 0   C: 00031 0   C: 02715 0   C: 02767 0   I: 77776 1      11550 1      12240 1      34756 1
07,2320        00004 0      05203 0   C: 02047 0   C: 16067 1      05472 0      05567 0   C: 00111 0      12202 1
07,2330     C: 00307 0   C: 01527 0      54016 1      30033 1      54063 0      30034 0      54064 1      30032 0

07,2340        54065 0      00006 1      30025 0      52062 1      56002 0      54012 0      34776 0      00006 1
07,2350        02016 1      10000 0      12403 0      34740 0      71307 0      10000 0      05270 1      11307 0
07,2360        12364 0      05567 0   C: 00112 0      05270 1      34747 1      00006 1      02016 1      10000 0
07,2370        12460 0      34750 1      00006 1      02016 1      10000 0      12421 0      34751 0      00006 1
```

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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969                PAGE 1612

OCTAL LISTING FOR PARAGRAPH # 055,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,2400         02016 1        10000 0        12415 1        34776 0        00006 1        02016 1        00006 1        12412 0
07,2410         04635 0     C: 46455 1        05567 0     C: 00113 1        05270 1        34755 1        54070 1        34742 1
07,2420         12424 0        34753 1        54070 1        34741 1        55551 0        02513 1        12520 0        34736 1
07,2430         71307 0        00006 1        12443 1        41550 1        64751 0        00006 1        62453 1        25550 0

07,2440         47714 0        71307 0        55307 0        31551 1        71307 0        10000 0        12450 0        12525 0
07,2450         05567 0     C: 00114 0        05270 1        05567 0     C: 00107 1        02513 1        12626 0        05270 1
07,2460         02513 1        12506 1        35015 0        71307 0        10000 0        12471 0        05567 0     C: 00115 1
07,2470         05270 1        44355 1        71307 0        64737 0        57307 1        74737 1        10000 0        12504 0

07,2500         41551 0        71307 0        55307 0        12576 0        45015 1        12501 0        11550 1        12511 1
07,2510         12466 0        55550 1        05270 1        40104 0        74744 0        10000 0        24002 0        00002 0
07,2520         34755 1        54070 1        41307 0        75015 1        27307 0        35004 0        71307 0        54071 0
07,2530         00006 1        30062 0        53562 0        31550 0        00006 1        76245 0        56001 0        60071 1

07,2540         26070 1        55552 0        30063 1        50070 0        54000 0        30064 0        50070 0        54002 1
07,2550         30065 1        50070 0        54004 1        02513 1        12603 1        34737 0        61551 1        40000 0
07,2560         71307 0        61551 1        55307 0        75015 1        54001 1        35015 0        00006 1        06001 0
07,2570         10000 0        12576 0        41307 0        74736 0        27307 0        12576 0        35015 0        71307 0

07,2600         00006 1        74746 1        55552 0        35025 0        05072 1     C: 02610 1     C: 16067 1        05270 1
07,2610         02513 1        12626 0        51552 1        32615 1        02211 1     C: 15507 1     C: 15307 1     C: 15107 0
07,2620      C: 15507 1     C: 04000 0     C: 00000 1     C: 00034 0     C: 01507 1     C: 01517 0        32625 1        04616 1
07,2630      C: 20334 1        12060 1        12640 0        34746 0        70154 0        10000 0        12644 1        12626 0

07,2640         44736 0        71307 0        64736 1        55307 0        31235 1        51552 1        54001 1        31237 0
07,2650         51552 1        54003 0        41307 0        74736 0        00006 1        12216 1        31550 0        64753 1
07,2660         40000 0        64756 1        00006 1        62453 1        25550 0        12205 0     I: 77614 1     C: 06466 0
07,2670      I: 74345 0     C: 02355 0     C: 02303 0     I: 74325 0     C: 02361 1     C: 03726 1     I: 53455 0     I: 45325 1

07,2700      C: 03474 0     C: 13504 1     I: 52044 0     C: 61002 1     C: 71446 1        00004 0        41035 1        74771 0
07,2710         10000 0        12715 1        05567 0     C: 00206 0        13650 0        03644 1        41300 1        74773 1
07,2720         27300 1        41277 0        75741 1        27277 0        44771 0        00006 1        03012 1        03257 1
07,2730         34747 1        00006 1        05012 1        05457 1        34746 0        05203 0     C: 02750 1     C: 16103 1

07,2740         41277 0        74743 1        10000 0        12746 1        05567 0     C: 00210 1        00003 1        14631 0
07,2750         03632 0        05457 1        44747 0        00006 1        03012 1        34741 1        05224 0        03632 0
07,2760         45741 1        71277 0        55277 0        44773 1        71300 1        55300 1        04674 0     C: 14703 0
07,2770         13622 0        00004 0        03644 1        03135 0        36245 1        05203 0     C: 03001 0     C: 16103 1
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OCTAL LISTING FOR PARAGRAPH # 056,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

07,3000        12746 1      03632 0      34746 0      00006 1      05012 1      34752 0      55474 0      51474 1
07,3010        30321 1      00006 1      51474 1      20032 1      00006 1      74737 1      56001 0      60000 1
07,3020        54061 1      13023 1      26001 1      51474 1      23471 1      11474 0      03006 1      34752 0
07,3030        05224 0      03632 0      54061 1      34752 0      55474 0      51474 1      11471 0      03043 0

07,3040        03052 0      03110 1      03052 0      63736 0      00006 1      63120 1      51474 1      55471 0
07,3050        43737 0      24061 0      64754 0      51474 1      54050 0      11474 0      03034 0      10061 1
07,3060        13124 1      05221 0   C: 00226 1      34752 0      54061 1      50000 1      30032 0      00006 1
07,3070        50061 0      20321 0      10000 0      13101 0      13076 1      13101 0      10061 1      13064 1

07,3100        13622 0      63107 1      00006 1      63076 0      05567 0   C: 00211 0      13630 0   C: 77511 1
07,3110        63736 0      00006 1      63120 1      40000 0      51474 1      55471 0      33737 1      03051 0
07,3120        34755 1      51474 1      57471 1      03051 0      37743 0      00006 1      05014 1      33740 1
07,3130        13030 0      34746 0      00006 1      05012 1      05261 1      34750 1      00006 1      02012 0

07,3140        10000 0      00002 0      44746 1      00006 1      03012 1      44742 0      00006 1      03014 1
07,3150        44755 0      54047 0      34750 1      00006 1      05012 1      41035 1      73200 1      27035 1
07,3160        41300 1      74746 1      27300 1      41277 0      74750 0      27277 0      44747 0      70075 1
07,3170        54075 1      44735 0      70076 1      54076 1      44737 1      70077 0      54077 0      00002 0

07,3200     C: 40010 1      00304 0      03644 1      43735 1      00006 1      03012 1      44746 1      71300 1
07,3210        55300 1      03257 1      34742 1      05203 0   C: 03225 1   C: 16103 1      35000 1      05203 0
07,3220     C: 03223 1   C: 16103 1      12746 1      03632 0      13622 0      03637 0      15261 0      34750 1
07,3230        00006 1      02012 0      10000 0      15261 0      41277 0      74737 1      27277 0      44750 0

07,3240        71277 0      55277 0      04674 0   C: 14703 0      15261 0      03637 0      15261 0      41277 0
07,3250        74742 0      27277 0      41300 1      74737 1      27300 1      44747 0      13240 0      43200 1
07,3260        71035 1      64735 1      55035 1      00002 0      44755 0      54037 1      54040 1      54041 0
07,3270        03637 0      14631 0      00004 0      44753 0      71277 0      55277 0      04674 0   C: 14703 0

07,3300        12746 1      00004 0      41277 0      74753 0      27277 0      74742 0      10000 0      12746 1
07,3310        05567 0   C: 00212 0      00004 0      13276 0      54161 0      03644 1      11311 1      03360 1
07,3320        54156 1      34746 0      00006 1      05014 1      34751 0      05203 0   C: 03376 0   C: 16103 1
07,3330        30161 1      56003 1      56161 1      55311 1      74357 0      54061 1      34752 0      54157 0

07,3340        60000 1      60061 0      54160 1      00006 1      50000 1      31401 0      52155 1      07262 0
07,3350        52155 1      50160 0      53401 1      10157 0      13337 1      30161 1      54003 0      12746 1
07,3360        00006 1      30134 1      52155 1      33375 0      15133 1      11311 1      13363 0      54156 1
07,3370        00006 1      30155 0      52134 0      34753 1      13325 1   C: 17365 1      43617 0      00006 1
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OCTAL LISTING FOR PARAGRAPH # 057, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
07,3400        03014 1      03632 0      31311 0      00006 1      74750 0      50000 1      13407 0      03424 0
07,3410     C: 00202 1      03424 0   C: 00302 0      03422 0   C: 00100 0      34755 1      55311 1      33375 0
07,3420        05137 1      13223 0      44751 1      27311 1      50002 0      30000 1      54064 1      74757 1
07,3430        64737 0      27311 1      54003 0      74357 0      54061 1      44757 1      70064 1      54064 1

07,3440        00006 1      50061 0      31401 0      52071 0      10070 1      13460 1      13450 1      13600 0
07,3450        10071 0      13455 1      13402 0      13575 1      13402 0      63511 1      00006 1      63402 1
07,3460        00006 1      33621 1      20071 0      30064 0      00006 1      05014 1      36077 1      70071 0
07,3470        56071 1      00006 1      74744 0      54062 1      30070 0      00006 1      74743 1      54070 1

07,3500        30001 0      00006 1      74736 0      26062 1      00006 1      30071 1      67752 0      10000 0
07,3510        13534 1   C: 77601 0      13516 1      34736 1      26062 1      34755 1      50061 0      53401 1
07,3520        30062 0      54047 0      00006 1      74742 0      66250 0      05203 0   C: 03376 0   C: 16103 1
07,3530        34742 1      00006 1      05014 1      15261 0      50061 0      53401 1      34736 1      60062 0

07,3540        54047 0      00006 1      74742 0      67750 1      05203 0   C: 03550 1   C: 16103 1      13530 0
07,3550        03632 0      34750 1      00006 1      02012 0      10000 0      13630 0      31311 0      54003 0
07,3560        74357 0      54061 1      50061 0      11400 0      13570 1      34736 1      26047 0      13522 0
07,3570        50061 0      55400 0      34736 1      26047 0      13541 0      63511 1      00006 1      63402 1

07,3600        00006 1      43621 0      20071 0      30064 0      64743 0      00006 1      05014 1      40070 1
07,3610        54070 1      40071 0      76077 0      40000 0      56071 1      40000 0      13471 1   C: 01700 1
07,3620     C: 00000 1   C: 00034 0      00006 1      00011 1      74753 0      10000 0      13630 0      13656 0
07,3630        34755 1      13653 0      34746 0      71277 0      10000 0      13630 0      00002 0      41277 0

07,3640        74746 1      10000 0      24002 0      00002 0      41277 0      74746 1      10000 0      00002 0
07,3650        44755 0      55301 0      12746 1      54071 0      44755 0      13660 0      54071 0      44753 0
07,3660        54072 0      50071 1      11301 0      13667 1      13677 0      00006 1      13700 1      34755 1
07,3670        50071 1      57301 1      05137 1      40072 0      50064 0      26164 0      15261 0      30072 1

07,3700        50071 1      55301 0      15261 0      34753 1      03710 1      34752 0      13710 0      34755 1
07,3710        00004 0      54071 0      50000 1      11301 0      13732 0      13726 0      13722 1      50071 1
07,3720        55301 0      12746 1      10000 0      13732 0      24133 0      13717 1      04645 1      50071 1
07,3730        55301 0      15133 1      52134 0      05706 0   C: 31210 0   C: 00030 1   C: 77500 1   C: 77477 0

07,3740     C: 00074 1      31304 1      00006 1      13745 0      03732 1      00006 1      30134 1      53305 1
07,3750        30006 1      74757 1      27305 1      30167 1      77730 0      55306 1      33762 1      54003 0
07,3760        04635 0   C: 44004 0   C: 03275 1   C: 03763 0   C: 03764 1 CKSM 13445 0         @            @
07,3770           @            @            @            @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 060, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2000     I: 77160 0   C: 00002 0   C: 00000 1   I: 77614 1   C: 04343 1   C: 20011 0   I: 77160 0   C: 00012 1
10,2010     C: 00002 0   I: 66143 1   C: 10011 0   C: 02776 0   C: 22317 1   C: 10003 0   I: 54214 1   C: 04343 1
10,2020     C: 20022 0   C: 20607 1   C: 02321 0   I: 43134 0   C: 02777 1   C: 01271 1   I: 77650 1   C: 73515 1
10,2030     I: 77776 1      04616 1   C: 20036 0      06042 1   I: 77616 0   C: 02664 1      32035 0      54142 1

10,2040        56003 1      56142 0      74357 0      65007 0      54141 1      00006 1      30744 0      52155 1
10,2050        07106 1   C: 00745 1      52155 1      20001 1      50141 0      52001 1      00006 1      30740 1
10,2060        50141 0      52003 0      00006 1      40736 1      52155 1      07112 1      52155 1      20001 1
10,2070        50141 0      52005 0      00006 1      40742 1      52155 1      07112 1      52155 1      20001 1

10,2100        52160 1      00006 1      40742 1      52155 1      07106 1   C: 00737 1      00006 1      40155 1
10,2110        52162 0      07106 1   C: 00735 0      52155 1      20001 1      20001 1      52162 0      52155 1
10,2120        07106 1   C: 00743 1      52155 1      20001 1      20001 1      52131 0      00006 1      30744 0
10,2130        52155 1      07106 1   C: 00747 0      52155 1      20001 1      20162 0      00006 1      30736 0

10,2140        52155 1      07112 1      52155 1      20001 1      20131 0      52131 0      52155 1      00006 1
10,2150        30155 0      50141 0      52015 1      00006 1      30160 0      50141 0      52017 0      00006 1
10,2160        30162 1      50141 0      52021 0      30141 0      54116 0      00006 1      30006 1      64751 0
10,2170        52165 1      34744 1      54023 1      17463 0      52155 1      20001 1      50141 0      52007 1

10,2200        52160 1      20001 1      50141 0      52011 0      52162 0      20001 1      50141 0      52013 1
10,2210        30142 0      54003 0      14631 0      00004 0      52071 0      34355 0      05072 1   C: 03577 1
10,2220     C: 60102 1      52071 0      00003 1      52006 0      22073 0      30065 1      74757 1      60000 1
10,2230        54061 1      30065 1      75030 0      00006 1      74740 1      54062 1      30065 1      74101 1

10,2240        56065 1      75024 0      10000 0      15370 1      30062 0      50061 0      54750 1      10066 0
10,2250        12264 1      12252 1      40072 0      22072 1      50071 1      52750 1      10066 0      12260 0
10,2260        12264 1      40025 1      50071 1      55050 1      10065 0      12300 1      12303 1      40025 1
10,2270        50061 0      55050 1      30065 1      62276 0      10000 0      12276 1   C: 17777 0      12303 1

10,2300        00006 1      30025 0      53151 1      40062 1      50061 0      54747 1      30002 0      22073 0
10,2310        00003 1      52006 0      22073 0      30062 0      50061 0      54750 1      30070 0      50061 0
10,2320        55051 0      00006 1      30064 0      50061 0      53435 0      12247 0      05474 0      13422 1
10,2330        54155 1      34735 1      12501 0      34755 1      54155 1      33032 0      12501 0      54155 1

10,2340        33521 1      12501 0      54155 1      33506 1      12501 0      54155 1      33507 0      12501 0
10,2350        54155 1      34735 1      12454 1      54155 1      33032 0      12640 0      54155 1      33521 1
10,2360        12640 0      65023 0      54155 1      33506 1      12640 0      34753 1      02736 1      30100 0
10,2370        73522 0      10000 0      12430 0      30100 0      74743 1      00006 1      12400 0      15155 1
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OCTAL LISTING FOR PARAGRAPH # 061,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,2400        00004 0      44756 0      70100 1      64753 1      54100 1      00003 1      41070 0      74747 0
10,2410        10000 0      12414 0      40370 1      54370 1      34753 1      12617 1      30165 0      54156 1
10,2420        50164 1      33532 0      54162 0      50164 1      31067 1      54160 1      54003 0      00002 0
10,2430        30100 0      73255 1      10000 0      13455 1      40100 1      74751 1      00004 0      26100 1

10,2440        12535 1      30370 0      74144 0      13121 1      54155 1      34755 1      12501 0      54155 1
10,2450        34746 0      12501 0      54155 1      34755 1      54160 1      34755 1      12642 1      34755 1
10,2460        54155 1      33505 1      12501 0      54155 1      33505 1      12640 0      54155 1      34736 1
10,2470        12501 0      54155 1      34736 1      12454 1      54155 1      33544 1      12501 0      54155 1

10,2500        34750 1      54160 1      02723 0      00003 1      12547 1      54155 1      33524 1      12640 0
10,2510        54155 1      33524 1      12501 0      34755 1      54164 0      03375 0      12523 0      30100 0
10,2520        73543 1      10000 0      12576 0      30100 0      75632 1      00006 1      12531 0      34755 1
10,2530        12775 1      30100 0      73541 0      00006 1      12537 0      34753 1      12775 1      02735 1

10,2540        03206 0      05137 1      03223 1      30025 0      55164 1      34755 1      12617 1      30167 1
10,2550        77730 0      54163 1      37724 1      05146 1      30160 0      73523 1      10000 0      12513 0
10,2560        12562 0      12365 1      34752 0      54164 0      03375 0      12600 1      41071 1      74750 0
10,2570        10000 0      12600 1      30100 0      73514 0      00006 1      12600 1      05624 1   C: 31502 1

10,2600        02737 0      30163 0      00006 1      04007 1      54366 0      30100 0      73515 1      10000 0
10,2610        12755 0      12613 0      12755 0      03206 0      05137 1      03223 1      34752 0      54164 0
10,2620        13071 0      54155 1      37737 0      12501 0      55044 1      33477 0      54155 1      33476 1
10,2630        12501 0      54155 1      33502 0      12501 0      02716 0      12501 0      54155 1      34750 1

10,2640        54160 1      36250 0      00004 0      54072 0      30167 1      77730 0      54063 0      30160 0
10,2650        74750 0      10000 0      12660 1      30063 1      05072 1   C: 02547 0   C: 20067 1      12666 1
10,2660        30006 1      00306 1      04007 1      54001 1      33540 0      05116 1      02723 0      00006 1
10,2670        30156 0      50064 0      52156 1      00006 1      30160 0      50064 0      52160 1      30064 0

10,2700        54161 0      02730 1      00003 1      14640 0      55044 1      33477 0      54155 1      33476 1
10,2710        12640 0      54155 1      33502 0      12640 0      02716 0      12640 0      55143 1      33503 1
10,2720        54155 1      33504 0      00002 0      00004 0      43513 1      70160 1      60003 1      54160 1
10,2730        22002 0      04645 1      54157 0      60072 1      00001 0      34755 1      54164 0      00004 0

10,2740        30160 0      50164 1      55067 0      73531 1      00006 1      12751 1      30157 1      50164 1
10,2750        54372 0      30155 0      50164 1      54367 1      13232 0      50164 1      33532 0      72761 1
10,2760        03545 0   C: 03004 0      44753 0      60164 1      54154 0      50154 1      33511 1      00004 0
10,2770        05137 1      03223 1      50154 1      33511 1      15133 1      54154 0      03206 0      05137 1
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OCTAL LISTING FOR PARAGRAPH # 062,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3000        30154 1     50064 0     54154 0     33016 0     03224 0     50154 1     33533 1     73535 0
10,3010        03555 1  C: 74004 0     50154 1     34747 1     64751 0     03545 0  C: 02765 1     30100 0
10,3020        74751 1     10030 0     02400 1     12537 0     34755 1     54160 1     50160 0     33525 0
10,3030        64751 0     03555 1  C: 40010 1     50160 0     33511 1     00004 0     05137 1     13336 0

10,3040        31071 0     54003 0     30366 1     04727 1     77730 0     05146 1     46250 1     60374 1
10,3050        14640 0     00003 1     31072 0     54156 1     30100 0     77743 1     10000 0     13062 1
10,3060        13472 1     12400 0     05504 0  C: 00105 0     34736 1     70100 1     10000 0     12545 0
10,3070        12616 0     32420 0     30160 0     74757 1     54001 1     44737 1     50164 1     71067 0

10,3100        50164 1     55067 0     74744 0     54141 1     30156 0     54165 1     55072 1     50164 1
10,3110        10367 1     13120 0     13234 0     40370 1     54370 1     76077 0     63516 0     60141 0
10,3120        64753 1     34155 1     13246 0     04433 1     02416 0     05516 0  C: 00102 1     05516 0
10,3130     C: 00103 0     05516 0  C: 00104 1     30160 0     04255 1     13071 0     34747 1     70160 1

10,3140        10000 0     13164 0     34750 1     70160 1     10000 0     13261 0     40160 1     74746 1
10,3150        10000 0     13155 1     50164 1     30372 1     54157 0     13354 1     50164 1     30367 0
10,3160        76077 0     00006 1     13261 0     15155 1     30160 0     74737 1     10000 0     13142 1
10,3170        34737 0     50164 1     27067 0     22007 0     00006 1     62441 1     74740 1     00006 1

10,3200        13204 0     41066 1     63542 1     13121 1     33501 0     13121 1     44747 0     00006 1
10,3210        03011 1     30100 0     73517 0     10000 0     34753 1     54001 1     34755 1     50001 0
10,3220        57041 0     30004 0     00002 0     34217 1     56064 0     00006 1     63232 1     56064 0
10,3230        50064 0     54164 0     00003 1     00002 0     37723 0     05105 0  C: 04231 0  C: 04060 0

10,3240        13262 0     30130 0     73267 0     00006 1     12576 0     15155 1     11041 1     15155 1
10,3250        13252 0     15155 1     30162 1     73520 1     03545 0  C: 24100 0     50164 1     33510 0
10,3260        04442 1     04427 1     30164 1     54157 0     30162 1     73011 0     03545 0  C: 40040 1
10,3270        31073 1     50164 1     74751 1     10000 0     13361 1     11041 1     13241 1     13301 1

10,3300        13241 1     04207 0     13373 1     13412 1     43527 0     60154 1     00006 1     26000 0
10,3310        00006 1     13462 0     34752 0     54161 0     30100 0     74101 1     10000 0     13322 0
10,3320        13430 1     13414 1     40025 1     61164 0     10000 0     40000 0     67734 0     64753 1
10,3330        63571 1     00006 1     62545 1     13430 1     34753 1     13025 1     10161 0     64753 1

10,3340        13342 0     15155 1     50157 1     60372 1     54157 0     30162 1     73350 0     03555 1
10,3350     C: 74044 1     46250 1     04154 0     13354 1     30163 0     77730 0     05146 1     30157 1
10,3360        14640 0     50164 1     44751 1     71073 0     55073 0     34755 1     04727 1     36250 0
10,3370        50164 1     60372 1     14640 0     34755 1     13313 1     40160 1     74736 0     10000 0
```

```
OCTAL LISTING FOR PARAGRAPH # 063,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

10,3400        16742 1     40157 0     50164 1     60372 1     00006 1     13407 0     00002 0     11011 1
10,3410        05155 0     00002 0     34753 1     13313 1     46245 0     70100 1     00004 0     54100 1
10,3420        00003 1     13336 0     37752 0     54161 0     30100 0     74355 1     10000 0     13062 1
10,3430        30100 0     73525 1     10000 0     13024 0     30100 0     73526 1     10000 0     13334 1

10,3440        31071 0     74771 0     10000 0     13336 0     30371 1     00006 1     13336 0     35025 0
10,3450        00004 0     05072 1  C: 02616 1  C: 20060 0     13336 0     30100 0     73525 1     10000 0
10,3460        15155 1     12755 0     50157 1     30367 0     76077 0     40000 0     60155 0     00006 1
10,3470        13312 0     13051 1     46250 1     04154 0     15155 1     15155 1  C: 00036 1  C: 00231 1

10,3500     C: 01407 0  C: 14400 0  C: 00030 1  C: 01006 0  C: 00014 1  C: 20010 1  C: 40230 1  C: 40036 0
10,3510     C: 20543 1  C: 20400 1  C: 20616 1  C: 03400 0  C: 11210 1  C: 66521 1  C: 01177 1  C: 00700 0
10,3520     C: 00704 1  C: 40030 0  C: 34300 0  C: 40100 1  C: 00110 1  C: 02020 1  C: 01010 1  C: 00026 0
10,3530     C: 77730 0  C: 00050 1  C: 20144 1  C: 42424 0  C: 11254 1  C: 74704 1  C: 67777 1  C: 40420 0

10,3540     C: 02547 0  C: 10200 1  C: 30200 0  C: 20100 1  C: 24030 1     00004 0     75650 0     54001 1
10,3550        40100 1     70001 1     26100 1     00003 1     16742 1     00004 0     75650 0     40000 0
10,3560        70100 1     54100 1     13553 0     00004 0     54001 1     30133 0     55363 1     30134 1
10,3570        05576 0  C: 77467 1     35006 1     12505 1     00006 1     30025 0     16060 0     10154 0

10,3600        34755 1     13604 1     13603 0     44736 0     54155 1     34755 1     56154 1     00006 1
10,3610        74736 0     20155 1     16064 1     07262 0     16064 1     03645 0     34755 1     54155 1
10,3620        16063 0     03645 0     52162 0     52155 1     03645 0     54156 1     52160 1     52155 1
10,3630        03645 0     54155 1     30161 1     54154 0     34753 1     16063 0     03645 0     52160 1

10,3640        52155 1     03645 0     54001 1     30157 1     16060 0     52155 1     20001 1     10000 0
10,3650        64753 1     13653 0     40000 0     54154 0     00002 0     50000 1     34734 0     26154 0
10,3660        00002 0     54142 1     50130 0     10000 0     64753 1     13671 0     64753 1     64753 1
10,3670        40000 0     60142 0     10000 0     64753 1     13676 1     40000 0     54142 1     13703 1

10,3700        50000 1     34734 0     60142 0     50130 0     54000 0     00002 0     50120 1     30046 0
10,3710        04616 1  C: 17314 1     16064 1     00006 1     34733 1     52155 1     10000 0     34755 1
10,3720        16062 1     13722 1     00006 1     44733 0     16060 0     34753 1     13730 1     34755 1
10,3730        60120 1     54156 1     04616 1  C: 01010 1     10154 0     13771 1     13740 0     13771 1

10,3740        10157 0     13771 1     13744 1     13771 1     10161 0     13771 1     13750 1     13771 1
10,3750        30155 0     00006 1     74736 0     20155 1     30160 0     00006 1     74736 0     20160 1
10,3760        30162 1     00006 1     74736 0     20162 0     34761 0     50156 0     54045 1     04635 0
10,3770     C: 01024 0     34755 1     13765 1     04616 1  C: 01010 1     06064 0  C: 03776 1  CKSM 44510 0
```

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OCTAL LISTING FOR PARAGRAPH # 064, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2000     I: 77614 1    C: 00475 1    I: 44175 1    C: 03444 0    C: 03463 0    C: 03472 0    I: 77646 0    C: 03723 1
11,2010     I: 46135 1    C: 03000 1    C: 22026 0    I: 72575 0    C: 02323 1    C: 26323 1    C: 02331 1    I: 77752 1
11,2020     C: 26331 1    C: 03472 0    I: 77752 1    C: 03472 0    I: 77646 0    C: 03723 1    I: 71331 0    C: 03617 1
11,2030     C: 77776 1    I: 70546 1    C: 17667 0    I: 67154 0    C: 00154 1    C: 02701 0    I: 77775 1    C: 02323 1

11,2040     C: 26655 0    C: 03472 0    C: 16663 0    C: 03452 1    C: 02671 0    I: 77201 1    C: 00001 0    C: 02323 1
11,2050     I: 41456 0    I: 53435 0    C: 02331 1    C: 26674 0    C: 03472 0    I: 50256 0    I: 43015 1    C: 03667 0
11,2060     C: 03665 1    C: 03667 0    I: 43044 0    C: 22105 0    C: 03465 0    I: 41575 0    C: 02663 0    I: 63246 1
11,2070     I: 46206 1    C: 02674 0    I: 51352 1    I: 74256 0    I: 77772 0    C: 02663 0    I: 67351 1    C: 24007 0

11,2100     C: 03617 1    I: 77244 0    C: 22105 0    C: 02663 0    C: 03472 0    I: 63345 0    C: 26007 1    C: 02663 0
11,2110     I: 63256 0    C: 02655 0    I: 41456 0    I: 57435 1    C: 00003 1    I: 77606 1    I: 71350 1    C: 02776 0
11,2120     C: 00023 0    I: 62040 1    C: 22124 0    C: 77767 1    I: 67310 1    C: 00012 1    C: 00047 1    I: 77230 0
11,2130     C: 22132 1    I: 41476 1    I: 77775 1    I: 50235 0    I: 71244 0    C: 22137 1    I: 41476 1    I: 67154 0

11,2140     C: 00000 1    C: 02672 0    I: 66350 1    C: 02776 0    C: 00027 1    C: 00024 1    I: 77624 1    C: 25212 1
11,2150     I: 77214 0    C: 00675 0    C: 02744 1    C: 16337 1    C: 02702 0    I: 45030 0    C: 22233 0    C: 27410 1
11,2160     I: 43135 1    C: 03000 1    C: 00263 0    I: 43030 0    C: 22166 0    C: 00063 1    I: 77775 1    C: 02323 1
11,2170     C: 02655 0    C: 25535 0    C: 02337 1    C: 15543 1    C: 03610 0    C: 01517 0    I: 43015 1    C: 03452 1

11,2200     C: 01673 1    C: 34041 0    C: 27106 0    I: 77775 1    C: 00025 0    C: 02703 1    I: 63154 1    C: 03616 0
11,2210     C: 00001 0    I: 55134 1    C: 03616 0    C: 02701 0    I: 46135 1    C: 00050 1    C: 22230 0    I: 52375 1
11,2220     C: 03472 0    C: 00017 1    I: 77655 1    C: 02663 0    C: 16663 0    C: 03667 0    I: 77650 1    C: 22062 0
11,2230     I: 77775 1    C: 02663 0    C: 03472 0    I: 52375 1    C: 02337 1    C: 02331 1    C: 26366 0    C: 02703 1

11,2240     C: 03566 1    I: 46135 1    C: 03000 1    C: 22260 0    I: 70575 1    C: 03566 1    C: 27566 1    C: 02337 1
11,2250     I: 77742 0    C: 26337 1    C: 03472 0    I: 77742 0    C: 27472 0    C: 02366 0    I: 77742 0    C: 02366 0
11,2260     I: 70750 1    C: 02776 0    C: 10003 0    I: 41206 0    C: 02742 1    I: 56342 1    C: 00041 1    C: 17721 0
11,2270     I: 77661 0    C: 20607 1    C: 03717 0    I: 77201 1    C: 00001 0    C: 03472 0    C: 03444 0    I: 52014 0

11,2300     C: 01267 0    C: 03463 0       56016 0       00006 1       22012 1       05321 1    C: 00100 0       15270 0
11,2310        00006 1       00031 0       40000 0       72401 1       55444 0       34752 0       55443 1       34756 1
11,2320        05173 1    C: 02326 1       15270 0       55443 1       34757 0       05224 0       00006 1       00031 0
11,2330        40000 0       72401 1       57444 1       54001 1       11444 0       12324 1       10001 1       12347 1

11,2340        11443 1       12323 0       06022 1       34740 0       00006 1       05013 0       15261 0       34737 0
11,2350        00006 1       02031 1       00006 1       12342 1       30001 0       74746 1       10000 0       42402 1
11,2360        27445 1       30001 0       74747 0       10000 0       32402 0       27445 1       30001 0       74753 0
11,2370        10000 0       42403 0       27446 1       30001 0       74752 1       10000 0       32403 1       27446 1
```

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OCTAL LISTING FOR PARAGRAPH # 065,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,2400        12342 1   C: 00063 1   C: 01074 0   C: 00217 0   I: 40354 1   C: 02030 0   C: 00001 0   I: 75543 1
11,2410     C: 51770 0   I: 53515 0   C: 01535 0   I: 60325 0   C: 00045 0   C: 00047 1   I: 77715 1   I: 65241 0
11,2420     C: 01543 1   C: 02074 0   I: 60225 1   C: 01551 1   C: 00051 0   I: 77742 0   I: 65271 0   C: 00003 1
11,2430     I: 41405 0   C: 00005 1   I: 65316 0   C: 00005 1   I: 64716 0   C: 51770 0   I: 40442 1   I: 47515 0

11,2440     C: 01543 1   I: 44205 0   C: 00045 0   I: 41271 0   C: 00003 1   I: 53605 1   C: 11230 0   C: 20176 0
11,2450     I: 43260 1   C: 00050 1   I: 45257 0   C: 20211 1   I: 41205 0   C: 00001 0   C: 00005 1   I: 53657 0
11,2460     C: 20211 1   C: 20201 0   I: 65215 1   C: 01553 0   I: 53605 1   C: 00001 0   C: 20202 0   I: 43204 0
11,2470     C: 57754 0   I: 77626 0   C: 75647 0   I: 74020 0   C: 02112 1   C: 00012 1   I: 74014 1   C: 00303 1

11,2500     C: 24023 0   C: 00002 0   I: 77650 1   C: 24023 0   I: 66350 1   C: 01500 0   C: 00051 0   C: 77762 1
11,2510     I: 54345 1   C: 02076 1   C: 20612 0   I: 61500 0   C: 22515 0   I: 43206 1   C: 01551 1   C: 16074 0
11,2520     I: 77615 0   C: 01517 0   C: 35517 1   C: 22404 1   I: 73150 1   C: 02030 0   C: 02030 0   I: 77775 1
11,2530     C: 24007 0   C: 26062 1   C: 02032 1   I: 53257 1   C: 57605 0   C: 01535 0   C: 02040 1   I: 65014 1

11,2540     C: 01756 1   C: 22546 0   C: 01500 0   C: 12132 1   I: 77724 0   C: 01500 0   I: 53575 0   C: 02032 1
11,2550     C: 16032 1   C: 00045 0   C: 36070 0   C: 22655 1   I: 66175 1   C: 02040 1   C: 00051 0   C: 16032 1
11,2560     C: 02072 0   C: 02070 1   I: 71214 0   C: 00342 1   C: 23026 1   C: 01517 0   I: 77624 1   C: 33647 1
11,2570     I: 72174 0   C: 00002 0   C: 00051 0   I: 77614 1   C: 00343 0   C: 22600 1   I: 77076 0   C: 00000 1

11,2600     C: 02040 1   C: 26105 1   C: 00003 1   C: 02122 1   I: 45335 0   C: 01011 0   C: 11232 1   I: 43030 0
11,2610     C: 22613 0   C: 01756 1   C: 22627 1   I: 74375 0   C: 02032 1   C: 02070 1   I: 52257 0   C: 57175 0
11,2620     C: 02040 1   I: 77724 0   C: 01500 0   C: 12140 1   C: 02114 1   I: 77724 0   C: 01500 0   I: 62175 0
11,2630     C: 02105 1   C: 00004 0   I: 43014 0   C: 04260 1   C: 00343 0   C: 22642 1   I: 53261 1   C: 20612 0

11,2640     C: 02122 1   C: 02122 1   I: 77624 1   C: 22655 1   I: 62174 1   C: 00004 0   C: 00004 0   I: 77775 1
11,2650     C: 02122 1   C: 36040 0   C: 22655 1   I: 77650 1   C: 23026 1   I: 74575 0   C: 02040 1   I: 40236 1
11,2660     C: 00001 0   I: 61501 1   C: 00040 0   I: 60325 0   C: 02070 1   C: 00041 1   I: 63342 1   C: 02040 1
11,2670     I: 77656 1   C: 16040 1   C: 00045 0   C: 02072 0   I: 55301 0   C: 00042 1   I: 41562 0   I: 77743 1

11,2700     C: 27731 1   C: 00051 0   I: 57124 1   C: 00050 1   C: 00040 0   I: 71264 1   C: 00041 1   C: 00003 1
11,2710     I: 65057 0   C: 57177 1   C: 00050 1   I: 74406 0   I: 50315 0   C: 02032 1   C: 02040 1   I: 44372 1
11,2720     I: 57206 1   C: 00005 1   I: 77752 1   I: 43206 1   C: 25766 1   I: 75406 1   I: 41475 1   C: 00013 0
11,2730     I: 43352 1   C: 25766 1   I: 43325 1   C: 00013 0   C: 24005 1   I: 72475 1   C: 00011 1   I: 56215 1

11,2740     C: 25760 1   C: 00017 1   I: 74275 1   C: 00007 0   C: 02040 1   I: 64515 1   C: 02032 1   I: 41455 0
11,2750     I: 41345 0   C: 00001 0   C: 00015 0   I: 61501 1   C: 00037 0   I: 40665 0   C: 00003 1   C: 51770 0
11,2760     I: 74276 1   I: 57124 1   C: 00050 1   C: 00051 0   I: 55064 0   C: 00036 1   C: 00037 0   I: 53604 0
11,2770     C: 57754 0   C: 57177 1   I: 53324 1   C: 00050 1   C: 02062 1   C: 02062 1   I: 43400 1   C: 23000 0
```

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GAP:  ASSEMBLE REVISION 131 OF AGC PROGRAM LUMINARY BY NASA 2021112-091      17:53 DEC. 19,1969             PAGE 1621

OCTAL LISTING FOR PARAGRAPH # 066,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3000       I: 51575 1    C: 01521 0    I: 77654 0    C: 23023 1    I: 54345 1    C: 02100 1    C: 20612 0    I: 44206 0
11,3010       C: 01551 1    C: 16074 0    C: 01517 0    I: 45425 0    C: 42260 0    C: 22404 1    I: 77624 1    C: 27671 1
11,3020       I: 77614 1    C: 04020 1    C: 27256 0    I: 77776 1       05642 1    C: 20430 1    I: 71354 0    C: 02030 0
11,3030       C: 02070 1    I: 44601 0    C: 00001 0    C: 50032 0    I: 43044 0    C: 23264 0    C: 00343 0    C: 23273 0

11,3040       I: 65375 0    C: 02032 1    C: 01517 0    I: 45125 0    C: 25756 1    C: 51700 1    C: 24017 1    C: 24001 0
11,3050       I: 45006 0    C: 23301 1    I: 77715 1    C: 24005 1    I: 45006 0    C: 23301 1    I: 77772 0    C: 24041 1
11,3060       I: 77772 0    C: 14025 0    C: 00023 0    I: 65275 1    C: 25770 0    C: 00023 0    I: 57316 1    C: 25772 1
11,3070       I: 41425 1    C: 25764 0    I: 41275 1    C: 00023 0    C: 11222 0    I: 65372 1    C: 00001 0    I: 44275 1

11,3100       C: 11230 0    I: 57206 1    C: 00023 0    I: 65275 1    C: 11224 0    C: 00003 1    I: 44275 1    C: 11226 1
11,3110       I: 56203 0    C: 51764 0    C: 02070 1    I: 56615 0    C: 00005 1    C: 51760 1    I: 43271 1    C: 02070 1
11,3120       C: 00003 1    I: 77761 1    C: 02032 1    C: 14033 1    I: 70403 1    C: 51764 0    I: 43271 1    C: 02070 1
11,3130       I: 50473 1    C: 51760 1    I: 43271 1    C: 02070 1    I: 76561 1    C: 00025 0    I: 77645 0    C: 00033 1

11,3140       C: 14033 1    C: 02070 1    I: 63501 0    C: 00047 1    I: 60316 0    C: 00051 0    I: 54606 0    C: 51754 0
11,3150       I: 40161 0    C: 00033 1    C: 23153 1    I: 56070 0    C: 00046 0    C: 00046 0    I: 53670 0    C: 00050 1
11,3160       C: 20153 1    I: 40055 0    C: 02062 1    C: 23000 0    C: 16062 1    C: 00017 1    I: 41414 0    C: 00343 0
11,3170       C: 23264 0    I: 65316 0    C: 00021 1    I: 45316 1    I: 74205 0    C: 27733 0    C: 02032 1    I: 65332 0

11,3200       I: 53361 0    C: 00041 1    I: 47315 0    C: 00041 1    C: 00025 0    I: 74372 1    C: 00021 1    I: 41455 0
11,3210       I: 77745 1    C: 00023 0    I: 41516 0    I: 65205 0    C: 27733 0    I: 43302 1    C: 00011 1    I: 41221 0
11,3220       C: 11007 0    C: 00017 1    I: 74205 0    C: 27733 0    C: 02032 1    I: 65272 0    I: 74225 1    C: 11007 0
11,3230       C: 00041 1    I: 53372 1    I: 41325 0    C: 00017 1    C: 00023 0    I: 74205 0    C: 27733 0    C: 00025 0

11,3240       I: 53352 0    I: 60325 0    C: 02070 1    C: 00050 1    I: 67206 1    C: 01351 1    I: 74271 0    I: 63257 1
11,3250       C: 57601 1    I: 67206 1    C: 01350 0    I: 53361 0    I: 70257 0    C: 20146 0    I: 40055 0    C: 02062 1
11,3260       C: 23000 0    C: 02062 1    I: 77754 1    C: 02030 0    I: 72135 0    C: 01501 1    C: 00154 1    I: 73205 1
11,3270       C: 27735 0    C: 00155 0    C: 23306 0    I: 77745 1    C: 02036 0    C: 24023 0    C: 24001 0    I: 77650 1

11,3300       C: 23061 1    I: 57435 1    C: 02013 1    I: 77655 1    I: 43505 0    C: 00025 0    C: 23475 0    C: 23501 1
11,3310       C: 23512 0    I: 77214 0    C: 00342 1    C: 23342 0    C: 01535 0    I: 41241 0    C: 01543 1    C: 02076 1
11,3320       I: 77640 0    C: 23342 0    I: 43614 0    C: 00303 1    C: 23417 1    C: 04340 1    C: 23414 1    I: 45145 0
11,3330       C: 01517 0    C: 33647 1    C: 02105 1    I: 77754 1    C: 02030 0    I: 51445 0    C: 01535 0    I: 50025 0

11,3340       C: 27741 0    C: 23434 0    I: 51575 1    C: 01521 0    I: 77600 1    C: 23370 1    I: 51025 1    C: 11220 1
11,3350       C: 23370 1    I: 53615 0    C: 11220 1    C: 57605 0    I: 45271 1    C: 00013 0    C: 27737 1    I: 77244 0
11,3360       C: 23370 1    C: 01527 0    I: 45246 0    C: 11220 1    I: 77600 1    C: 23370 1    I: 77640 0    C: 23372 0
11,3370       I: 77624 1    C: 27671 1    I: 77775 1    C: 01527 0    C: 25134 0    C: 01521 0    C: 01126 0    I: 77614 1
```

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OCTAL LISTING FOR PARAGRAPH # 067,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

11,3400      C: 00261 1    I: 66375 0    C: 01126 0    C: 01501 1    C: 00000 1    C: 16032 1    C: 24007 0    C: 02100 1
11,3410      I: 52014 0    C: 00301 0    C: 23714 1    C: 22524 1    I: 52175 0    C: 02105 1    C: 23335 0    I: 60545 0
11,3420      C: 00013 0    I: 50025 0    C: 27741 0    C: 23342 0    I: 71214 0    C: 04340 1    C: 23434 0    C: 01517 0
11,3430      I: 77624 1    C: 33647 1    I: 77676 0    C: 02105 1    I: 77624 1    C: 23440 0    I: 77650 1    C: 23372 0

11,3440      I: 45020 1    C: 02112 1    C: 27671 1    I: 53775 1    C: 01535 0    C: 57576 1    I: 53651 0    C: 02105 1
11,3450      C: 57574 0    C: 01503 0    C: 01535 0    I: 57414 1    C: 00343 0    C: 23456 1    I: 53715 1    C: 01543 1
11,3460      C: 57576 1    I: 77651 0    I: 77657 0    C: 57574 0    C: 01511 0    C: 01543 1    I: 67154 0    C: 02112 1
11,3470      C: 00052 0    I: 52014 0    C: 00303 1    C: 26710 0    C: 26715 0    I: 64575 1    C: 02062 1    C: 36046 0

11,3500      C: 23655 0    I: 74575 0    C: 02062 1    I: 53206 0    C: 02046 1    C: 26054 1    I: 53362 0    C: 02046 1
11,3510      C: 36046 0    C: 23655 0    I: 57345 1    C: 02100 1    C: 11230 0    I: 74206 0    C: 02046 1    I: 53372 1
11,3520      C: 01134 0    I: 53361 0    C: 02100 1    C: 01126 0    C: 25126 0    C: 02062 1    I: 53322 1    C: 02054 1
11,3530      I: 76561 1    I: 77655 1    C: 01134 0    C: 01134 0    I: 45014 0    C: 00341 1    C: 23606 0    C: 11210 1

11,3540      I: 77354 0    C: 01116 0    C: 01134 0    I: 77732 1    C: 12467 1    I: 77775 1    C: 01126 0    I: 40132 0
11,3550      C: 23700 1    C: 12401 1    I: 77624 1    C: 11210 1    I: 66354 0    C: 01116 0    C: 00052 0    C: 00000 1
11,3560      I: 67114 1    C: 00006 1    C: 01125 0    I: 45104 0    C: 23651 1    C: 11210 1    I: 67154 0    C: 01125 0
11,3570      C: 01116 0    I: 77624 1    C: 11210 1    I: 76754 0    C: 01116 0    C: 75376 1    I: 77722 0    C: 01126 0

11,3600      I: 76173 0    C: 75310 1    C: 00000 1    I: 77722 0    C: 35134 1    C: 23401 0    I: 77200 0    C: 23000 0
11,3610      C: 01134 0    C: 25527 0    C: 01126 0    C: 01521 0    I: 43014 0    C: 04715 0    C: 27627 1    C: 01756 1
11,3620      C: 27256 0    I: 77776 1       05353 1    C: 04022 0       05504 0    C: 00236 0       06042 1    I: 77731 1
11,3630      C: 00053 1    C: 23636 0    I: 52014 0    C: 01714 1    C: 26660 0    C: 26733 1    I: 66214 0    C: 00061 0

11,3640      C: 01117 1    C: 77741 0    I: 66214 0    C: 01755 1    C: 23571 0    C: 01117 1    C: 77717 0    I: 77650 1
11,3650      C: 23571 0    I: 77745 1    C: 01115 0    C: 34041 0    C: 27140 1    I: 43345 1    C: 02076 1    C: 02100 1
11,3660      I: 66110 1    C: 77763 0    C: 01500 0    C: 02100 1    I: 74561 0    C: 02062 1    I: 74255 0    C: 01134 0
11,3670      C: 02100 1    I: 77655 1    C: 01126 0    C: 02032 1    I: 52014 0    C: 00301 0    C: 23714 1    C: 22504 0

11,3700      I: 43014 0    C: 01676 1    C: 01671 0    I: 77614 1    C: 02676 1    I: 77414 0    C: 01472 1       05567 0
11,3710      C: 00421 0       06042 1    I: 77650 1    C: 27256 0    I: 70754 0    C: 02030 0    C: 51770 0    C: 36072 1
11,3720      C: 23742 1    C: 02062 1    I: 62014 0    C: 00342 1    C: 23264 0    C: 77771 0    I: 70744 1    C: 02030 0
11,3730      C: 51772 1    C: 36072 1    C: 23742 1    I: 50414 0    C: 00303 1    C: 23736 1    I: 77655 1    C: 02062 1

11,3740      C: 36062 0    C: 23264 0    I: 60575 0    C: 02032 1    I: 53513 0    C: 02132 0    I: 46315 1    C: 02032 1
11,3750      I: 52361 1    C: 11220 1    I: 60325 0    C: 00045 0    C: 00052 0    I: 63406 0    I: 77605 1    I: 65301 0
11,3760      C: 00043 0    C: 02072 0    I: 56342 1    I: 77761 1    I: 57154 0    C: 00051 0    C: 00051 0    I: 57074 0
11,3770      C: 00051 0    C: 00042 1    I: 43457 0    C: 57606 0    C: 03774 0    C: 03775 1  CKSM 10027 0         @
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OCTAL LISTING FOR PARAGRAPH # 070, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2000     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 20000 0   C: 00000 1   C: 00000 1   C: 00000 1
12,2010     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 77777 0   C: 77771 0   C: 77763 0   C: 37777 1
12,2020     C: 37777 1   C: 37777 1   C: 37777 1   I: 40001 1   C: 00001 0   C: 24026 0   I: 77773 1   C: 10005 0
12,2030     C: 24017 1   C: 01503 0   I: 66256 0   C: 00027 1   C: 00024 1   C: 16647 0   C: 00045 0   C: 24041 1

12,2040     C: 01503 0   I: 76441 1   C: 01511 0   I: 76405 1   C: 00023 0   C: 24043 0   C: 01511 0   I: 57236 1
12,2050     C: 00017 1   I: 52405 1   C: 00041 1   I: 61425 0   C: 11001 0   C: 00045 0   I: 74421 0   C: 11001 0
12,2060     I: 77671 1   C: 00041 1   C: 00011 1   I: 71244 0   C: 24073 0   C: 11017 1   I: 40071 0   C: 00011 1
12,2070     C: 24077 1   I: 52166 1   C: 24077 1   I: 55366 1   C: 11021 1   I: 77600 1   C: 24077 1   C: 00013 0

12,2100     I: 65205 0   C: 00023 0   C: 00011 1   I: 65301 0   C: 00047 1   I: 56257 1   C: 20173 0   I: 50000 1
12,2110     C: 24124 0   C: 24124 0   I: 51525 1   C: 02074 0   I: 50025 0   C: 00001 0   C: 24124 0   I: 77765 0
12,2120     C: 02074 0   C: 16074 0   I: 77650 1   C: 24112 0   I: 71201 1   C: 00001 0   C: 02130 1   C: 00025 0
12,2130     I: 53165 0   C: 02074 0   C: 24302 0   I: 51440 0   C: 24302 0   I: 51025 1   C: 00013 0   C: 24302 0

12,2140     I: 51145 0   C: 02074 0   C: 24152 1   I: 57545 1   C: 00013 0   C: 14015 0   C: 24007 0   C: 00013 0
12,2150     I: 77650 1   C: 24155 0   I: 77745 1   C: 24007 0   C: 00015 0   I: 57345 1   C: 02074 0   C: 11012 1
12,2160     I: 77646 0   C: 16177 1   C: 01553 0   I: 77621 1   C: 00025 0   C: 02643 1   I: 63545 0   C: 00025 0
12,2170     I: 41501 0   C: 00047 1   I: 53605 1   C: 00011 1   C: 21573 0   C: 34031 1   C: 24421 0   I: 44200 0

12,2200     C: 24311 1   C: 02074 0   C: 02645 1   I: 44246 1   C: 02177 1   I: 71244 0   C: 24333 1   C: 00037 0
12,2210     I: 60225 1   C: 01551 1   C: 00047 1   I: 60325 0   C: 02643 1   C: 00050 1   I: 41260 0   C: 00047 1
12,2220     C: 02645 1   I: 56257 1   C: 21202 1   I: 41542 1   I: 71244 0   C: 24246 1   C: 00025 0   C: 00013 0
12,2230     I: 45221 1   C: 00015 0   I: 51000 0   C: 24240 1   C: 24240 1   I: 52145 0   C: 00001 0   C: 24260 0

12,2240     I: 45345 1   C: 00015 0   C: 00025 0   I: 52075 1   C: 11015 0   C: 24260 0   I: 77745 1   C: 00025 0
12,2250     C: 00015 0   I: 45221 1   C: 00013 0   I: 50000 1   C: 24274 0   C: 24274 0   I: 77745 1   C: 00001 0
12,2260     C: 02643 1   I: 43254 0   C: 24333 1   C: 00025 0   C: 14025 0   C: 00037 0   C: 01551 1   I: 46034 1
12,2270     C: 24644 1   C: 24333 1   I: 77650 1   C: 24166 0   I: 45345 1   C: 00013 0   C: 00025 0   I: 52075 1

12,2300     C: 11015 0   C: 24260 0   I: 70545 1   C: 00013 0   I: 77765 0   C: 02074 0   C: 00025 0   I: 77650 1
12,2310     C: 24140 1   I: 50145 1   C: 00025 0   C: 24330 1   C: 00013 0   I: 70545 1   C: 02643 1   C: 02643 1
12,2320     I: 44254 1   C: 02112 1   C: 00025 0   C: 14025 0   C: 01551 1   C: 00037 0   I: 77650 1   C: 24267 1
12,2330     C: 00015 0   I: 77650 1   C: 24315 0   I: 44545 0   C: 00041 1   I: 74225 1   C: 00035 1   C: 02647 0

12,2340     I: 65372 1   C: 00025 0   I: 60316 0   C: 00047 1   I: 57275 0   C: 00023 0   C: 00025 0   I: 53605 1
12,2350     C: 00033 1   C: 21572 1   I: 77621 1   C: 00037 0   I: 74352 0   C: 01511 0   I: 53372 1   I: 77712 0
12,2360     C: 01535 0   I: 60246 1   C: 00050 1   C: 14043 0   C: 00031 0   I: 45275 0   C: 00033 1   C: 10777 1
12,2370     I: 76405 1   C: 00021 1   I: 53605 1   C: 00025 0   C: 56601 0   I: 74271 0   C: 00043 0   C: 02647 0
```

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OCTAL LISTING FOR PARAGRAPH # 071, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,2400      I: 65372 1   C: 00035 1   I: 56257 1   C: 56602 0   C: 00043 0   I: 74221 0   C: 11013 0   C: 01511 0
12,2410      I: 42455 0   I: 77626 0   C: 62234 0   C: 00037 0   C: 15551 1   C: 00025 0   C: 01553 0   I: 77650 1
12,2420      C: 02112 1   I: 77776 1      07225 0   C: 00010 0   C: 02525 1   C: 12526 0   C: 67356 0   C: 75666 0
12,2430      C: 15001 1   C: 23771 1   C: 64342 0   C: 43674 0   C: 06563 1   C: 04645 1   C: 75173 0   C: 52672 0

12,2440      C: 00656 1   C: 14331 0   C: 77633 1   C: 40512 0   C: 00023 0   C: 11210 1   C: 77774 0   C: 67506 0
12,2450         06042 1   C: 14033 1   C: 00031 0   I: 77776 1      07225 0   C: 00010 0   C: 01000 0   C: 00000 1
12,2460      C: 72525 0   C: 52506 0   C: 13301 1   C: 15337 1   C: 62776 0   C: 54733 1   C: 11176 1   C: 13267 0
12,2470      C: 73410 0   C: 51674 0   C: 01446 0   C: 33641 1   C: 77451 1   C: 65233 0   C: 00055 1   C: 37266 1

12,2500      C: 77767 1   C: 52336 0      06042 1   I: 53605 1   C: 00001 0   C: 21574 1   C: 00035 1   I: 72405 0
12,2510      C: 00043 0   I: 65234 1   C: 21634 0   I: 53605 1   C: 00033 1   C: 21574 1   I: 72405 0   C: 00045 0
12,2520      I: 65234 1   C: 21634 0   C: 00041 1   I: 76261 0   C: 20607 1   I: 41301 0   C: 00047 1   C: 00025 0
12,2530      I: 76257 0   C: 20576 1   I: 57232 0   C: 00023 0   C: 00037 0   I: 77616 0   I: 71214 0   C: 00614 1

12,2540      C: 24606 1   C: 00037 0   I: 60225 1   C: 02762 0   C: 00047 1   I: 60325 0   C: 00015 0   C: 00050 1
12,2550      I: 41260 0   C: 00047 1   C: 02760 1   I: 56257 1   C: 21202 1   I: 43142 1   C: 04351 1   C: 24562 0
12,2560      I: 75246 0   C: 02760 1   I: 51006 0   C: 24620 0   I: 43145 0   C: 02766 1   C: 04311 0   C: 24571 1
12,2570      C: 00017 1   I: 45221 1   C: 00011 1   I: 51000 0   C: 24600 1   C: 24600 1   I: 77650 1   C: 24632 0

12,2600      I: 45345 1   C: 00011 1   C: 02766 1   I: 52005 0   C: 11015 0   C: 24634 0   I: 41345 0   C: 00011 1
12,2610      C: 00051 0   I: 41325 0   C: 00017 1   C: 00051 0   I: 77625 0   I: 52165 1   C: 02760 1   C: 24562 0
12,2620      I: 43145 0   C: 02766 1   C: 04311 0   C: 24625 0   C: 00011 1   I: 45221 1   C: 00017 1   I: 50000 1
12,2630      C: 24636 1   C: 24636 1   I: 77745 1   C: 00001 0   C: 00015 0   I: 77616 0   I: 45345 1   C: 00017 1

12,2640      C: 02766 1   I: 52005 0   C: 11015 0   C: 24634 0      44753 0      50120 1      60026 0      50120 1
12,2650         54026 1      54154 0      06064 0   I: 44545 0   C: 00041 1   I: 74225 1   C: 00035 1   C: 02722 1
12,2660      I: 65372 1   C: 00025 0   I: 60316 0   C: 00047 1   I: 57275 0   C: 00023 0   C: 00025 0   I: 53605 1
12,2670      C: 00033 1   C: 21572 1   I: 77621 1   C: 00037 0   I: 74352 0   C: 02744 1   I: 53372 1   I: 41512 1

12,2700      I: 77646 0   I: 77701 1   C: 00047 1   C: 16720 0   C: 00031 0   I: 45205 1   C: 00033 1   C: 10777 1
12,2710      I: 76405 1   C: 00021 1   I: 53605 1   C: 00025 0   C: 21176 1   I: 74271 0   C: 02720 0   C: 02722 1
12,2720      I: 65372 1   C: 00035 1   I: 56257 1   C: 21175 1   C: 02720 0   I: 77621 1   C: 11013 0   I: 53361 0
12,2730      C: 02744 1   I: 43412 1   I: 40220 0   C: 02710 0   C: 00001 0   I: 77600 1   C: 24737 1   I: 63375 0

12,2740      C: 02655 0   C: 02744 1   I: 77624 1   C: 11030 1   I: 45000 0   C: 24764 1   C: 24767 1   I: 43145 0
12,2750      C: 00031 0   C: 04310 1   C: 25752 0   I: 45014 0   C: 04273 0   C: 24421 0   I: 45014 0   C: 03706 0
12,2760      C: 02710 0   C: 24653 1   I: 77650 1   C: 02710 0   I: 77614 1   C: 04033 0   C: 25752 0   I: 66374 1
12,2770      C: 00003 1   C: 00052 1   C: 00001 0   I: 77614 1   C: 04276 0   I: 65366 1   C: 02732 0   I: 44342 1
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OCTAL LISTING FOR PARAGRAPH # 072, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3000      C: 11003 1    I: 54325 1    C: 02730 1    C: 21607 0    I: 77671 1    I: 77600 1    C: 25122 1    I: 41225 1
12,3010      C: 02766 1    I: 40132 0    C: 25122 1    I: 63406 0    I: 65351 0    C: 00155 0    C: 02742 1    I: 76202 0
12,3020      I: 75440 0    C: 25205 1    I: 43306 0    I: 61000 0    C: 25120 0    C: 25013 1    I: 40065 0    C: 10777 1
12,3030      C: 25205 1    I: 41440 1    C: 25205 1    I: 77716 1    I: 41301 0    C: 00047 1    C: 02742 1    I: 77457 1

12,3040      C: 21567 0       07225 0    C: 00005 1    C: 20000 0    C: 00000 1    C: 72525 0    C: 52471 1    C: 03146 1
12,3050      C: 15003 0    C: 75556 0    C: 45210 0    C: 01615 1    C: 13553 0    C: 76371 0    C: 63777 0    C: 01232 0
12,3060      C: 27367 0       06042 1    I: 76405 1    I: 43006 0    C: 04316 1    C: 25172 1    I: 60316 0    C: 00047 1
12,3070      I: 53605 1    C: 02742 1    C: 21565 1    C: 14031 0    C: 00041 1    I: 75542 0    I: 41306 1    I: 77632 0

12,3100      C: 00025 0    I: 60316 0    C: 00047 1    I: 41325 0    C: 02740 0    C: 00041 1    I: 75452 0    I: 56405 0
12,3110      C: 02766 1    C: 14043 0    C: 02742 1    I: 43021 0    C: 11001 0    C: 04270 0    C: 00045 0    I: 77616 0
12,3120      I: 77774 0    C: 00003 1    I: 51001 1    C: 00001 0    C: 25127 1    I: 77614 1    C: 04076 1    I: 75545 1
12,3130      C: 02740 0    I: 41325 0    C: 02730 1    C: 02766 1    I: 65352 0    C: 02732 0    I: 43202 0    C: 11007 0

12,3140      I: 41225 1    I: 55301 0    C: 00047 1    C: 02730 1    I: 51457 0    C: 21174 0    I: 63406 0    C: 14043 0
12,3150      C: 11005 1    I: 63406 0    I: 65234 1    C: 21634 0    C: 02742 1    I: 40405 1    C: 00043 0    I: 77771 0
12,3160      I: 75440 0    C: 25205 1    I: 77615 0    I: 60304 0    C: 25151 0    C: 00047 1    I: 77665 1    I: 52057 1
12,3170      C: 21172 0    C: 25031 1    I: 50145 1    C: 02742 1    C: 25205 1    I: 60366 1    C: 00047 1    I: 53665 1

12,3200      C: 11021 1    C: 20176 0    I: 41425 1    I: 77650 1    C: 25066 0    I: 40001 1    C: 00001 0    C: 25210 0
12,3210      I: 43414 1    C: 04070 1    I: 40220 0    C: 02710 0    C: 00001 0    I: 77600 1    C: 25217 1    I: 76614 0
12,3220      C: 02674 0    C: 10005 0    C: 14017 1    C: 02671 0    I: 77675 0    C: 11006 1    C: 02764 0    I: 77214 0
12,3230      C: 00474 0    C: 02655 0    I: 45115 0    C: 02663 0    C: 11074 1    C: 16730 1    C: 02720 0    I: 65301 0

12,3240      C: 00047 1    C: 00041 1    I: 56342 1    I: 65257 1    C: 20173 0    I: 77626 0    C: 75045 1    I: 44342 1
12,3250      C: 11003 1    C: 02734 0    I: 53106 0    C: 25473 0    I: 65301 0    C: 00047 1    C: 00001 0    I: 56342 1
12,3260      I: 75457 0    C: 20176 0    I: 54325 1    C: 02730 1    C: 20607 1    I: 43271 1    C: 02734 0    I: 77626 0
12,3270      C: 77760 0    I: 50000 1    C: 25277 1    C: 25302 1    I: 50025 0    C: 11025 0    C: 25302 1    I: 77745 1

12,3300      C: 11025 0    C: 00017 1    I: 77745 1    C: 02732 0    I: 45261 0    C: 20607 1    I: 77626 0    C: 61041 0
12,3310      C: 02673 1    I: 71240 1    C: 25513 1    C: 02736 1    I: 56352 0    C: 02730 1    I: 77600 1    C: 25513 1
12,3320      C: 00011 1    I: 66214 0    C: 00715 1    C: 25477 1    C: 00051 0    C: 00001 0    I: 77745 1    C: 02766 1
12,3330      I: 77605 1    C: 02730 1    I: 45342 0    C: 02736 1    I: 65301 0    C: 00047 1    C: 02734 0    I: 56257 1

12,3340      C: 20170 0    I: 53040 0    C: 25427 1    C: 25427 1    C: 16740 0    C: 02766 1    I: 43316 1    C: 11011 1
12,3350      I: 41301 0    C: 00047 1    C: 02740 0    I: 44257 1    C: 20571 0    C: 11007 0    C: 16742 1    C: 02740 0
12,3360      I: 45000 0    C: 25432 0    C: 24767 1    I: 77745 1    C: 00037 0    C: 16762 0    C: 00031 0    I: 45014 0
12,3370      C: 04310 1    C: 25427 1    C: 24421 0    I: 44200 0    C: 25447 1    C: 02671 0    C: 02760 1    I: 44246 1
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OCTAL LISTING FOR PARAGRAPH # 073,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

12,3400      C: 02764 0    I: 47044 1    C: 25516 1    C: 24644 1    I: 43030 0    C: 25460 1    C: 00714 0    C: 25415 0
12,3410      I: 45345 1    C: 00037 0    C: 02762 0    I: 77654 0    C: 25460 1    I: 77624 1    C: 24536 1    I: 53145 1
12,3420      C: 00155 0    C: 25460 1    I: 77615 0    C: 02766 1    C: 02766 1    I: 77650 1    C: 25330 0    I: 51145 0
12,3430      C: 00015 0    C: 25452 0    I: 71201 1    C: 00001 0    C: 02766 1    C: 00011 1    I: 70545 1    C: 00015 0

12,3440      C: 00015 0    I: 44254 1    C: 25460 1    C: 02766 1    C: 02766 1    I: 77650 1    C: 25330 0    I: 77745 1
12,3450      C: 02762 0    C: 00037 0    I: 71201 1    C: 00001 0    C: 02766 1    C: 00017 1    I: 77650 1    C: 25436 1
12,3460      I: 51545 1    C: 02760 1    I: 41325 0    C: 02671 0    C: 10774 1    I: 45215 0    C: 11023 0    I: 43044 0
12,3470      C: 25516 1    C: 02434 0    C: 25516 1    I: 43001 1    C: 00001 0    C: 02434 0    C: 02710 0    I: 71331 0

12,3500      C: 00051 0    C: 10000 0    C: 00011 1    I: 65342 1    C: 00017 1    I: 43342 0    I: 77626 0    C: 75011 0
12,3510      C: 00015 0    I: 77650 1    C: 25330 0    I: 52145 0    C: 11027 1    C: 25320 1    I: 60345 0    C: 00041 1
12,3520      C: 00047 1    I: 70525 1    C: 02740 0    I: 77671 1    I: 75457 0    C: 20175 0    I: 72405 0    C: 00021 1
12,3530      I: 41206 0    C: 02766 1    I: 74261 1    C: 20206 1    C: 02722 1    I: 77725 1    I: 76561 1    C: 02674 0

12,3540      I: 53235 0    C: 02722 1    I: 77772 0    C: 02744 1    I: 53135 0    C: 02702 0    C: 25551 1    I: 77650 1
12,3550      C: 02710 0    I: 45145 0    C: 02720 0    C: 24701 1    C: 02703 1    I: 77650 1    C: 02710 0    I: 40220 0
12,3560      C: 02710 0    C: 00001 0    I: 77600 1    C: 25564 1    I: 63375 0    C: 02655 0    C: 02744 1    I: 77624 1
12,3570      C: 11030 1    I: 71200 0    C: 24764 1    C: 11007 0    I: 41225 1    C: 02742 1    C: 02740 0    I: 41366 1

12,3600      C: 02766 1    I: 74212 0    C: 02712 1    I: 45325 1    C: 11001 0    C: 02742 1    I: 52361 1    C: 02722 1
12,3610      I: 53512 1    I: 77600 1    C: 25670 1    I: 60325 0    C: 02756 1    C: 00047 1    I: 41325 0    C: 00041 1
12,3620      C: 02740 0    I: 56257 1    C: 20201 0    I: 56225 1    C: 11005 1    C: 00045 0    C: 00031 0    I: 63400 0
12,3630      C: 25674 0    I: 50021 1    C: 11003 1    C: 25674 0    I: 75366 0    C: 02755 1    I: 77614 1    C: 04272 1

12,3640      I: 76561 1    C: 02674 0    I: 63235 0    C: 00001 0    I: 53361 0    C: 00031 0    I: 41572 1    I: 56241 0
12,3650      C: 02722 1    C: 25766 1    I: 40142 1    C: 25654 1    C: 26732 0    C: 02722 1    I: 76435 1    I: 72441 0
12,3660      C: 02674 0    C: 16730 1    C: 02740 0    I: 77624 1    C: 24767 1    I: 77614 1    C: 02634 1    C: 24747 0
12,3670      I: 43001 1    C: 00001 0    C: 02434 0    C: 25752 0    I: 75345 1    C: 24005 1    C: 00031 0    C: 14031 0

12,3700      C: 24007 0    I: 77614 1    C: 04032 1    C: 25640 1    I: 40220 0    C: 02710 0    C: 00001 0    I: 77600 1
12,3710      C: 25711 1    I: 63375 0    C: 02655 0    C: 02744 1    I: 77624 1    C: 11030 1    I: 77600 1    C: 25720 0
12,3720      I: 42405 0    C: 02742 1    I: 75421 1    C: 11001 0    C: 02752 0    I: 65215 1    C: 10775 0    C: 00041 1
12,3730      I: 72405 0    C: 02740 0    I: 77671 1    I: 60325 0    C: 02742 1    C: 00047 1    I: 53725 1    C: 00041 1

12,3740      C: 20174 1    I: 45271 1    I: 50000 1    C: 25747 1    C: 25747 1    I: 77650 1    C: 02710 0    I: 52145 0
12,3750      C: 24020 0    C: 02710 0    I: 77776 1       05642 1    C: 20607 1    C: 04631 1    C: 23146 0    C: 14000 1
12,3760      C: 00000 1    C: 02314 0    C: 31463 1    C: 01400 1    C: 00000 1    C: 10000 0    C: 00000 1    C: 03000 1
12,3770      C: 00000 1    C: 36000 1    C: 00000 1    C: 03773 1    C: 03774 0   CKSM 52177 1         @             @
```

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OCTAL LISTING FOR PARAGRAPH # 074,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2000     C: 07112 1    C: 06620 0    C: 27446 1    C: 14620 0    C: 16471 1    C: 01352 1    C: 22437 1    C: 16067 1
13,2010     C: 00000 1    C: 00000 1    C: 02302 1    C: 24736 0    C: 77651 0    C: 76237 0    C: 77776 1    C: 53032 0
13,2020     C: 10407 0    C: 05344 1    C: 13710 0    C: 35320 0    C: 12160 0    C: 12124 0    I: 43014 0    C: 01474 1
13,2030     C: 04347 0    C: 26036 0    I: 43014 0    C: 02756 1    C: 26036 0    C: 01476 0    I: 45014 0    C: 01667 1

13,2040     C: 27133 0    I: 71214 0    C: 04307 1    C: 26063 0    C: 01571 0    C: 34041 0    C: 27410 1    I: 45014 0
13,2050     C: 01674 0    C: 26643 1    I: 77614 1    C: 02756 1    C: 26060 0    I: 43014 0    C: 01476 0    C: 01475 0
13,2060     I: 45014 0    C: 01467 0    C: 27133 0    I: 77614 1    C: 01236 1    C: 26631 1    I: 43414 1    C: 01674 0
13,2070     I: 43414 1    C: 04756 1    C: 26073 1    I: 53775 1    C: 01521 0    C: 57605 0    I: 53655 1    C: 01535 0

13,2100     C: 57576 1    C: 25220 0    C: 01527 0    I: 53257 1    C: 57602 1    C: 01543 1    I: 77657 0    C: 57576 1
13,2110     C: 15226 0    C: 01517 0    C: 01234 0    I: 77616 0    I: 53775 1    C: 01521 0    C: 57605 0    I: 53655 1
13,2120     C: 01535 0    C: 57576 1    C: 25720 0    C: 01527 0    I: 53257 1    C: 57602 1    C: 01543 1    I: 77657 0
13,2130     C: 57576 1    C: 01726 0    I: 77616 0    C: 00041 1    I: 57545 1    C: 00043 0    I: 67401 0    C: 00001 0

13,2140     I: 44206 0    C: 24005 1    C: 14005 1    C: 24007 0    C: 24043 0    C: 00041 1    I: 41056 1    C: 52432 0
13,2150     C: 14041 1    C: 00041 1    I: 44142 0    C: 00051 0    C: 14023 0    C: 00045 0    I: 77742 0    C: 34021 0
13,2160     C: 47322 1    I: 43206 1    C: 24005 1    C: 24007 0    C: 00005 1    I: 77634 0    C: 21636 1    C: 25111 1
13,2170     C: 00001 0    I: 77634 0    C: 21636 1    C: 01107 0    I: 77776 1       40110 0       74740 1       10000 0

13,2200        12204 1       53107 1       53111 0       53107 1       06042 1    I: 77650 1    C: 00051 0       05504 0
13,2210     C: 00031 0       06042 1    I: 77775 1    C: 03434 1    C: 02223 0    I: 77776 1       32335 0       04616 1
13,2220     C: 20477 1       12331 0       02224 1       02216 0       32334 1       04616 1    C: 20477 1       12331 0
13,2230        02232 0       02224 1       06042 1    I: 43145 0    C: 03442 0    C: 01076 1    C: 34041 0    C: 27042 1

13,2240     I: 53575 0    C: 00001 0    I: 77676 0    C: 00031 0    I: 53435 0    C: 00007 0    C: 00023 0    I: 53435 0
13,2250     C: 00031 0    C: 24015 0    C: 02223 0    I: 76505 0    C: 00015 0    I: 77655 1    C: 00007 0    C: 00007 0
13,2260     I: 77624 1    C: 27410 1    I: 77624 1    C: 26336 0    I: 53775 1    C: 00007 0    C: 57176 0    C: 25543 1
13,2270     C: 00001 0    I: 77657 0    C: 57176 0    C: 15535 0    C: 03442 0    C: 01517 0    I: 71214 0    C: 01673 1

13,2300     C: 01643 1    C: 34041 0    C: 27106 0    I: 77624 1    C: 27410 1    I: 77775 1    C: 00017 1    C: 01503 0
13,2310     C: 15535 0    C: 00015 0    C: 25517 0    C: 00025 0    I: 77624 1    C: 27705 0    I: 77776 1       05353 1
13,2320     C: 04024 0       06042 1    I: 45014 0    C: 05070 0    C: 26660 0    I: 77624 1    C: 27417 0    I: 77414 0
13,2330     C: 01276 0       34755 1       55462 1       16001 1    C: 01524 0    C: 01441 1    I: 43174 1    C: 00002 0

13,2340     C: 00063 1    I: 77014 1    C: 04303 0    C: 00052 0    C: 00000 1    I: 43414 1    C: 00263 0    I: 40220 0
13,2350     C: 03674 1    C: 00001 0    C: 24007 0    C: 02032 1    I: 51406 1    C: 16070 1    C: 24007 0    I: 71414 0
13,2360     C: 01743 0    C: 26362 1    I: 77624 1    C: 51700 1    I: 77656 1    C: 36032 0    C: 26546 1    I: 77624 1
13,2370     C: 26556 0    I: 63545 0    C: 02032 1    I: 63525 0    C: 02034 1    I: 75415 0    I: 76405 1    C: 00011 1
```

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OCTAL LISTING FOR PARAGRAPH # 075, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,2400   C: 14021 1   C: 02036 0   C: 34023 1   C: 26506 0   C: 15120 0   C: 02032 1   C: 14021 1   C: 02034 1
13,2410   C: 34023 1   C: 26506 0   C: 15122 1   C: 02070 1   I: 77625 0   C: 03673 0   C: 35124 0   C: 03674 1
13,2420   I: 40220 0   C: 03674 1   C: 00001 0   C: 34007 1   C: 26546 1   I: 73545 1   C: 01120 0   I: 65275 1
13,2430   C: 00011 1   C: 01120 0   I: 65346 0   C: 01122 1   I: 57356 0   I: 71525 0   C: 01120 0   I: 71525 0

13,2440   C: 01122 1   I: 55475 1   I: 41456 0   C: 36032 0   C: 26556 0   I: 43145 0   C: 24007 0   C: 01743 0
13,2450   C: 26452 0   I: 77746 1   I: 77624 1   C: 55716 1   C: 16032 1   C: 03673 0   I: 74215 1   C: 01124 1
13,2460   C: 02032 1   I: 77772 0   C: 36032 0   C: 03674 1   I: 63545 0   C: 02036 0   I: 44352 0   C: 24005 1
13,2470   I: 44275 1   C: 26505 0   C: 24005 1   I: 75465 1   C: 26501 1   I: 77622 1   C: 03673 0   I: 77616 0

13,2500   C: 00446 1   C: 00305 1   C: 17711 0   C: 05254 1   C: 00155 0   C: 25250 1   I: 77600 1   C: 26510 1
13,2510   I: 63545 0   C: 00023 0   I: 63525 0   C: 00021 1   I: 77615 0   I: 75454 0   C: 26534 1   I: 40065 0
13,2520   C: 00023 0   C: 26541 0   I: 67542 0   C: 00025 0   I: 50125 1   C: 00021 1   C: 26530 0   I: 43545 1
13,2530   I: 57545 1   I: 43244 1   C: 26536 0   C: 24005 1   C: 00025 0   I: 77616 0   I: 52025 1   C: 24005 1

13,2540   C: 26534 1   I: 75345 1   C: 11003 1   C: 00023 0   C: 00025 0   I: 77616 0   I: 43145 0   C: 26503 0
13,2550   C: 01743 0   C: 26554 1   I: 77735 0   C: 24005 1   C: 00011 1   I: 77616 0   I: 71220 1   C: 00051 0
13,2560   C: 10003 0   I: 71214 0   C: 01703 1   C: 26573 1   C: 10001 1   I: 45014 0   C: 00742 0   C: 26571 0
13,2570   C: 26464 0   C: 37673 1   C: 00051 0   I: 77214 0   C: 00702 1   C: 26571 0   C: 02023 1   I: 64446 0

13,2600   I: 77650 1   C: 26571 0      05353 1   C: 00052 0      35017 1      05105 0   C: 02611 0   C: 26063 0
13,2610      05261 1      06042 1   I: 47014 1   C: 04712 1   C: 26652 1   C: 21574 1   C: 00041 1   I: 77624 1
13,2620   C: 27410 1   I: 45014 0   C: 01076 1   C: 26643 1   I: 52014 0   C: 01460 1   C: 26026 1   C: 00003 1
13,2630   C: 25140 0   I: 77414 0   C: 01672 0      05353 1   C: 20032 1      00006 1      32630 0      05277 0

13,2640   C: 02602 1   C: 26063 0      05155 0   I: 43014 0   C: 01472 1   C: 01673 1   I: 43014 0   C: 01676 1
13,2650   C: 01675 1   I: 77616 0   I: 77776 1      05353 1   C: 00002 0      05516 0   C: 00221 0      05155 0
13,2660   I: 47020 0   C: 00051 0   C: 26673 1   I: 45014 0   C: 04063 0   C: 26114 1   I: 43014 0   C: 00303 1
13,2670   C: 00051 0   C: 04223 0   C: 00051 0      03035 1      55500 1      51500 0      31502 1      51500 0

13,2700      55554 0      11500 1      12674 1      06064 0   I: 43034 1   C: 26722 1   C: 04303 0   C: 26715 0
13,2710   I: 66214 0   C: 00263 0   C: 02031 1   C: 00000 1   I: 77616 0   I: 66214 0   C: 00063 1   C: 02031 1
13,2720   C: 00002 0   I: 77616 0      03035 1      55500 1      51500 0      31554 1      51500 0      55502 0
13,2730      11500 1      12723 1      06064 0   I: 47020 0   C: 00051 0   C: 26746 0   I: 45014 0   C: 04064 1

13,2740   C: 26070 1   I: 43014 0   C: 00303 1   C: 00051 0   C: 04224 1   C: 00051 0      03035 1      55500 1
13,2750      51500 0      31502 1      51500 0      55626 0      11500 1      12747 0      06064 0   I: 47014 1
13,2760   C: 04307 1   C: 27030 1   C: 26767 0   I: 52014 0   C: 04304 1   C: 26715 0   C: 26710 0      03035 1
13,2770      55500 1      51500 0      31626 1      51500 0      55502 0      11500 1      12770 1      06064 0
```

OCTAL LISTING FOR PARAGRAPH # 076, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

```
13,3000     I: 77201 1   C: 00001 0   C: 02023 1   I: 41525 0   C: 00041 1   C: 15517 0   C: 27733 0   I: 77624 1
13,3010     C: 55716 1   C: 25535 0   C: 24001 0   C: 14001 0   C: 01517 0   C: 14007 0   C: 27733 0   I: 45014 0
13,3020     C: 00063 1   C: 55716 1   I: 74235 0   C: 01535 0   C: 26001 1   C: 25543 1   C: 24007 0   C: 01521 0
13,3030     I: 67174 1   C: 00002 0   C: 02030 0   C: 35527 1   C: 27156 0      33041 1      54006 0      33446 1

13,3040        00002 0   C: 26063 0   I: 45020 1   C: 00046 0   C: 27410 1   I: 43130 1   C: 02102 0   C: 01474 1
13,3050     I: 43014 0   C: 01467 0   C: 01676 1   I: 77614 1   C: 01633 0   C: 27135 0   I: 45020 1   C: 00046 0
13,3060     C: 27410 1   I: 43130 1   C: 02102 0   C: 01634 1   C: 27050 1   I: 45020 1   C: 00046 0   C: 27410 1
13,3070     I: 43130 1   C: 02102 0   C: 01474 1   I: 43014 0   C: 01676 1   C: 01433 1   C: 27135 0   I: 45020 1

13,3100     C: 00046 0   C: 27410 1   I: 43130 1   C: 02102 0   C: 01634 1   C: 27073 0   I: 66214 0   C: 01467 0
13,3110     C: 02031 1   C: 00000 1   I: 66214 0   C: 00343 0   C: 27117 0   C: 02031 1   C: 00002 0   I: 77220 1
13,3120     C: 02102 0   C: 24007 0   C: 01521 0   C: 35527 1   C: 27671 1   I: 43014 0   C: 01676 1   C: 04062 1
13,3130     I: 77614 1   C: 04020 1   C: 27147 0   I: 77620 0   C: 02102 0   I: 43014 0   C: 04060 0   C: 04062 1

13,3140     I: 77731 1   C: 00053 1   C: 27147 0   I: 52014 0   C: 01714 1   C: 26704 0   C: 26757 0   I: 77745 1
13,3150     C: 00041 1   C: 01115 0   I: 52014 0   C: 01753 1   C: 27256 0   C: 27242 0   I: 77414 0   C: 01752 0
13,3160     C: 27177 0      05353 1   C: 04022 0      05504 0   C: 00236 0      06042 1   I: 77731 1   C: 00053 1
13,3170     C: 27175 1   I: 52014 0   C: 01714 1   C: 26660 0   C: 26733 1   I: 77624 1   C: 11210 1   I: 45001 1

13,3200     C: 00001 0   C: 27671 1   I: 53775 1   C: 01503 0   C: 57576 1   I: 53715 1   C: 01511 0   C: 57576 1
13,3210     I: 63325 0   C: 01517 0   C: 01503 0   I: 64715 0   C: 01511 0   C: 51770 0   I: 76006 0   C: 77765 0
13,3220     I: 76014 0   C: 00303 1   C: 27224 0   C: 77775 1   I: 40001 1   C: 00001 0   C: 27227 0   I: 43014 0
13,3230     C: 04676 1   C: 01667 1   I: 77614 1   C: 01672 0   I: 77535 1   C: 02103 1      30154 1      50120 1

13,3240        54052 1      03421 0   I: 45345 1   C: 01115 0   C: 01517 0   C: 36074 1   C: 27671 1   I: 77624 1
13,3250     C: 22404 1   I: 43345 1   C: 01551 1   C: 01517 0   C: 35517 1   C: 27177 0   I: 43014 0   C: 04752 0
13,3260     C: 27263 0   C: 01632 1   C: 27224 0   I: 73001 1   C: 00013 0   C: 02030 0   I: 51575 1   C: 01535 0
13,3270     I: 43006 0   C: 00262 1   I: 50023 0   C: 53755 0   C: 27277 0   I: 77614 1   C: 00062 0   I: 41345 0

13,3300     C: 00013 0   C: 00043 0   I: 55762 1   C: 51770 0   I: 41366 1   C: 25762 0   I: 40442 1   I: 54345 1
13,3310     C: 00155 0   C: 20220 0   I: 40006 0   C: 27340 0   I: 50021 1   C: 27407 1   C: 27340 0   I: 45345 1
13,3320     C: 01115 0   C: 01517 0   I: 54234 0   C: 21613 0   C: 20211 1   C: 02076 1   I: 51400 1   C: 27344 1
13,3330     I: 50025 0   C: 00015 0   C: 27350 1   I: 75345 1   C: 00015 0   C: 02076 1   C: 36076 0   C: 27350 1

13,3340     I: 65345 0   C: 27407 1   I: 77650 1   C: 27317 1   I: 77634 0   C: 21713 1   C: 36076 0   C: 27333 1
13,3350     I: 51545 1   C: 02076 1   I: 50025 0   C: 27405 0   C: 27156 0   I: 43014 0   C: 01740 0   C: 23311 0
13,3360     C: 01707 0   C: 23311 0   I: 45345 1   C: 02076 1   C: 00015 0   I: 43040 1   C: 27156 0   C: 04242 1
13,3370     C: 23311 0   I: 45345 1   C: 01115 0   C: 01517 0   I: 77640 0   C: 27224 0   I: 40525 1   C: 02076 1
```

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OCTAL LISTING FOR PARAGRAPH # 077,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

13,3400     I: 44322 1   I: 52040 1   C: 27224 0   C: 23311 0   C: 00000 1   C: 01400 1   C: 14152 1   C: 00000 1
13,3410     I: 77776 1      30106 0      73462 0      00006 1      13454 0      33461 1      05133 0   I: 77776 1
13,3420        13441 1      4 106 1      74745 1      10000 0      03441 0      50120 1      30052 0      55054 0
13,3430        05353 1   C: 04022 0      31054 1      50120 1      54052 1      34745 0      70106 1      00006 1

13,3440        13457 0      33461 1      00004 0      05137 1      10064 1      13441 1   C: 00051 0      43462 0
13,3450        70106 1      54106 1      00003 1      13457 0      34736 1      00004 0      26106 1      06042 1
13,3460     I: 77616 0   C: 27411 0   C: 20100 1   I: 43020 1   C: 02772 1   C: 02716 0   C: 27532 0   I: 77614 1
13,3470     C: 01711 1   C: 27532 0   I: 45145 0   C: 01234 0   C: 27410 1   I: 45014 0   C: 01474 1   C: 26643 1

13,3500     C: 34041 0   C: 27133 0   I: 45174 1   C: 00002 0   C: 27410 1   I: 77014 1   C: 04304 1   C: 27511 1
13,3510     C: 00000 1   I: 53775 1   C: 01220 0   C: 57176 0   C: 01503 0   C: 15535 0   C: 01234 0   C: 25517 0
13,3520     C: 01226 0   I: 45057 1   C: 57176 0   C: 27705 0   I: 66234 1   C: 26746 0   C: 03463 0   C: 00000 1
13,3530     I: 77650 1   C: 47230 0   I: 45145 0   C: 01234 0   C: 27410 1   I: 43014 0   C: 01476 0   C: 04476 0

13,3540     I: 43014 0   C: 01475 0   C: 01674 0   C: 34041 0   C: 27133 0   I: 77650 1   C: 27472 0   I: 43020 1
13,3550     C: 03744 0   C: 04634 1   C: 27566 1   I: 43020 1   C: 03744 0   C: 04474 1   I: 43234 0   C: 21574 1
13,3560     C: 27670 0   I: 51021 0   C: 00041 1   C: 27572 1   I: 77624 1   C: 27656 1   I: 43234 0   C: 21574 1
13,3570     C: 27670 0   C: 00041 1   I: 77624 1   C: 27410 1   I: 45014 0   C: 01676 1   C: 26066 0   I: 43014 0

13,3600     C: 01673 1   C: 04475 0   I: 77624 1   C: 27133 0   I: 77214 0   C: 04675 1   C: 00001 0   C: 27545 0
13,3610     C: 00007 0   C: 17553 1   C: 00015 0   C: 03561 0   I: 66134 1   C: 02777 1   C: 02776 0   I: 77776 1
13,3620        00004 0      00006 1      40025 1      20155 1      07262 0      31744 1      04640 1   I: 47014 1
13,3630     C: 04754 0   C: 27646 0   C: 21574 1   I: 44215 1   C: 27670 0   C: 01115 0   I: 45044 0   C: 27256 0

13,3640     C: 27656 1   I: 43234 0   C: 21574 1   C: 27670 0   C: 35115 1   C: 27256 0   I: 45345 1   C: 01115 0
13,3650     C: 01517 0   I: 45246 0   C: 27666 1   I: 52040 1   C: 27156 0   C: 27641 1   I: 77414 0   C: 04674 0
13,3660        25744 1      05567 0   C: 01703 1      06042 1   I: 77616 0   C: 00000 1   C: 00003 1   C: 00000 1
13,3670     C: 03720 1   I: 77354 0   C: 02030 0   C: 01521 0   I: 53257 1   C: 57605 0   C: 01535 0   C: 01503 0

13,3700     C: 25535 0   C: 01527 0   I: 53257 1   C: 57602 1   C: 01543 1   C: 01511 0   C: 25543 1   C: 24007 0
13,3710     C: 01521 0   C: 15527 0   C: 24007 0   C: 01551 1   C: 01553 0   I: 77616 0   C: 77764 1   C: 77775 1
13,3720     C: 77766 0   C: 77771 0   C: 77775 1   C: 77775 1   C: 00000 1   C: 77763 0   C: 77766 0   C: 77773 1
13,3730     C: 77770 1   C: 77771 0   C: 24000 1   C: 00000 1   C: 74631 0   C: 63145 1   C: 00243 1   C: 32703 1

13,3740     C: 03654 0   C: 21000 1   C: 03654 0   C: 21000 1   C: 04627 0   C: 25200 1      44747 0      70077 0
13,3750        54077 0      44745 1      70106 1      54106 1      44753 0      70076 1      54076 1      00002 0
13,3760     C: 03760 0   C: 03761 1 CKSM 23056 0          @            @            @            @            @
13,3770             @            @            @            @            @            @            @            @
```

```
14,2000      C: 26723 0    C: 00450 0    C: 00065 1    C: 01265 1    C: 00302 0    C: 24533 1    C: 00052 0    C: 04047 0
14,2010      C: 15262 0    C: 21773 1    C: 74130 0    C: 42420 1    C: 70033 0    C: 41533 1    C: 15014 0    C: 04650 0
14,2020      C: 67067 1    C: 60150 0    C: 02551 1    C: 15723 0    C: 07210 0    C: 01664 1    C: 67276 0    C: 62232 0
14,2030      C: 13262 0    C: 00563 1    C: 05076 0    C: 35561 0    C: 70716 0    C: 40260 1    C: 62466 1    C: 64656 0

14,2040      C: 10652 1    C: 04246 0    C: 63235 0    C: 44200 0    C: 73710 0    C: 66230 0    C: 07204 0    C: 33712 0
14,2050      C: 61747 1    C: 72343 0    C: 02343 1    C: 21362 0    C: 03237 1    C: 13301 1    C: 62030 0    C: 65332 0
14,2060      C: 70715 0    C: 71267 1    C: 01745 0    C: 06477 0    C: 63531 0    C: 75365 0    C: 12010 0    C: 03005 1
14,2070      C: 76146 0    C: 77014 1    C: 60371 1    C: 75073 1    C: 03370 0    C: 12003 1    C: 76125 0    C: 40037 1

14,2100      C: 72436 0    C: 77062 0    C: 61041 0    C: 54164 0    C: 72277 0    C: 51044 0    C: 62641 0    C: 45471 1
14,2110      C: 70711 1    C: 70546 1    C: 67364 1    C: 47073 0    C: 64425 0    C: 77777 0    C: 07157 0    C: 16322 0
14,2120      C: 63327 1    C: 64446 0    C: 67515 1    C: 55266 0    C: 05230 0    C: 25476 0    C: 64754 0    C: 72604 0
14,2130      C: 71235 0    C: 72553 1    C: 66427 0    C: 42171 0    C: 66546 0    C: 70765 1    C: 73260 1    C: 71643 0

14,2140      C: 14121 0    C: 30153 0    C: 61247 1    C: 73310 1    C: 72313 0    C: 41247 0    C: 74744 0    C: 44566 1
14,2150      C: 70606 0    C: 54564 1    C: 77153 0    C: 61536 0    C: 61601 1    C: 47046 0    C: 60604 0    C: 76224 1
14,2160      C: 77031 0    C: 73354 1    C: 73161 0    C: 63065 1    C: 60431 1    C: 51702 0    C: 00656 1    C: 33013 0
14,2170      C: 04044 0    C: 10627 0    C: 62164 0    C: 45040 1    C: 07325 1    C: 37443 0    C: 03267 1    C: 06626 0

14,2200      C: 63471 0    C: 50471 0    C: 11660 1    C: 04151 0    C: 75501 1    C: 46664 1    C: 70430 1    C: 46540 1
14,2210      C: 07507 1    C: 20100 1    C: 13727 1    C: 05455 0    C: 72160 0    C: 64202 0    C: 11144 0    C: 05203 0
14,2220      C: 64200 1    C: 65331 0    C: 71322 1    C: 41512 1    C: 16402 0    C: 16205 1    C: 01365 0    C: 04034 1
14,2230      C: 75054 1    C: 56052 0    C: 17030 1    C: 17635 1    C: 73321 0    C: 57603 0    C: 77010 0    C: 47623 0

14,2240      C: 11515 0    C: 21640 1    C: 63215 1    C: 52176 0    C: 02143 0    C: 26755 1    C: 12715 1    C: 31470 0
14,2250      C: 13401 0    C: 31222 1    C: 03157 1    C: 27504 0    C: 17402 1    C: 12312 1    C: 75552 1    C: 63657 0
14,2260      C: 05471 0    C: 06122 0    C: 16220 0    C: 16362 1    C: 04417 1    C: 32762 0    C: 06443 1    C: 12622 1
14,2270      C: 07766 1    C: 10237 0    C: 14154 1    C: 36154 1    C: 13200 1    C: 31653 0    C: 13244 1    C: 21036 1

14,2300      C: 01067 1    C: 23106 1    C: 10560 0    C: 27227 0    C: 10402 0    C: 00275 1    C: 65477 0    C: 77044 1
14,2310      C: 30153 0    C: 11212 0    C: 00077 1    C: 36275 1    C: 17777 0    C: 01417 1    C: 07674 0    C: 21771 0
14,2320      C: 03416 1    C: 07626 1    C: 62413 0    C: 57536 0    C: 07510 1    C: 06414 0    C: 01673 1    C: 06065 1
14,2330      C: 15735 1    C: 31531 1    C: 16745 0    C: 17555 1    C: 02615 1    C: 13716 0    C: 73010 1    C: 40311 0

14,2340      C: 15776 0    C: 34560 0    C: 00325 0    C: 26625 1    C: 07572 0    C: 05105 0    C: 15472 1    I: 77634 0
14,2350      C: 21574 1    I: 43225 0    C: 01234 0    C: 03454 1    I: 77476 1       07262 0       35016 0       54003 0
14,2360         00004 0       10155 1       12365 1       12365 1       34755 1       64753 1       55644 1       05173 1
14,2370      C: 02402 0       05353 1    C: 47014 1    C: 76133 1    C: 02402 0    C: 30067 0       06042 1    I: 52014 0
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OCTAL LISTING FOR PARAGRAPH # 101,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,2400      C: 03470 1   C: 60452 1      04674 0   C: 75555 0      35027 1      05105 0   C: 02416 0   C: 30067 0
14,2410         05353 1   C: 07024 0   C: 17000 1   C: 02416 0   C: 30067 0      15261 0      05504 0   C: 00214 0
14,2420         32437 0      04616 1   C: 20477 1      12426 1      12430 0      12420 1      04635 0   C: 71464 1
14,2430         00004 0      04674 0   C: 40154 0      04674 0   C: 40141 1      04635 0   C: 71454 1   C: 04077 0

14,2440      I: 77620 0   C: 02746 0   C: 35242 0   C: 26347 0   I: 70545 1   C: 01122 1   C: 16711 1   C: 01124 1
14,2450      C: 16713 0   C: 01120 0   C: 02707 0   I: 77776 1      32477 1      04616 1   C: 20477 1      16001 1
14,2460         12462 1      12454 1      06042 1   I: 72545 0   C: 02711 1   C: 15122 1   C: 02713 0   C: 15124 1
14,2470      C: 02707 0   C: 15120 0   C: 01242 1   I: 77624 1   C: 26420 0   I: 77650 1   C: 02746 0   C: 01531 1

14,2500      I: 77620 0   C: 02745 0   C: 37562 1   C: 33647 1   I: 77745 1   C: 03562 0   C: 34041 0   C: 27056 1
14,2510      I: 61131 0   C: 00052 0   C: 00000 1   C: 30535 1   I: 74375 0   C: 02723 0   C: 30001 0   I: 52372 0
14,2520      C: 00001 0   I: 77656 1   C: 26723 0   C: 00001 0   I: 57456 1   C: 16707 0   C: 30005 1   I: 77624 1
14,2530      C: 30567 0   C: 14017 1   C: 30576 0   C: 34023 1   C: 30562 0   I: 74375 0   C: 02723 0   C: 30007 0

14,2540      I: 53445 1   C: 02715 0   C: 26715 0   C: 02723 0   I: 53361 0   C: 30001 0   C: 00001 0   I: 57456 1
14,2550      C: 26707 0   C: 00001 0   I: 57456 1   C: 16723 0   C: 30003 1   I: 77624 1   C: 30567 0   C: 14023 0
14,2560      C: 30576 0   C: 00017 1   I: 77745 1   C: 30600 1   C: 00021 1   I: 77650 1   C: 02745 0   I: 70471 1
14,2570      C: 00045 0   I: 43336 0   C: 30602 0   I: 70546 1   I: 77616 0   C: 07760 1   C: 14473 1   C: 04000 0

14,2600      C: 00000 1   C: 00343 0   C: 21616 0      04645 1      55745 1      06042 1   I: 77624 1   C: 47541 1
14,2610      I: 77624 1   C: 20030 0   I: 77601 0   C: 00001 0   I: 71214 0   C: 01465 1   C: 24007 0   C: 26756 1
14,2620      C: 02665 0   I: 63361 0   C: 24005 1   C: 02701 0   I: 74370 0   C: 00344 1   C: 24005 1   I: 77655 1
14,2630      I: 53505 1   C: 01734 0   C: 02731 0   I: 66331 0   C: 00051 0   C: 00006 1   C: 00052 0   C: 00006 1

14,2640      I: 52100 1   C: 30643 0   C: 30760 0   I: 50373 0   C: 30347 1   C: 02731 0   I: 50025 0   C: 30757 1
14,2650      C: 30640 0   I: 77754 1   C: 00046 0   I: 52104 0   C: 30656 1   C: 30640 0   I: 50373 0   C: 47430 0
14,2660      C: 02731 0   I: 50025 0   C: 30757 1   C: 30653 1   I: 47773 1   C: 30347 1   C: 47430 0   I: 51025 1
14,2670      C: 30755 0   C: 30653 1   I: 45173 0   C: 30347 1   C: 30732 1   I: 77614 1   C: 01710 0   C: 30640 0

14,2700      I: 45173 0   C: 47430 0   C: 30732 1   I: 77614 1   C: 01710 0   C: 30653 1   I: 77614 1   C: 01605 0
14,2710      C: 30725 1   I: 65120 1   C: 02755 1   C: 02756 1   I: 47773 1   C: 30347 1   C: 47430 0   I: 43006 0
14,2720      C: 01545 1   C: 30711 0   I: 45345 1   I: 77644 1   C: 30653 1   I: 67130 1   C: 02755 1   C: 02756 1
14,2730      I: 77650 1   C: 30653 1   I: 51321 0   C: 02707 0   C: 00017 1   I: 77654 0   C: 30751 1   I: 75240 0

14,2740      C: 30751 1   C: 00160 0   I: 75240 0   C: 30751 1   C: 00162 1   I: 43040 1   C: 30751 1   C: 01630 0
14,2750      C: 00052 0   I: 77614 1   C: 01430 1   C: 00052 0   C: 05110 1   C: 35052 0   C: 05110 1   C: 35052 0
14,2760      I: 77414 0   C: 01745 0   C: 30764 1      03005 1   I: 73150 1   C: 02755 1   C: 02756 1   I: 47775 1
14,2770      C: 02731 0   C: 30347 1   I: 47715 1   C: 02731 0   C: 47430 0   I: 77625 0   I: 66044 1   C: 31003 0
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OCTAL LISTING FOR PARAGRAPH # 102,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3000    C: 02756 1   I: 77734 1   C: 02755 1   I: 77776 1      25745 0      31745 0      04622 0   I: 77620 0
14,3010    C: 02746 0   I: 77776 1      05353 1   C: 04024 0      34761 0      04616 1   C: 20624 0      06001 0
14,3020       03022 1      03045 0      06042 1   I: 43234 0   C: 21574 1   C: 31155 1   I: 77624 1   C: 30500 1
14,3030    I: 77776 1      04616 1   C: 30603 1      03035 1      03045 0      05567 0   C: 00405 0      35006 1

14,3040       04616 1   C: 20477 1      06001 0      03045 0      03014 1      34755 1      55757 1      06042 1
14,3050    I: 77776 1      05353 1   C: 04024 0      06042 1   I: 77624 1   C: 31671 0   I: 77776 1      04616 1
14,3060    C: 16000 0      04616 1   C: 17703 0      05701 1      11757 1      13067 1      03137 1      06042 1
14,3070    I: 77775 1   C: 02715 0   C: 02767 0   I: 77776 1      05353 1   C: 04024 0      06042 1   I: 45145 0

14,3100    C: 03562 0   C: 32472 1   I: 53521 1   C: 01734 0   C: 26715 0   C: 03554 0   I: 53521 1   C: 01734 0
14,3110    C: 26707 0   C: 02761 0   C: 24007 0   C: 02767 0   C: 34015 1   C: 31250 1   I: 45014 0   C: 00354 0
14,3120    C: 31126 0   C: 47443 1   I: 77624 1   C: 31216 0   I: 77614 1   C: 01273 0   I: 77776 1      35741 0
14,3130       04616 1   C: 20624 0      06001 0      03014 1      06042 1   I: 77650 1   C: 02746 0      06042 1

14,3140    I: 77775 1   C: 02715 0   C: 02761 0   I: 45145 0   C: 03562 0   C: 32472 1   C: 03554 0   I: 77731 1
14,3150    C: 02760 1   C: 00001 0   I: 77650 1   C: 31050 0   C: 00002 0   C: 06240 1   I: 45020 1   C: 02746 0
14,3160    C: 47251 1   I: 43014 0   C: 01260 1   C: 01662 1   I: 77776 1      33215 1      04616 1   C: 20452 0
14,3170       33247 0      04616 1   C: 17314 1      04616 1   C: 17707 1      05701 1      05353 1   C: 04024 0

14,3200       06042 1   I: 75160 1   C: 03606 1   C: 01733 1   I: 77624 1   C: 31371 0   I: 43014 0   C: 01273 0
14,3210    C: 01462 0   I: 77624 1   C: 31603 0   I: 77650 1   C: 31126 0   C: 04024 0   I: 77620 0   C: 02745 0
14,3220    I: 77624 1   C: 47251 1   I: 77776 1      33246 1      04616 1   C: 20477 1      06001 0      03231 1
14,3230       03243 1      05353 1   C: 00214 0      33247 0      04616 1   C: 17314 1      04616 1   C: 17707 1

14,3240       05701 1      05353 1   C: 04024 0      06042 1   I: 77650 1   C: 02745 0   C: 01535 0   C: 02737 0
14,3250    I: 43020 1   C: 02745 0   C: 00074 1   I: 77760 0   C: 02706 1   I: 47773 1   C: 00001 0   C: 00007 0
14,3260    I: 65552 0   C: 00025 0   I: 43014 0   C: 00354 0   C: 31274 1   C: 00174 0   I: 71360 1   C: 00006 1
14,3270    C: 00025 0   C: 00023 0   I: 77650 1   C: 31255 1   I: 45345 1   C: 00025 0   C: 00023 0   I: 77634 0

14,3300    C: 21613 0   C: 01045 1   I: 77414 0   C: 00074 1      33320 0      04616 1   C: 20477 1      16001 1
14,3310       03315 0      06042 1   I: 52014 0   C: 00274 0   C: 02745 0      06042 1   I: 77650 1   C: 02745 0
14,3320    C: 01405 1   I: 77624 1   C: 31620 1   I: 66234 1   C: 31405 1   C: 00051 0   C: 00001 0   I: 40370 1
14,3330    C: 00003 1   C: 00005 1   I: 70543 1   C: 00325 0   I: 70523 1   C: 00005 1   I: 51425 0   I: 45206 1

14,3340    C: 31404 0   I: 71240 1   C: 31360 0   I: 51025 1   C: 31405 1   C: 31360 0   I: 77776 1      05353 1
14,3350    C: 04024 0      06042 1   I: 77624 1   C: 31557 1   I: 77624 1   C: 31603 0   I: 77650 1   C: 31362 1
14,3360    I: 77700 0   C: 31332 1   I: 75160 1   C: 02642 0   C: 01733 1   I: 77624 1   C: 31371 0   I: 77650 1
14,3370    C: 32161 0   I: 77773 1   C: 00001 0   C: 10001 1   I: 77773 1   C: 00007 0   C: 10007 1   I: 77773 1
```

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OCTAL LISTING FOR PARAGRAPH # 103,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

14,3400      C: 00015 0    C: 10015 1    I: 77616 0    C: 00056 1    C: 37722 1       00004 0       30032 0       50120 1
14,3410         54001 1       30033 1       50120 1       54002 1       30034 0       50120 1       54003 0       00003 1
14,3420         06064 0       04616 1    C: 33635 1       34761 0       04616 1    C: 20624 0       06001 0       13453 1
14,3430         05353 1    C: 04024 0       34755 1       54321 0       54322 0       54323 1       35010 0       04616 1

14,3440      C: 20447 1       33556 1       04616 1    C: 20447 1       06042 1    I: 77624 1    C: 31557 1    I: 77776 1
14,3450         05353 1    C: 04024 0       13423 0       05353 1    C: 00014 1       06042 1    I: 77624 1    C: 31603 0
14,3460      I: 40331 1    C: 02760 1    C: 00000 1    C: 00001 0    I: 77776 1       05353 1    C: 04024 0       04616 1
14,3470      C: 16000 0       04616 1    C: 17703 0       05701 1       11757 1       13503 0       06042 1    I: 77775 1

14,3500      C: 02715 0    C: 02761 0    I: 77776 1       05353 1    C: 04024 0       11757 1       13522 0       05353 1
14,3510      C: 04024 0       06042 1    I: 45145 0    C: 03562 0    C: 32472 1    C: 03554 0    I: 77776 1       34753 1
14,3520         55757 1       13465 1       05353 1    C: 04024 0       06042 1    I: 45145 0    C: 03562 0    C: 32472 1
14,3530      C: 24015 0    C: 03554 0    C: 24007 0    C: 02761 0    C: 26707 0    C: 02767 0    C: 36715 1    C: 31250 1

14,3540      I: 77414 0    C: 00314 1    C: 31544 0       03423 1    I: 77624 1    C: 47443 1    I: 75160 1    C: 02664 1
14,3550      C: 01733 1    I: 77624 1    C: 31371 0    I: 77414 0    C: 01462 0       06001 0    C: 12200 0    I: 77776 1
14,3560         31301 1       00006 1       13567 1       34777 1       04616 1    C: 01736 1       13560 0       04616 1
14,3570      C: 16771 1       04616 1    C: 17707 1       05701 1       04616 1    C: 17201 1       04616 1    C: 17707 1

14,3600         05701 1       06042 1    I: 77616 0    I: 77776 1       30025 0       55074 1       44755 0       54037 1
14,3610         54040 1       54041 0       06042 1    I: 77775 1    C: 24007 0    C: 01472 1    I: 43414 1    C: 01060 0
14,3620      I: 45020 1    C: 02746 0    C: 47541 1    I: 77624 1    C: 20030 0    I: 66370 0    C: 00022 1    C: 00051 0
14,3630      C: 00006 1    I: 61373 1    C: 02707 0    C: 01734 0    I: 77656 1    C: 06707 1    I: 77700 0    C: 31631 1

14,3640      I: 75160 1    C: 03606 1    C: 02642 0    I: 77624 1    C: 31371 0    I: 77624 1    C: 47355 1    I: 77650 1
14,3650      C: 02746 0    I: 77620 0    C: 02746 0    C: 34041 0    C: 27077 1    I: 53575 0    C: 00001 0    C: 27607 0
14,3660      C: 00007 0    I: 53435 0    C: 00001 0    C: 27615 0    C: 03607 0    I: 53435 0    C: 03615 0    C: 37623 1
14,3670      C: 02746 0    I: 77420 1    C: 03665 1       51757 0       31755 1       00006 1       73772 1       64744 1

14,3700         54734 0       33773 1       04616 1    C: 20477 1       06001 0       13707 0       13701 0       05516 0
14,3710      C: 00124 0       30734 1       77747 0       00006 1       74743 1       54001 1       00006 1       63735 0
14,3720         65650 1       00006 1       13735 1       35016 0       54003 0       50001 0       31403 1       54001 1
14,3730         35014 1       54003 0       34737 0       56001 0       13745 0       33774 0       04616 1    C: 20477 1

14,3740         06001 0       13743 0       13735 1       00006 1       31345 1       50120 1       52011 0       06042 1
14,3750      I: 77624 1    C: 10522 0    I: 45034 1    C: 21574 1    C: 32472 1    I: 53521 1    C: 01734 0    C: 03773 1
14,3760      I: 77776 1       04616 1    C: 54123 0       37747 1       70734 0       00006 1       13701 0       06042 1
14,3770      I: 77650 1    C: 03665 1    C: 05253 0    C: 00306 1    C: 01527 0    C: 03775 1    C: 03776 1  CKSM 63670 0
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OCTAL LISTING FOR PARAGRAPH # 104,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2000     I: 77773 1   C: 00001 0   C: 00766 0   I: 47133 0   C: 00002 0   C: 21577 1   C: 00031 0   I: 77654 0
15,2010     C: 16171 1   I: 71406 0   I: 73525 1   I: 65361 0   C: 00023 0   I: 52361 1   C: 00015 0   I: 47256 0
15,2020     C: 03765 0   I: 41456 0   I: 47133 0   C: 00004 0   C: 21577 1   C: 00033 1   I: 43225 0   C: 00031 0
15,2030     C: 32047 0   I: 77605 1   C: 32466 1   C: 00033 1   I: 74356 1   I: 65372 1   C: 00033 1   I: 74346 0

15,2040     C: 03765 0   I: 53372 1   I: 45056 0   C: 47666 1   C: 34031 1   C: 16276 0   C: 37777 1   C: 37775 0
15,2050        04616 1   C: 11233 0      34750 1      70076 1      10000 0      02060 0      36250 0      02061 1
15,2060        34753 1      55144 0      34753 1      04616 1   C: 20714 1      06001 0      12073 0      02062 1
15,2070        05353 1   C: 00014 1      05155 0      31144 0      76250 1      50000 1      02077 0      12105 0

15,2100        12153 0      12110 1      06042 1   I: 77650 1   C: 32164 0      00006 1      31401 0      12112 0
15,2110        00006 1      34755 1      53045 0      32170 0      04616 1   C: 20477 1      06001 0      02121 1
15,2120        02113 0      53045 0      00006 1      62125 0      12127 0      00006 1      30025 0      53775 1
15,2130        31144 1      74752 1      10000 0      02137 0      06042 1   I: 77650 1   C: 32220 0      06042 1

15,2140     I: 45145 0   C: 02775 0   C: 31651 1   I: 77624 1   C: 31620 1   I: 77776 1      35010 0      04616 1
15,2150     C: 20477 1      06001 0      12171 0      06042 1   I: 77650 1   C: 32143 0      06042 1   I: 77624 1
15,2160     C: 31321 0   I: 43014 0   C: 01462 0   C: 01273 0   I: 77624 1   C: 31007 1   I: 77776 1      06001 0
15,2170     C: 01442 1      32217 1      04616 1   C: 20624 0      16001 1      12156 0      06042 1   I: 64375 1

15,2200     C: 03607 0   C: 01734 0   I: 77656 1   C: 26665 0   C: 03615 0   I: 53521 1   C: 01734 0   C: 26673 1
15,2210     C: 03623 0   I: 53521 1   C: 01734 0   C: 36701 1   C: 31156 1   I: 77650 1   C: 32366 1   C: 00013 0
15,2220     I: 43014 0   C: 01463 1   C: 00662 0   I: 77201 1   C: 00001 0   C: 02023 1   I: 41525 0   C: 02775 0
15,2230     C: 36401 1   C: 55716 1   I: 77742 0   C: 16032 1   C: 02775 0   I: 77624 1   C: 30440 1   I: 53575 0

15,2240     C: 02032 1   C: 37607 1   C: 10757 0   I: 77650 1   C: 32143 0      40077 0      74737 1      10000 0
15,2250        12455 0      32463 1      04616 1   C: 20477 1      06001 0      12257 1      12245 1      47747 0
15,2260        70734 0      00006 1      76245 0      56001 0      51757 0      55755 0      50120 1      54046 1
15,2270        00006 1      12455 0      40000 0      62557 1      00006 1      62455 1      06042 1   I: 64373 1

15,2300     C: 30347 1   C: 01734 0   I: 45056 0   C: 47650 1   C: 02731 0   I: 77776 1      34753 1      55241 0
15,2310        35016 0      54003 0      51241 1      31403 1      54001 1      35014 1      54003 0      34737 0
15,2320        56001 0      55745 1      50120 1      52011 0      06042 1   I: 77624 1   C: 10522 0   I: 50375 0
15,2330     C: 02731 0   C: 03765 0   I: 65552 0   C: 00031 0   I: 51025 1   C: 32466 1   C: 32420 0   I: 45345 1

15,2340     C: 00031 0   C: 32470 0   I: 71240 1   C: 32413 0   C: 00031 0   I: 42405 0   C: 11220 1   C: 24031 0
15,2350     C: 03765 0   I: 53435 0   C: 24005 1   I: 47206 0   C: 03765 0   I: 77676 0   I: 63256 0   C: 03765 0
15,2360     I: 53435 0   C: 02731 0   I: 50206 0   C: 00001 0   I: 65552 0   C: 24033 1   I: 77641 1   I: 71244 0
15,2370     C: 32375 1   C: 32047 0   I: 77625 0   C: 00033 1   C: 00033 1   I: 70535 0   C: 02746 0   I: 41415 1
```

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OCTAL LISTING FOR PARAGRAPH # 105,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,2400    C: 00033 1   I: 77634 0   C: 21615 0   C: 15236 1   C: 00031 0   I: 77615 0   I: 77634 0   C: 21615 0
15,2410    C: 01240 0   I: 77776 1      12437 1   I: 77776 1      34755 1      55235 0      55237 1      12437 1
15,2420    I: 77776 1      25241 1      41241 0      64757 0      00006 1      62427 1      12310 0      05567 0
15,2430    C: 00404 1      35006 1      04616 1   C: 20477 1      16001 1      12455 0      12245 1      32464 0

15,2440       04616 1   C: 20477 1      16001 1      12445 1      12245 1      34757 0      71241 0      00006 1
15,2450       74745 1      47747 0      70734 0      60001 0      54734 0      04616 1   C: 16000 0      04616 1
15,2460    C: 17703 0      05701 1      13037 1   C: 00306 1   C: 01517 0   C: 02525 1   C: 12525 0   C: 00026 0
15,2470    C: 30131 1   C: 12525 0   C: 03562 0   I: 77420 1   C: 02736 1      47747 0      70734 0      00006 1

15,2500       76245 0      56001 0      51757 0      55755 0      10000 0      12521 1      32560 0      04616 1
15,2510    C: 20477 1      02506 0      02514 0      02506 0      06042 1   I: 53575 0   C: 02707 0   I: 77650 1
15,2520    C: 02736 1      40000 0      62557 1      00006 1      62535 0      51757 0      31755 1      50120 1
15,2530       54046 1      06042 1   I: 52173 0   C: 30347 1   C: 02736 1      06042 1   I: 45145 0   C: 03562 0

15,2540    C: 30500 1   I: 77340 0   C: 02757 0   C: 02707 0   C: 24001 0   C: 02715 0   C: 26707 0   C: 00001 0
15,2550    C: 02715 0   I: 70143 0   C: 02756 1   C: 00154 1   I: 52173 0   C: 02343 1   C: 02736 1   C: 00343 0
15,2560    C: 01530 0      32762 0      54321 0      40000 0      54322 0      32763 1      54323 1      06042 1
15,2570    I: 45014 0   C: 01662 1   C: 32666 0   I: 66370 0   C: 00022 1   C: 00051 0   C: 00006 1   I: 77744 0

15,2600    C: 00050 1   I: 45173 0   C: 54000 0   C: 47675 0   C: 06707 1   I: 77775 1   C: 02731 0   I: 73744 1
15,2610    C: 00047 1   C: 75047 1   I: 71152 1   C: 00047 1   I: 63047 1   C: 54000 0   C: 00002 0   C: 06665 1
15,2620    I: 45100 1   C: 32601 1   C: 47355 1   I: 74575 0   C: 02715 0   C: 36723 1   C: 32666 0   I: 74575 0
15,2630    C: 02715 0   I: 53455 0   C: 02723 0   C: 02761 0   I: 77641 1   C: 02231 0   I: 65552 0   C: 01045 1

15,2640    I: 77776 1      05516 0   C: 00014 1      32761 0      04616 1   C: 20477 1      06001 0      12652 0
15,2650       05504 0   C: 00014 1      05353 1   C: 04024 0      06042 1   I: 77775 1   C: 02761 0   C: 02231 0
15,2660    I: 77776 1      34751 0      70074 0      10000 0      12561 0      13536 0   I: 77220 1   C: 02745 0
15,2670    C: 24007 0   C: 02707 0   I: 77776 1      05353 1   C: 04024 0      06042 1   I: 77624 1   C: 31557 1

15,2700    I: 77776 1      32760 1      55736 0      37721 1      55074 1      04616 1   C: 15707 0      05353 1
15,2710    C: 04024 0      04616 1   C: 77541 1      06042 1   I: 77776 1      35000 1      05173 1   C: 02721 1
15,2720       05155 0      04674 0   C: 77541 1      35023 0      05105 0   C: 02730 1   C: 32065 0      05261 1
15,2730       04616 1   C: 15271 1      25736 1      06042 1   I: 53375 0   C: 00325 0   C: 02707 0   C: 02707 0

15,2740    I: 50135 0   C: 02737 0   C: 32714 1   I: 53575 0   C: 02707 0   C: 36731 1   C: 47541 1   I: 77624 1
15,2750    C: 47673 0   C: 02715 0   I: 77776 1      05353 1   C: 04024 0      06042 1   I: 77650 1   C: 02745 0
15,2760    C: 77753 0   C: 01404 0   C: 07357 1   C: 06211 0   I: 71220 1   C: 02745 0   C: 00322 1   I: 65325 0
15,2770    C: 00324 1   C: 00323 0   I: 77666 1   C: 24766 0   C: 24005 1   I: 77624 1   C: 47666 1   C: 26707 0
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OCTAL LISTING FOR PARAGRAPH # 106,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3000     C: 24003 1   I: 77624 1   C: 47675 0   C: 36715 1   C: 47541 1   I: 77624 1   C: 20030 0   I: 77775 1
15,3010     C: 02665 0   C: 24007 0   C: 02673 1   C: 34015 1   C: 47443 1   I: 77624 1   C: 47251 1   I: 77776 1
15,3020        33027 1      04616 1   C: 17314 1      04616 1   C: 17707 1      05701 1      12755 0   C: 02737 0
15,3030        34755 1      13033 0      34753 1      55757 1      05353 1   C: 04024 0      12245 1      31757 0

15,3040        00006 1      13052 1      05353 1   C: 04024 0      06042 1   I: 45145 0   C: 03562 0   C: 32472 1
15,3050     C: 37254 0   C: 33064 0      06042 1   I: 77775 1   C: 02715 0   C: 02761 0   I: 45145 0   C: 03562 0
15,3060     C: 32472 1   C: 03246 1   I: 77776 1      13032 1   I: 77131 1   C: 00052 0   C: 00006 1   C: 00014 1
15,3070     I: 64373 1   C: 74515 0   C: 03607 0   I: 77656 1   C: 12723 1   I: 77773 1   C: 75002 1   C: 10023 1

15,3100     I: 43104 0   C: 33070 0   C: 04315 1   C: 33111 0   I: 77624 1   C: 31250 1   I: 77614 1   C: 00354 0
15,3110     C: 33171 0   I: 77624 1   C: 47443 1   I: 77624 1   C: 47251 1   I: 77776 1      34752 0      70104 0
15,3120        10000 0      13130 1      33276 1      04616 1   C: 20477 1      06001 0      13130 1      13172 1
15,3130        06042 1   I: 40175 0   C: 02740 0   C: 33134 1   C: 02750 1   I: 40141 1   C: 30602 0   C: 33237 1

15,3140     I: 52131 0   C: 02746 0   C: 33144 0   C: 33017 1   I: 77776 1      05353 1   C: 04024 0      06042 1
15,3150     I: 75160 1   C: 03606 1   C: 01733 1   I: 45014 0   C: 01462 0   C: 31371 0   I: 77776 1      11144 0
15,3160        13162 0      13172 1      34752 0      70104 0      10000 0      13544 0      06042 1   I: 77624 1
15,3170     C: 33471 0   I: 77776 1      35741 0      04616 1   C: 20624 0      16001 1      13544 0      44752 1

15,3200        61144 1      00006 1      13204 0      16001 1      05353 1   C: 04024 0      06042 1   I: 45175 0
15,3210     C: 02231 0   C: 47663 1   I: 43105 1   C: 01734 0   C: 01463 1   I: 51515 1   C: 02023 1   I: 45561 1
15,3220     C: 75745 0   I: 47014 1   C: 00662 0   C: 21574 1   I: 77624 1   C: 30440 1   C: 01220 0   I: 65352 0
15,3230     C: 01242 1   I: 77606 1   C: 35234 1   C: 51700 1   C: 02023 1   I: 77776 1      16001 1   I: 75160 1

15,3240     C: 02664 1   C: 02642 0   I: 77624 1   C: 31371 0   I: 77624 1   C: 47541 1   I: 77624 1   C: 20030 0
15,3250     I: 77624 1   C: 47355 1   I: 77414 0   C: 04355 0   C: 33266 0      35010 0      04616 1   C: 20477 1
15,3260        06001 0      13263 1      13255 1      05353 1   C: 04024 0      06042 1   I: 77624 1   C: 31557 1
15,3270     I: 77624 1   C: 31603 0   I: 77624 1   C: 32764 0   I: 77650 1   C: 33144 0   C: 01535 0      04616 1

15,3300     C: 33635 1      36250 0      55144 0      34753 1      04616 1   C: 20714 1      06001 0      13314 0
15,3310        13303 0      05353 1   C: 00014 1      05155 0      31144 1      76250 1      50000 1      13320 1
15,3320        13333 0      13374 0      13303 0      06042 1   I: 75160 1   C: 01733 1   C: 03606 1   I: 77624 1
15,3330     C: 31371 0   I: 77650 1   C: 33373 0      06042 1   I: 77745 1   C: 03442 0   C: 01045 1   I: 77776 1

15,3340        32170 0      04616 1   C: 20477 1      16001 1      13346 1      13340 1      06042 1   I: 65234 1
15,3350     C: 21574 1   C: 01045 1   I: 65254 1   C: 33363 1   I: 51025 1   C: 01045 1   C: 33363 1   I: 45545 1
15,3360     C: 74335 1   C: 36775 1   C: 33365 1   I: 45545 1   C: 75002 1   C: 34041 0   C: 27056 1   I: 53575 0
15,3370     C: 00001 0   C: 37607 1   C: 10757 0   I: 77776 1      34755 1      55144 0      55145 1      34737 0
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OCTAL LISTING FOR PARAGRAPH # 107,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

15,3400        70077 0        10000 0        34745 0        27145 1        34753 1        70102 0        10000 0        34750 1
15,3410        27145 1        34750 1        55143 1        33634 0        04616 1     C: 20477 1        16001 1        13421 1
15,3420        13413 0        34737 0        70077 0        10000 0        13524 0        34753 1        70102 0        10000 0
15,3430        13530 0        34752 0        71144 0        10000 0        13530 0        05567 0     C: 00701 1        35006 1

15,3440        04616 1     C: 20477 1        16001 1        13413 0        13413 0     I: 40220 0     C: 02746 0     C: 00001 0
15,3450     I: 77634 0     C: 21574 1     C: 27562 0     C: 03246 1     I: 41525 0     C: 03562 0     I: 77624 1     C: 55716 1
15,3460     C: 27246 1     C: 03254 1     I: 65201 1     C: 00001 0     C: 03562 0     I: 45006 0     C: 55716 1     C: 37254 0
15,3470     C: 02746 0     I: 45020 1     C: 02746 0     C: 47541 1     I: 40234 0     C: 21574 1     C: 00001 0     C: 37562 1

15,3500     C: 20030 0     I: 61375 1     C: 02673 1     C: 01734 0     I: 65256 0     C: 03562 0     I: 45006 0     C: 51700 1
15,3510     C: 26237 0     C: 02701 0     I: 53505 1     C: 01734 0     I: 41525 0     C: 03562 0     I: 77624 1     C: 51700 1
15,3520     C: 02245 0     I: 77614 1     C: 03036 1     C: 02746 0        06042 1     I: 77624 1     C: 33471 0     I: 77776 1
15,3530        05504 0     C: 00205 0        34753 1        71144 0        10000 0        12561 0        05353 1     C: 04024 0

15,3540        34753 1        70102 0        10000 0        13560 0        05353 1     C: 04024 0        05516 0     C: 00205 0
15,3550        36250 0        71144 0        50000 1        13554 1        13560 0        13601 1        13617 0        13620 1
15,3560        06042 1     I: 77775 1     C: 02237 0     C: 27246 1     C: 02245 0     C: 37254 0     C: 47541 1     I: 77624 1
15,3570     C: 20030 0     I: 77775 1     C: 02673 1     C: 26761 0     C: 02701 0     C: 36767 1     C: 33445 1     I: 77650 1

15,3600     C: 33064 0        06042 1     I: 53575 0     C: 02023 1     C: 27246 1     C: 02245 0     C: 37254 0     C: 47541 1
15,3610     I: 77624 1     C: 20030 0     I: 45175 0     C: 02231 0     C: 47663 1     I: 77650 1     C: 33573 0        13030 0
15,3620        06042 1     I: 53575 0     C: 02023 1     C: 03246 1     C: 27254 1     C: 02231 0     I: 77624 1     C: 47663 1
15,3630     C: 36761 1     C: 33445 1     I: 77776 1        13032 1     C: 01206 1        41277 0        74743 1        10000 0

15,3640        13644 0        05567 0     C: 00210 1        06001 0        05504 0     C: 00007 0        04631 1     I: 54201 0
15,3650     C: 00001 0     C: 20617 0     I: 56371 1     C: 01707 0     C: 12024 1     C: 00031 0     I: 77170 1     C: 00000 1
15,3660     C: 00000 1     I: 77614 1     C: 00274 0     I: 77745 1     C: 12004 0     C: 00027 1     I: 40745 0     C: 00031 0
15,3670     C: 12050 1     I: 42661 0     C: 20211 1     C: 12046 0     I: 40756 1     C: 12044 1     I: 62015 1     C: 00027 1

15,3700     C: 77771 0     C: 00027 1     I: 77614 1     C: 00054 0     C: 33666 1     I: 40745 0     C: 00031 0     C: 65747 0
15,3710     I: 42661 0     C: 20206 1     C: 65741 0     I: 77625 0     C: 00027 1     C: 10021 0     I: 63135 0     C: 00050 1
15,3720     C: 77775 1     I: 53015 0     C: 12026 0     C: 33753 0     I: 77644 1     C: 33663 1     I: 45345 1     C: 00021 1
15,3730     C: 00025 0     I: 65356 1     C: 00021 1     I: 65356 1     C: 00021 1     I: 55546 0     I: 53521 1     C: 12002 0

15,3740     C: 02723 0     I: 65345 0     C: 12004 0     C: 00023 0     I: 65356 1     C: 00023 0     I: 55546 0     I: 53521 1
15,3750     C: 12002 0     C: 02715 0     I: 77616 0     I: 77745 1     C: 12004 0     C: 00027 1     I: 77650 1     C: 33705 0
15,3760     C: 03760 0     C: 03761 1   CKSM 42503 1          @              @              @              @              @
15,3770          @              @              @              @              @              @              @              @
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OCTAL LISTING FOR PARAGRAPH # 110,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2000        00006 1        00031 0        40000 0        74355 1        00006 1        12157 1        41300 1        74746 1
16,2010        10000 0        12206 0        41262 1        74751 1        27262 1        12163 0        34742 1        00006 1
16,2020        02030 0        10000 0        12157 1        00002 0        22016 0        00006 1        22012 1        31262 0
16,2030        74737 1        10000 0        12041 1        34737 0        27262 1        37720 0        05072 1     C: 03645 0

16,2040     C: 42106 0        02000 0        30111 0        74751 1        00006 1        12157 1        04674 0     C: 40154 0
16,2050        34755 1        55524 1        55525 0        55526 0        55421 0        55422 0        55423 1        55430 0
16,2060        55431 1        55432 1        55536 1        55537 0        55540 0        55541 1        55424 0        55425 1
16,2070        55501 0        55503 1        55544 1        55545 0        55510 0        55512 1        55502 0        55630 1

16,2100        55632 0        55631 0        55633 1        55460 0        55461 1        55766 0        55767 1        55770 1
16,2110        42202 1        71262 1        55262 1        00006 1        30033 1        53441 0        30034 0        55442 0
16,2120        41262 1        74740 1        27262 1        34751 0        55534 0        55535 1        34733 1        54031 1
16,2130        55466 0        55470 1        34755 1        55467 1        55471 0        55465 0        55472 0        55473 1

16,2140        55474 0        44363 1        55756 0        34752 0        55433 0        55434 1        55435 0        00006 1
16,2150        32205 1        53264 1        37732 0        54030 0        15270 0     C: 02024 0     C: 34106 1        04674 0
16,2160     C: 36655 1        04674 0     C: 35452 1        00006 1        32156 1        53264 1        34755 1        55472 0
16,2170        55473 1        55474 0        00006 1        01005 0        00006 1        01006 0        42203 0        00006 1

16,2200        03012 1        12152 1     C: 03021 1     C: 07400 1     C: 02213 0     C: 34106 1        00006 1        32212 1
16,2210        52006 0     C: 02227 1     C: 40106 1        37732 0        26030 0        22016 0        00006 1        22012 1
16,2220        11756 0        05624 1     C: 32000 0        02000 0        30032 0        55747 0        30033 1        55750 0
16,2230        30034 0        55751 1        31634 1        00006 1        21637 0        02256 1        55634 0        31635 0

16,2240        00006 1        21640 0        02256 1        55635 1        31636 0        00006 1        21641 1        02256 1
16,2250        55636 1        00006 1        27445 1        00006 1        27457 1        12647 1        10000 0        64753 1
16,2260        00002 0        40000 0        00002 0        00006 1        71740 1        21427 0        00006 1        31427 1
16,2270        53743 1        11426 1        12274 0        12304 0        62315 1        00006 1        62304 1        11426 1

16,2300        34733 1        00002 0        44733 0        00002 0        53427 0        00006 1        11747 0        00002 0
16,2310        54007 1        00002 0        50000 1        44734 1        00002 0     C: 77147 0        31736 1        00006 1
16,2320        71530 1        55744 0        31747 1        54001 1        00006 1        21440 1        23440 0        55736 0
16,2330        33624 1        55747 0        41744 0        00006 1        74736 0        27430 0        31745 0        61544 0

16,2340        00006 1        77741 0        27431 1        31746 0        61545 1        00006 1        77741 0        27432 1
16,2350        31750 1        54001 1        00006 1        21441 0        23441 1        55737 1        00006 1        71414 0
16,2360        61736 1        53427 0        02266 1        00006 1        61421 1        27430 0        02310 1        55430 0
16,2370        00006 1        31743 0        21447 0        41454 1        00006 1        73624 0        21447 0        31751 0
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OCTAL LISTING FOR PARAGRAPH # 111,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,2400        54001 1     00006 1     21442 0     55740 1     23442 1     31415 0     00006 1     71737 1
16,2410        53427 0     31417 1     02263 1     00006 1     61422 1     27431 1     02310 1     55431 1
16,2420        00006 1     31743 0     21451 1     41455 0     00006 1     73624 0     21451 1     31416 0
16,2430        00006 1     71737 1     53427 0     31420 0     02263 1     00006 1     61423 0     27432 1

16,2440        02310 1     55432 1     00006 1     31743 0     21453 0     41456 0     00006 1     73624 0
16,2450        21453 0     30111 0     74737 1     00006 1     12462 1     00006 1     31405 1     53750 0
16,2460        31403 1     12466 0     00006 1     31410 0     53750 0     31406 1     55751 1     11430 0
16,2470        12472 0     12507 0     61751 0     00006 1     62507 1     22007 0     23430 1     34755 1

16,2500        00006 1     11433 0     27421 0     02310 1     55421 0     31747 1     55433 0     25433 1
16,2510        31744 1     27421 0     02310 1     55421 0     11431 1     12517 1     12544 1     61751 0
16,2520        00006 1     62544 0     22007 0     23431 0     34755 1     00006 1     11434 1     55736 0
16,2530        27422 0     02310 1     55422 0     31747 1     57434 0     61750 1     57736 1     00006 1

16,2540        74756 0     00006 1     11736 0     27536 1     25434 0     31745 0     61544 0     27422 0
16,2550        02310 1     55422 0     11432 1     12555 1     12602 0     61751 0     00006 1     62602 1
16,2560        22007 0     23432 0     34755 1     00006 1     11435 0     55737 1     27423 1     02310 1
16,2570        55423 1     31747 1     57435 1     61750 1     57737 0     00006 1     74756 0     00006 1

16,2600        11737 1     27540 0     25435 1     31746 0     61545 1     27423 1     02310 1     55423 1
16,2610        40111 1     74744 0     10000 0     12624 1     55424 0     55425 1     55544 1     55545 0
16,2620        55536 1     55540 0     12667 0  C: 00074 1     31510 1     00006 1     74766 0     21537 0
16,2630        31536 0     55424 0     00006 1     73622 0     55544 1     31512 0     00006 1     74766 0

16,2640        21541 1     31540 1     55425 1     00006 1     73622 0     55545 0     12667 0     34747 1
16,2650        71262 1     10000 0     03742 0     52011 0     53753 0     32666 0     56017 1     22012 1
16,2660        53755 0     32665 0     52016 1     53757 1     15275 0  C: 02667 1     13645 1     11631 0
16,2670        12710 1     12734 0     11633 1     12712 0     12724 0     00006 1     27766 0     00006 1

16,2700        27767 1     00006 1     27770 1     34740 0     71262 1     00006 1     12734 1     02740 0
16,2710        55631 0     12672 1     55633 1     12675 0     55501 0     55510 0     45007 1     00006 1
16,2720        03012 1     34735 1     55631 0     12672 1     55503 1     55512 1     45020 1     00006 1
16,2730        03012 1     34735 1     55633 1     12675 0     41262 1     74740 1     27262 1     13630 0

16,2740        00006 1     00031 0     40000 0     73617 0     00006 1     13014 0     00006 1     74745 1
16,2750        50000 1     33576 0     55743 1     36245 1     03555 1     46245 0     61742 1     00006 1
16,2760        13013 1     44756 0     61743 0     00006 1     63002 0     41742 0     64751 0     00006 1
16,2770        63013 0     05567 0  C: 02001 1     34753 1     23262 0     00006 1     06001 0     55262 1
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OCTAL LISTING FOR PARAGRAPH # 112,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3000        34755 1      13014 0      34753 1      23262 0      00006 1      06001 0      55262 1      74753 0
16,3010        64751 0      27743 1      12753 0      31740 0      55472 0      34737 0      00006 1      02031 1
16,3020        00006 1      13027 0      30111 0      74743 1      10000 0      13467 0      13071 0      34735 1
16,3030        70111 1      00006 1      13071 0      34755 1      55464 1      30032 0      55634 0      11460 0

16,3040        13054 1      34751 0      00006 1      02031 1      00006 1      13064 1      34750 1      00006 1
16,3050        02031 1      00006 1      13062 1      13446 0      00006 1      00031 0      40000 0      75741 1
16,3060        55460 0      13446 0      44363 1      13065 0      34363 0      55524 1      34753 1      55460 0
16,3070        13354 1      00006 1      00031 0      55443 1      74735 0      00006 1      13223 0      34740 0

16,3100        70111 1      00006 1      13467 0      34743 0      71262 1      00006 1      13120 0      34737 0
16,3110        00006 1      02031 1      00006 1      13220 0      45014 0      71262 1      55262 1      13220 0
16,3120        31262 0      74742 0      00006 1      13125 0      13220 0      31262 0      74741 0      00006 1
16,3130        13134 0      13220 0   C: 74777 0   C: 00056 1      44740 1      00004 0      70111 1      54111 1

16,3140        34737 0      00006 1      02031 1      00006 1      13150 1      30032 0      55634 0      03152 1
16,3150        04674 0   C: 40154 0      00003 1      13467 0      55464 1      34740 0      26111 1      34755 1
16,3160        55446 1      55447 0      55450 0      55451 1      55452 1      55453 0      55454 1      55455 0
16,3170        55456 0      54042 0      54044 0      33132 1      71262 1      55262 1      03201 1      00003 1

16,3200        13446 0      22044 1      30042 1      53463 0      34755 1      54043 1      54042 0      54044 0
16,3210        00004 0      00006 1      23265 1      06022 1      33623 0      00006 1      05013 0      01265 1
16,3220        34755 1      54043 1      13232 0      41262 1      74743 1      27262 1      34740 0      70111 1
16,3230        00006 1      13154 0      30032 0      55634 0      10043 1      13240 0      13240 0      13240 0

16,3240        60000 1      60000 1      63133 0      00006 1      70043 1      30001 0      00006 1      71444 0
16,3250        57454 0      40000 0      61454 0      55736 0      03201 1      00003 1      41454 1      61421 1
16,3260        55427 0      11736 0      13265 1      13273 0      13265 1      61476 0      00006 1      63273 1
16,3270        34771 1      55445 1      03304 0      31262 0      74742 0      00006 1      13300 0      03304 0

16,3300        31446 0      55751 1      55464 1      03473 1      30032 0      55634 0      34755 1      55446 1
16,3310        55447 0      55464 1      11427 0      03316 0      03316 0      03316 0      55736 0      61476 0
16,3320        00006 1      63331 0      31445 0      00006 1      63331 0      41262 1      74742 0      27262 1
16,3330        13334 1      44742 0      71262 1      55262 1      41427 0      00006 1      71550 1      20001 1

16,3340        02310 1      00006 1      77721 0      55524 1      31736 1      61475 0      00006 1      63352 0
16,3350        36245 1      13361 1      31524 0      27524 1      34747 1      70101 0      10000 0      34753 1
16,3360        64751 0      55742 0      34753 1      54001 1      11524 1      13372 0      13446 0      13371 0
16,3370        13446 0      22007 0      64753 1      55736 0      23743 0      03535 1      46245 0      61742 1
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OCTAL LISTING FOR PARAGRAPH # 113,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

16,3400        00006 1     13403 1     44752 1     64751 0     55521 1     31740 0     05744 0     41736 0
16,3410        63616 0     00006 1     63630 1     63576 0     00006 1     63422 0     27736 0     51743 0
16,3420        33625 0     55524 1     31736 1     22007 0     00004 0     53471 0     04674 0  C: 37143 0
16,3430        44740 1     71262 1     55262 1     03435 0     13630 0     30101 1     54001 1     34747 1

16,3440        00006 1     06001 0     54101 0     00003 1     00002 0     03435 0     05743 1     34755 1
16,3450        55524 1     13630 0     30033 1     00006 1     21635 1     00006 1     71414 0     57751 0
16,3460        30032 0     00006 1     21634 0     61274 1     27751 1     57464 0     00002 0     03452 1
16,3470        41642 1     61421 1     55427 0     44753 0     55505 1     30111 0     74737 1     00006 1

16,3500        13511 0     00004 0     04674 0  C: 43736 1     31524 0     00006 1     13445 0     00003 1
16,3510        13354 1     34755 1     55500 1     00004 0     04674 0  C: 37304 1     00003 1     41740 1
16,3520        63534 0     00006 1     63354 0     11524 1     13526 1     13446 0     63533 1     00006 1
16,3530        63354 0     36245 1     13361 1  C: 77377 1  C: 75117 1     36245 1     55741 0     51742 1

16,3540        33567 0     51743 0     73560 0     55740 1     71260 0     10000 0     13550 0     00002 0
16,3550        11741 0     13555 0     05567 0  C: 02003 0     13446 0     55742 0     13536 0     12773 1
16,3560     C: 00252 1  C: 00125 1  C: 00140 1  C: 00006 1  C: 00220 1  C: 00011 1  C: 00151 1  C: 00146 1
16,3570     C: 00226 1  C: 00231 1  C: 00151 1  C: 00132 1  C: 00245 1  C: 00377 1  C: 77445 1  C: 00004 0

16,3600     C: 00002 0  C: 07776 0  C: 00005 1  C: 00011 1  C: 00012 1  C: 07776 0  C: 00003 1  C: 00010 0
16,3610     C: 00007 0  C: 07776 0  C: 07776 0  C: 07776 0  C: 07776 0  C: 07776 0  C: 00360 1  C: 07400 1
16,3620     C: 00266 0  C: 74631 0  C: 06315 0  C: 00600 1  C: 00632 0  C: 77751 1  C: 00026 0  C: 02734 0
16,3630        41644 1     61423 0     02310 1     55437 1     41643 0     61422 1     02310 1     55436 0

16,3640        00006 1     33644 1     52006 0  C: 02124 1  C: 36106 0     34752 0     55743 1     60000 1
16,3650        54002 1     51743 0     11524 1     13655 0     13674 0     63735 0     00006 1     63713 1
16,3660        51743 0     11524 1     33735 0     13665 0     43735 1     51743 0     27524 1     51743 0
16,3670        11524 1     43621 0     13674 0     33621 1     00006 1     51743 0     71521 1     30001 0

16,3700        51743 0     55736 0     00006 1     74742 0     00006 1     63736 0     50002 0     27513 0
16,3710        11743 1     13646 1     13722 1     34755 1     51743 0     57524 0     00006 1     74760 0
16,3720        30001 0     13674 0     31737 0     61740 0     00006 1     71532 0     55746 1     41740 1
16,3730        61737 0     00006 1     71531 0     55745 1     12316 0  C: 77537 0     40000 0     24002 0

16,3740        13706 1  C: 37400 1     41501 0     00006 1     71507 0     23510 1     41503 1     00006 1
16,3750        71511 1     23512 0     11501 0     34742 1     13756 1     34743 0     54066 0     11503 1
16,3760        34740 0     13763 1     34741 1     26066 0     43741 1     00006 1     02012 0     60066 1
16,3770        00006 1     01012 0     44747 0     71262 1     55262 1     00002 0  C: 03776 1 CKSM 24673 0
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OCTAL LISTING FOR PARAGRAPH # 114,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2000        54002 1      00006 1      06004 0      54001 1      74346 0      40000 0      64746 0      74346 0
17,2010        55270 1      67751 0      00006 1      62001 1      30002 0      00006 1      05013 0      40001 1
17,2020        55267 1      04707 0      55266 0      34750 1      00006 1      02013 1      00006 1      12050 1
17,2030        12031 0      00006 1      00004 0      61267 0      64736 1      64736 1      56001 0      32053 0

17,2040        61270 0      00006 1      60001 0      00006 1      62050 0      62054 1      00006 1      62030 0
17,2050        22002 0      31266 1      52005 0   C: 00440 1   C: 77754 1      10031 1      00002 0      05675 0
17,2060        05675 0      34733 1      22007 0      53471 0      53467 1      23465 1      54031 1      67730 1
17,2070        54000 0      12075 0      34733 1      54031 1      12115 1      00006 1      23265 1      22070 0

17,2100        06022 1      00006 1      23265 1      22070 0      34735 1      00006 1      05013 0      31466 1
17,2110        67730 1      54000 0      12115 1      34733 1      55466 0      50001 0      15743 0      22016 0
17,2120        00006 1      22012 1      02055 0      15270 0      34737 0      00006 1      02031 1      10000 0
17,2130        12135 0      40111 1      74740 1      00006 1      12136 0      02655 0      11630 1      12636 1

17,2140        12623 0      34755 1      55630 1      53437 1      03200 0      53427 0      34745 0      00006 1
17,2150        02031 1      00006 1      12200 0      34744 1      00006 1      02031 1      00006 1      12201 1
17,2160        34746 0      70111 1      10000 0      12200 0      55473 1      55474 0      40111 1      74744 0
17,2170        00006 1      12176 1      30106 0      74737 1      10000 0      34752 0      55500 1      12232 1

17,2200        34753 1      64751 0      55743 1      67750 1      55500 1      30111 0      74741 0      10000 0
17,2210        12352 0      30111 0      74742 0      10000 0      34753 1      64752 0      55742 0      03225 1
17,2220        11740 1      12224 0      05567 0   C: 02002 1      35764 1      71740 1      55473 1      45764 0
17,2230        71740 1      55474 0      34737 0      00006 1      02031 1      10000 0      12710 1      34735 1

17,2240        70111 1      00006 1      12354 0      00004 0      04674 0   C: 40154 0      34755 1      55450 0
17,2250        55452 1      00003 1      00006 1      00031 0      55736 0      11461 1      12300 1      31736 1
17,2260        74753 0      00106 1      12304 0      31736 1      74752 1      00006 1      12310 0      31736 1
17,2270        74747 0      00006 1      12314 1      31736 1      74746 1      00006 1      12316 0      13112 1

17,2300        41736 0      72351 0      55461 1      13112 1      33136 0      55525 0      43136 1      12320 0
17,2310        43136 1      55525 0      33136 0      12320 0      33136 0      12317 1      43136 1      55525 0
17,2320        55526 0      32350 0      55477 0      34753 1      55461 1      55505 1      30111 0      74737 1
17,2330        00006 1      12341 1      51505 0      11525 0      34776 0      12337 0      44776 1      51505 0

17,2340        55525 0      30111 0      74742 0      10000 0      34753 1      64752 0      55742 0      12756 0
17,2350     C: 02325 1   C: 00063 1      34751 0      12216 1      55632 0      44753 0      55630 1      34735 1
17,2360        71443 1      00006 1      12377 1      34740 0      70111 1      00006 1      12710 1      44743 1
17,2370        71262 1      55262 1      12374 1   C: 00056 1      34755 1      55462 1      55463 0      11462 1
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OCTAL LISTING FOR PARAGRAPH # 115,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,2400      12403 0     12403 0     12403 0     60000 1     60000 1     62373 1     00006 1     71462 1
17,2410      30001 0     00006 1     71444 0     57455 1     40000 0     61455 1     55740 1     11463 0
17,2420      12423 1     12423 1     12423 1     60000 1     60000 1     62373 1     00006 1     71463 0
17,2430      30001 0     30006 1     71444 0     57456 1     40000 0     61456 1     55741 0     41455 0

17,2440      61422 1     55436 0     41456 0     61423 0     55437 1     53437 1     03200 0     53427 0
17,2450      11740 1     02454 0     02454 0     02454 0     61476 0     00006 1     62460 1     12476 1
17,2460      11741 0     02464 0     02464 0     02464 0     61476 0     00006 1     62470 0     12476 1
17,2470      31262 0     74741 0     00006 1     12475 1     12500 1     12710 1     34771 1     55457 1

17,2500      00004 0     04674 0  C: 40154 0     00003 1     34755 1     55450 0     55451 1     55452 1
17,2510      55453 0     11426 1     12515 0     12515 0     12515 0     61476 0     00006 1     62533 0
17,2520      11427 0     12524 1     12524 1     12524 1     61476 0     00006 1     62530 0     12544 1
17,2530      34755 1     55427 0     12544 1     11427 0     02537 1     02537 1     02537 1     61476 0

17,2540      00006 1     62553 0     34755 1     55426 1     31457 0     00006 1     62553 0     41262 1
17,2550      74741 0     27262 1     02556 0     44741 0     71262 1     55262 1     32622 0     55477 0
17,2560      34753 1     55505 1     34751 0     55742 0     51505 0     51534 1     12567 0     34751 0
17,2570      51505 0     55534 0     13034 1     51505 0     11426 1     34755 1     12600 1     34753 1

17,2600      51505 0     63755 0     50000 1     41570 0     00006 1     51505 0     71426 1     54002 1
17,2610      20001 1     60002 0     54000 0     12615 0     30002 0     51505 0     55525 0     12756 0
17,2620      34755 1     12615 0  C: 02561 1     34736 1     70111 1     10000 0     12141 0     11502 0
17,2630      12632 0     12141 0     00006 1     00005 1     10000 0     12641 1     00006 1     32654 1

17,2640      52006 0     11632 0     12644 1     12141 0     00004 0     04674 0  C: 43327 0     00003 1
17,2650      34755 1     55632 0     12141 0  C: 03076 0  C: 42106 0     30033 1     00006 1     21635 1
17,2660      55736 0     00006 1     71415 1     55751 1     30034 0     00006 1     21636 1     55737 1
17,2670      00006 1     71417 0     61275 0     61751 0     57450 1     31736 1     00006 1     71416 1

17,2700      55751 1     31737 0     00006 1     71420 1     61276 0     61751 0     57452 0     00002 0
17,2710      31452 0     22000 1     31450 1     03200 0     53751 1     33142 0     55477 0     34753 1
17,2720      55505 1     51505 0     51534 1     12724 0     34751 0     51505 0     55534 0     13034 1
17,2730      51505 0     31750 1     55751 1     51505 0     31426 0     55427 0     30111 0     74737 1

17,2740      10000 0     12744 0     03304 0     12756 0     40111 1     74736 0     10000 0     55630 1
17,2750      00004 0     04674 0  C: 43736 1     00003 1     34751 0     55742 0     30101 1     74737 1
17,2760      00006 1     12772 0     40106 1     74737 1     00006 1     12772 0     30111 0     74744 0
17,2770      00006 1     13112 1     34752 0     54001 1     51505 0     11525 0     13003 0     13026 1
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OCTAL LISTING FOR PARAGRAPH # 116, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3000      13002 1     13026 1     22007 0     64753 1     55736 0     31505 0     60001 0     55743 1
17,3010      31736 1     63137 1     00006 1     63037 0     03225 1     51505 0     33134 1     54001 1
17,3020      31740 0     00004 0     50001 0     05744 0     00003 1     13100 1     51505 0     33134 1
17,3030      00004 0     50000 1     05743 1     00003 1     11505 1     01477 1     13270 0     41736 0

17,3040      63136 0     00006 1     63061 0     27736 0     51505 0     11525 0     33136 0     13051 1
17,3050      43136 1     51505 0     55525 0     11500 1     13060 0     00006 1     00004 0     74753 0
17,3060      55742 0     03225 1     51505 0     33134 1     00004 0     55471 0     31740 0     51471 1
17,3070      05744 0     31736 1     55470 1     03143 1     00003 1     34755 1     51505 0     55534 0

17,3100      46250 1     61742 1     00006 1     63106 0     34752 0     13107 0     34753 1     51505 0
17,3110      55522 1     13034 1     34755 1     55525 0     55526 0     34751 0     00004 0     57534 1
17,3120      00006 1     13123 0     05747 0     34751 0     57535 0     00003 1     00006 1     13270 0
17,3130      00004 0     05760 0     00003 1     13270 0  C: 00004 0  C: 00015 0  C: 00026 0  C: 77417 0

17,3140   C: 00600 1  C: 00266 0  C: 02720 0     41470 1     60031 0     00006 1     63163 0     23465 1
17,3150      53467 1     53471 0     54031 1     23465 1     00006 1     23265 1     06022 1     34735 1
17,3160      00006 1     05013 0     01265 1     61466 1     00006 1     63174 0     23467 0     53471 0
17,3170      00006 1     60031 0     53467 1     00002 0     40000 0     64754 0     55470 1     00002 0

17,3200      23737 0     00006 1     71626 0     57737 0     00006 1     71627 1     54001 1     61737 0
17,3210      55736 0     13215 0     50000 1     44734 1     55736 0     41737 1     60001 0     54007 1
17,3220      13223 0     50000 1     44734 1     23736 1     00002 0     51743 0     33257 1     51742 1
17,3230      73263 1     55740 1     71257 1     10000 0     13236 1     00002 0     36250 0     55742 0

17,3240      51743 0     33257 1     51742 1     73263 1     55740 1     71257 1     00006 1     13235 1
17,3250      11742 0     13237 0     51505 0     55525 0     05567 0  C: 02004 1     13026 1  C: 00110 1
17,3260   C: 00022 1  C: 00204 1  C: 00041 1  C: 00125 1  C: 00252 1  C: 00146 1  C: 00231 1  C: 00377 1
17,3270      33272 0     07757 0  C: 03273 1     53753 0     52011 0     53755 0     56017 1     22002 0

17,3300      34735 1     53757 1     52016 1     15272 1     00006 1     23744 1     51505 0     33755 0
17,3310      55745 1     31427 1     00006 1     63320 0     31745 0     55743 1     33757 1     13330 0
17,3320      41751 1     55751 1     41427 0     55427 0     34753 1     27745 1     55743 1     43757 0
17,3330      55737 1     31751 0     00006 1     74747 0     10000 0     13717 1     13340 1     13663 0

17,3340      34737 0     00006 1     70001 1     55751 1     31427 1     00006 1     74750 0     00006 1
17,3350      13352 1     13725 0     23427 1     31427 1     00006 1     70000 0     00006 1     74737 1
17,3360      55736 0     11751 1     13365 0     13365 0     13365 0     63760 0     00006 1     51745 0
17,3370      61600 0     00006 1     63377 1     34752 0     27743 1     34751 0     13402 0     11500 1
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OCTAL LISTING FOR PARAGRAPH # 117,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

17,3400        13402 0     13373 1     55742 0     41736 0     00006 1     51743 0     71566 1     51745 0
17,3410        61600 0     00006 1     61751 0     55740 1     00006 1     63575 0     51745 0     31572 0
17,3420        00006 1     71736 0     61751 0     51745 0     61602 1     00006 1     63461 1     51505 0
17,3430        41525 0     00006 1     71737 1     00006 1     63455 0     11554 0     13447 1     41740 1

17,3440        51745 0     61604 1     00006 1     63455 0     03561 0     31740 0     13615 1     51745 0
17,3450        41600 1     60000 1     61740 0     00006 1     63457 1     34755 1     13521 0     03561 0
17,3460        13602 1     54001 1     11737 1     13467 0     05675 0     44752 1     27743 1     30001 0
17,3470        00006 1     51743 0     71575 0     20001 1     20001 1     53747 0     51743 0     31567 1

17,3500        00006 1     71427 0     55741 0     00006 1     73767 0     61746 0     67751 0     00006 1
17,3510        63536 1     31741 1     00006 1     73770 0     61746 0     63761 1     00006 1     63546 0
17,3520        34741 1     00006 1     71737 1     51505 0     55525 0     00006 1     51505 0     71546 0
17,3530        30001 0     00006 1     63535 1     34751 0     55742 0     01744 1     43766 1     61741 1

17,3540        53747 0     00006 1     11746 1     00006 1     74736 0     13656 0     00006 1     33772 0
17,3550        21747 0     31741 1     63762 1     53747 0     00006 1     11746 1     00006 1     74736 0
17,3560        13521 0     41737 1     55737 1     31427 1     00006 1     51743 0     71566 1     55741 0
17,3570        63773 1     00006 1     63574 1     13520 1     00002 0     03561 0     31740 0     61554 1

17,3600        00006 1     63615 0     41555 1     61741 1     00006 1     63610 0     31741 1     13521 0
17,3610        11427 0     34746 0     13521 0     05675 0     13521 0     00006 1     51745 0     61604 1
17,3620        00006 1     51743 0     71574 1     20001 1     20001 1     53747 0     31741 1     63773 1
17,3630        00006 1     70000 0     00006 1     61746 0     00006 1     63520 0     31746 0     67751 0

17,3640        00006 1     63651 0     33763 0     53747 0     00006 1     11746 1     61741 1     63764 1
17,3650        13521 0     43765 1     53747 0     00006 1     11746 1     61741 1     63775 1     00006 1
17,3660        63455 0     63774 0     13521 0     43776 0     27427 0     00006 1     63707 1     03745 1
17,3670        31427 1     00006 1     51743 0     71570 0     67744 1     00006 1     63700 0     13520 1

17,3700        00006 1     13520 1     64740 0     20001 1     20001 1     20001 1     13656 0     03747 0
17,3710        11737 1     34753 1     13714 1     37752 0     27743 1     41427 0     13671 0     03745 1
17,3720        33776 1     61427 1     54000 0     13671 0     13520 1     03745 1     51745 0     41600 1
17,3730        61751 0     00006 1     74741 0     57427 1     00006 1     70000 0     00006 1     51745 0

17,3740        71570 0     51427 1     00006 1     63455 0     13520 1     41737 1     55737 1     34751 0
17,3750        55742 0     34735 1     55740 1     00002 0  C: 77757 1  C: 00000 1  C: 00020 0  C: 14400 0
17,3760     C: 75673 1  C: 77750 0  C: 00632 0  C: 01463 1  C: 00232 1  C: 77462 1  C: 77631 0  C: 77145 1
17,3770     C: 75462 0  C: 00007 0  C: 25605 0  C: 76631 1  C: 00122 0  C: 77655 1  C: 04476 0  CKSM 47661 0
```

```
OCTAL LISTING FOR PARAGRAPH # 120,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "1" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2000      C: 01150 1   C: 01046 1   C: 07361 1   C: 00666 1      32114 1      70111 1      55340 0      40106 1
20,2010         74737 1      10000 0      34736 1      27340 0      31340 1      74355 1      00006 1      12034 0
20,2020         31340 1      72113 1      55340 0      32112 1      04616 1   C: 20353 0      15472 1      12037 0
20,2030         12014 1      36245 1      05464 1      15155 1      34737 0      27340 0      12021 1      00004 0

20,2040         44737 1      70106 1      54001 1      41340 0      74736 0      10000 0      34737 0      60001 0
20,2050         54106 1      41340 0      74355 1      10000 0      44737 1      62114 1      71340 0      54001 1
20,2060         42114 0      70111 1      60001 0      54111 1      74737 1      10000 0      31327 0      61326 1
20,2070         55243 1      30111 0      74741 0      00006 1      12101 1      44735 0      70075 1      54075 1

20,2100         12104 1      40075 1      74735 0      26075 1      30111 0      76250 1      60000 1      55322 1
20,2110         04635 0   C: 02211 1   C: 00256 0   C: 33133 0   C: 13133 1      30111 0      74747 0      00006 1
20,2120         12122 0      12130 0      30111 0      74750 0      00006 1      12141 0      32153 1      12131 1
20,2130         32152 0      55343 0      00006 1      22070 0      37720 0      05072 1   C: 03652 0   C: 42106 0

20,2140         00070 0      32151 0      12131 1      00006 1      22070 0      02154 0      32153 1      55343 0
20,2150         12134 1   C: 00155 0   C: 03434 1   C: 00554 0      35015 0      56003 1      54001 1      30032 0
20,2160         55634 0      30033 1      55635 1      30034 0      55636 1      12171 0      35015 0      56003 1
20,2170         54001 1      34755 1      55642 1      55643 0      55644 1      55637 0      55640 0      55641 1

20,2200         55274 0      55275 1      55276 1      22003 1      00002 0      00006 1      22071 1      02166 1
20,2210         22003 1      55536 1      55537 0      55540 0      55541 1      55424 0      55425 1      55544 1
20,2220         55545 0      22003 1      40111 1      74744 0      26111 1      02116 0      00071 1      31262 0
20,2230         54001 1      34750 1      00006 1      06001 0      55262 1      74750 0      10000 0      12336 1

20,2240         40074 0      74735 0      00006 1      12257 1      30074 1      74750 0      10000 0      12266 0
20,2250         41450 0      55761 1      41452 1      55762 1      41464 1      57760 1      12456 0      41422 0
20,2260         55761 1      41423 1      55762 1      41421 0      57760 1      12456 0      00006 1      22061 0
20,2270         30322 1      00006 1      20033 0      55760 0      00006 1      71415 1      57761 0      30323 0

20,2300         00006 1      20034 1      55762 1      00006 1      71417 0      61761 0      02451 0      55761 1
20,2310         31760 1      00006 1      71416 1      57762 0      00006 1      71420 1      61762 0      02451 0
20,2320         55762 1      31760 1      00006 1      71414 0      57760 1      30321 1      00006 1      20032 1
20,2330         61760 1      02451 0      55760 0      00006 1      22061 0      12456 0      31262 0      76245 0

20,2340         00006 1      12376 0      74751 1      00006 1      12367 0      44746 1      00006 1      03012 1
20,2350         44755 0      55760 0      55761 1      55762 1      55763 0      55764 1      55765 0      54050 0
20,2360         54051 1      54052 1      46245 0      71262 1      64752 0      55262 1      12456 0      34746 0
20,2370         00006 1      05012 1      46245 0      71262 1      55262 1      12456 0      34746 0      00006 1
```

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OCTAL LISTING FOR PARAGRAPH # 121,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,2400        02012 0      10000 0      12407 1      41262 1      74751 1      27262 1      12456 0      34752 0
20,2410        54063 0      4245  0      00006 1      50063 1      71760 0      54001 1      10000 0      32446 0
20,2420        12422 0      42446 1      60001 0      54061 1      12430 0      50000 1      32446 0      54001 1
20,2430        50063 1      41763 0      60001 0      50063 1      26050 0      50063 1      23763 1      10063 0

20,2440        12410 1      37743 0      00006 1      05014 1      12456 0   C: 77177 0   C: 37200 1   C: 00600 1
20,2450     C: 03146 1      54007 1      00002 0      50000 1      44734 1      00002 0      00006 1      32462 0
20,2460        52006 0   C: 12016 1   C: 34106 1      35015 0      54003 0      04645 1      54117 1      30111 0
20,2470        74737 1      54157 0      10000 0      41327 1      61243 0      55326 0      00004 0      30106 0

20,2500        74737 1      00006 1      12526 0      44733 0      55475 1      35741 0      54154 0      41326 0
20,2510        61400 1      00006 1      62517 0      41326 0      62001 1      00006 1      62544 0      27326 0
20,2520        22007 0      10157 0      31327 0      61326 1      53244 0      12544 1      44742 0      55475 1
20,2530        36245 1      54154 0      41326 0      62002 1      00006 1      62517 0      41326 0      62003 0

20,2540        61400 1      00006 1      62544 0      12517 1      00003 1      10157 0      13111 1      34752 0
20,2550        54155 1      44752 1      26154 0      31326 1      50154 1      63064 0      54156 1      00006 1
20,2560        50154 1      33046 0      00006 1      10156 1      50154 1      63063 1      50155 0      55530 1
20,2570        10155 1      12550 1      12574 1      12673 0      22007 0      41532 0      61531 1      00006 1

20,2600        62624 0      00006 1      11531 0      54155 1      63110 1      00006 1      62611 0      43110 0
20,2610        54155 1      30155 0      00006 1      73104 0      63106 0      55627 1      44733 0      60155 0
20,2620        00006 1      71627 1      55626 0      12647 1      00006 1      11532 0      54155 1      40155 1
20,2630        63110 1      00006 1      62635 0      33110 1      54155 1      30155 0      00006 1      73104 0

20,2640        63107 1      55626 0      40155 1      64735 1      00006 1      71626 0      55627 1      41626 0
20,2650        00006 1      71531 0      55533 1      31627 0      00006 1      71532 0      61533 0      00006 1
20,2660        74736 0      55533 1      10154 0      34755 1      55502 0      13234 0      44752 1      54154 0
20,2670        44753 0      54155 1      12553 1      31245 0      00006 1      71243 1      03002 0   C: 03105 0

20,2700        00006 1      71527 1      00004 0      54154 0      00006 1      71532 0      03002 0   C: 02000 0
20,2710        55511 1      30154 1      00006 1      71531 0      03002 0   C: 02000 0      55507 0      00006 1
20,2720        73103 1      55504 0      31511 0      00006 1      73103 1      55506 1      00006 1      00012 1
20,2730        54155 1      34752 0      12734 1      34755 1      54154 0      30155 0      50154 1      73077 0

20,2740        00006 1      12755 0      30155 0      50154 1      73100 1      00006 1      12752 1      50154 1
20,2750        41507 0      12756 0      50154 1      31507 1      12756 0      34755 1      50154 1      55510 0
20,2760        10154 0      12733 0      40111 1      74736 0      00006 1      13712 1      41263 0      63772 0
20,2770        00006 1      12773 1      13712 1      11632 0      12777 0      04674 0   C: 43327 0      10157 0
```

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OCTAL LISTING FOR PARAGRAPH # 122,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3000         13675 1     13235 1     54161 0     54160 1     50002 0     30000 1     24002 0     50000 1
20,3010         30000 1     00006 1     13041 0     54162 0     10000 0     64753 1     13020 1     64753 1
20,3020         56161 1     00006 1     63024 1     40000 0     60161 1     00006 1     63033 1     30160 0
20,3030         00006 1     10162 0     00002 0     10160 1     10162 0     13041 0     10162 0     34735 1

20,3040         00002 0     34733 1     00002 0  C: 01240 0  C: 22513 0  C: 00141 0  C: 07416 0  C: 00030 1
20,3050      C: 21261 1  C: 00021 1  C: 03766 0  C: 00153 0  C: 07111 1  C: 00072 1  C: 24103 0  C: 00135 0
20,3060      C: 11511 1  C: 04754 0  C: 77142 0  C: 00061 0  C: 00217 0  C: 00464 1  C: 75642 0  C: 00536 1
20,3070      C: 75705 1  C: 00001 0  C: 77616 0  C: 05154 1  C: 00052 0  C: 00231 1  C: 77174 0  C: 01400 1

20,3100      C: 01000 0  C: 06000 1  C: 04000 0  C: 23146 0  C: 13241 1  C: 00337 0  C: 26501 1  C: 51276 0
20,3110      C: 62362 1     34753 1     54160 1     34753 1     54161 0     50160 0     33216 1     00006 1
20,3120         71326 0     00006 1     71327 1     50160 0     63217 0     54154 0     13132 0     54161 0
20,3130         00006 1     26160 1     50160 0     33221 0     00006 1     50161 1     71326 0     50160 0

20,3140         63223 1     00006 1     50161 1     71326 0     26154 0     10161 0     13127 1     10160 1
20,3150         13157 0  C: 00000 1  C: 20354 1     30154 1     54155 1     34757 0     13112 1     33216 1
20,3160         22007 0     03002 0  C: 01243 0     55530 1     34733 1     55550 1     55570 0     55571 1
20,3170         55610 0     55611 1     00006 1     33152 1     00006 1     10155 1     00004 0     55531 0

20,3200         55532 0     33107 1     55626 0     33106 0     55627 1     31243 0     00006 1     70154 0
20,3210         00006 1     71245 1     03002 0  C: 00155 0     55511 1     12716 1  C: 00167 1  C: 06176 1
20,3220      C: 77650 1  C: 72260 0  C: 76637 1  C: 02167 0  C: 00645 0  C: 06335 1  C: 04256 1  C: 30163 0
20,3230      C: 64072 0  C: 53632 0  C: 15133 1  C: 71777 0     55632 0     31343 1     00006 1     74737 1

20,3240         54001 1     60000 1     54115 0     41343 0     60001 0     54114 1     00004 0     31540 1
20,3250         54001 1     31536 0     04674 0  C: 37200 1     53543 0     00003 1     30111 0     74744 0
20,3260         10000 0     34753 1     54116 0     61502 1     10000 0     33767 1     54151 0     00006 1
20,3270         13274 1     10116 0     33766 0     54152 0     31530 0     64743 0     54157 0     31530 0

20,3300         03704 1     00004 0     55550 1     55551 0     44743 1     00006 1     71550 1     00006 1
20,3310         10157 0     55556 1     55557 0     34733 1     55552 0     55553 1     00003 1     22007 0
20,3320         10116 0     53543 0     34755 1     54154 0     54163 1     50154 1     11542 1     64753 1
20,3330         13333 0     54753 1     24163 0     54162 0     40163 1     54164 0     31343 1     54143 0

20,3340         54144 1     30162 1     63770 1     00006 1     63436 0     10151 0     13376 1     31343 1
20,3350         50164 1     26144 1     50163 0     54145 0     33233 0     60162 1     00006 1     63362 0
20,3360         40115 0     13371 0     40162 0     60000 1     60000 1     64736 1     60000 1     00006 1
20,3370         71343 0     50163 0     54143 0     30114 0     50164 1     54146 0     30162 1     00006 1
```

```
OCTAL LISTING FOR PARAGRAPH # 123,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

20,3400        74740 1     60162 1     03704 1     50164 1     54130 1     34733 1     50163 0     54127 1
20,3410        30162 1     61533 0     61533 0     64743 0     54000 0     13462 0     30162 1     00006 1
20,3420        74736 0     61533 0     54157 0     64744 1     56157 1     03704 1     00006 1     74736 0
20,3430        54160 1     33435 0     54161 0     44744 0     13737 0     13467 0     54001 1     34733 1

20,3440        54127 1     54130 1     10151 0     13462 0     33771 0     60001 0     00006 1     63457 1
20,3450        30115 1     50164 1     54146 0     60000 1     50163 0     54145 0     13462 0     31343 1
20,3460        54146 0     54145 0     30162 1     61533 0     61533 0     54157 0     03730 0     50164 1
20,3470        54134 0     30160 0     50164 1     54126 0     30162 1     61533 0     64743 0     54000 0

20,3500        13502 1     34733 1     63770 1     54157 0     03730 0     50164 1     54132 0     30160 0
20,3510        50164 1     54124 1     40162 0     61533 0     61533 0     03716 1     50163 0     54133 1
20,3520        54001 1     30160 0     50163 0     54125 0     40162 0     61533 0     54157 0     63770 1
20,3530        00006 1     63747 0     03724 0     50163 0     54131 0     30160 0     50163 0     54123 0

20,3540        50154 1     33775 1     71257 1     00006 1     13551 1     30124 0     54126 0     30132 1
20,3550        54134 0     50154 1     33773 1     71257 1     00006 1     13562 1     30123 1     54125 0
20,3560        30131 1     54133 1     40146 0     60143 1     60151 1     54147 1     40145 0     60144 0
20,3570        60151 1     54150 1     00004 0     10154 0     13616 1     30122 0     55546 0     34320 1

20,3600        05545 0  C: 00123 1  C: 01566 0     00003 1     52144 1     52136 1     52146 0     52140 0
20,3610        52150 1     52142 1     34753 1     54154 0     34755 1     13324 0     30122 0     55547 1
20,3620        34320 1     05545 0  C: 00123 1  C: 01606 0     52152 0     53555 1     31343 1     55560 1
20,3630        55561 0     61554 1     55563 1     55562 0     34755 1     55564 0     55565 1     11554 0

20,3640        13656 0     52136 1     53601 0     52140 0     53603 1     52142 1     53605 1     52144 1
20,3650        53621 1     52146 0     53623 0     52150 1     53625 0     13676 1     31343 1     55600 1
20,3660        55601 0     55620 0     55621 1     61554 1     55602 0     55603 1     55622 1     55623 0
20,3670        34755 1     55604 0     55605 1     55624 1     55625 0     00004 0     40111 1     74751 1

20,3700        26111 1     00003 1     30117 0     04640 1     54165 1     34743 0     22007 0     00006 1
20,3710        10165 1     00002 0     34755 1     55502 0     55632 0     12777 0     22007 0     22122 0
20,3720        54157 0     63770 1     00006 1     63744 0     30157 1     00006 1     50164 1     70130 1
20,3730        64743 0     56157 1     00006 1     22161 1     03704 1     54160 1     44743 1     00006 1

20,3740        70160 1     00006 1     10157 0     00161 1     43770 0     54157 0     13725 0     10163 1
20,3750        34752 0     67752 0     54122 1     60154 1     50000 1     33774 0     71257 1     00006 1
20,3760        13764 0     43770 0     54157 0     13532 1     30001 0     13533 0  C: 00110 1  C: 00443 1
20,3770     C: 77377 1  C: 00356 1  C: 02213 0  C: 00110 1  C: 00022 1  C: 00204 1  C: 00041 1  CKSM 62733 1
```

```
OCTAL LISTING FOR PARAGRAPH # 124, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2000     C: 24402 1  C: 01551 1  C: 21357 0  C: 22316 0  C: 01507 1  C: 00547 1     40103 1     74747 0
21,2010        10000 0     15261 0     11055 1     12015 0     12125 1     55714 0     36010 0     05173 1
21,2020     C: 02006 0     34753 1     70107 0     00006 1     12030 1     34747 1     54001 1     04606 0
21,2030        34752 0     70107 0     00006 1     12037 0     34751 0     54001 1     04606 0     30105 0

21,2040        74743 1     00006 1     12145 1     41010 0     62104 0     00006 1     12145 1     00006 1
21,2050        00030 1     40000 0     54001 1     74750 0     10000 0     12073 0     41010 0     62103 1
21,2060        00006 1     12145 1     30001 0     74753 0     10000 0     12070 0     12145 1     02105 1
21,2070        44755 0     12074 1     02105 1     34752 0     54002 1     00004 0     00006 1     32102 0

21,2100        52006 0  C: 03413 1  C: 12067 0  C: 00106 0  C: 00107 1     40774 1     61010 1     00006 1
21,2110        12121 0     40105 1     74743 1     10000 0     12121 0     30103 0     74747 0     10000 0
21,2120        00002 0     04364 1     04457 0     04635 0  C: 21051 0     40107 0     74735 0     00006 1
21,2130        12141 0     40107 0     74742 0     00006 1     12141 0     37723 0     05072 1  C: 03571 1

21,2140     C: 70067 1     00006 1     34755 1     52754 0     12021 1     23714 1     40025 1     53055 1
21,2150        40103 1     74741 0     10000 0     13052 1     31300 0     74745 1     10000 0     12231 1
21,2160        02315 1     41300 1     74745 1     27300 1     34752 0     00006 1     05014 1     31743 0
21,2170        00006 1     71706 0     56070 0     31744 1     00006 1     71707 1     26070 1     31745 0

21,2200        00006 1     71710 1     26070 1     32000 0     00006 1     70070 1     20001 1     20001 1
21,2210        56070 0     31716 0     00006 1     71715 1     60070 0     55711 0     41711 0     00006 1
21,2220        62222 1     12224 0     31711 1     64735 1     54060 0     34751 0     00006 1     05014 1
21,2230        15261 0     02315 1     44745 1     71300 1     55300 1     44752 1     00006 1     03014 1

21,2240        11741 0     12245 1     12245 1     12263 0     55741 0     44753 0     53742 0     53713 1
21,2250        34742 1     56002 0     22007 0     31715 0     00006 1     10002 1     00006 1     72002 0
21,2260        12264 1     53713 1     12304 0     32001 1     00006 1     71711 0     20001 1     61713 0
21,2270        55713 1     34755 1     27712 0     34733 1     64753 1     61713 0     55713 1     34755 1

21,2300        64733 1     61712 1     55712 0     13047 0     11713 1     12311 1     12311 1     34755 1
21,2310        55713 1     11712 0     34735 1     61713 0     12224 0     00006 1     23714 1     34746 0
21,2320        00006 1     02030 0     10000 0     13052 1     40075 1     74736 0     00006 1     12365 1
21,2330        40075 1     74736 0     26075 1     44745 1     71300 1     55300 1     40074 0     74752 1

21,2340        00006 1     15261 0     34744 1     00006 1     05012 1     34755 1     55702 1     55703 0
21,2350        55676 0     55677 1     34750 1     05173 1  C: 02356 0     15261 0     34752 0     00006 1
21,2360        05012 1     41300 1     74744 0     27300 1     15261 0     41234 1     60025 0     64736 1
21,2370        64736 1     57715 0     34777 1     54065 0     00006 1     31236 1     20001 1     20001 1
```

```
OCTAL LISTING FOR PARAGRAPH # 125,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,2400       00006 1    71715 1    00006 1    10065 0    57706 1    00006 1    31527 0    20001 1
21,2410       20001 1    27706 0    30037 0    61157 0    00006 1    72004 0    27706 0    00006 1
21,2420       31240 0    20001 1    20001 1    00006 1    71715 1    00006 1    10065 0    57707 0
21,2430       00006 1    31531 1    20001 1    20001 1    27707 1    30040 0    61160 1    00006 1

21,2440       72004 0    27707 1    00006 1    31242 1    20001 1    20001 1    00006 1    71715 1
21,2450       00006 1    10065 0    57710 0    00006 1    31533 0    20001 1    20001 1    27710 1
21,2460       30041 1    61161 0    00006 1    72004 0    27710 1    34751 0    05224 0    40074 0
21,2470       74752 1    10000 0    12474 0    01714 1    34752 0    00006 1    02012 0    10000 0

21,2500       12502 0    13052 1    31733 1    61706 1    54061 1    31735 1    61707 0    54062 1
21,2510       31737 0    61710 0    54063 0    30061 0    00006 1    71717 0    56070 0    30062 0
21,2520       00006 1    71721 0    26070 1    30063 1    00006 1    71723 1    26070 1    30070 0
21,2530       60000 1    57704 0    30061 0    00006 1    71725 1    56070 0    30062 0    00006 1

21,2540       71727 0    26070 1    30063 1    00006 1    71731 1    26070 1    30070 0    60000 1
21,2550       57705 1    35015 0    54003 0    31417 1    54063 0    31420 0    54064 1    35016 0
21,2560       54003 0    30064 0    00006 1    71704 1    56070 0    30063 1    00006 1    71705 0
21,2570       26070 1    32003 0    00006 1    70070 1    20001 1    57700 1    30064 0    00006 1

21,2600       71705 0    56070 0    30063 1    00006 1    71704 1    40000 0    26070 1    32003 0
21,2610       00006 1    70070 1    20001 1    57701 0    42005 1    54066 0    34753 1    54065 0
21,2620       50065 1    11700 0    12626 0    12727 0    12634 0    12727 0    50065 1    41700 0
21,2630       62005 0    00006 1    62642 0    12727 0    50065 1    31700 1    62005 0    00006 1

21,2640       62642 0    12727 0    50065 1    11676 0    12650 1    12661 0    12655 1    12661 0
21,2650       50065 1    31700 1    00006 1    62700 1    12661 0    50065 1    41700 0    00006 1
21,2660       62715 0    50065 1    11702 1    12673 0    12666 1    12711 0    50065 1    31700 1
21,2670       00006 1    62717 1    12702 1    50065 1    31700 1    00006 1    62700 1    12702 1

21,2700       42005 1    13023 1    50065 1    41676 0    62005 0    50065 1    56072 1    34753 1
21,2710       13026 1    50065 1    31700 1    00006 1    62717 1    32005 0    13023 1    50065 1
21,2720       31676 1    62005 0    40000 0    50065 1    56072 1    44753 0    13026 1    50065 1
21,2730       11702 1    12760 0    12734 1    12765 0    50065 1    41676 0    00006 1    62741 1

21,2740       12774 0    50065 1    41700 0    00006 1    63017 1    60066 1    50065 1    61676 1
21,2750       00006 1    63017 1    50065 1    61700 1    00006 1    50065 1    61676 1    13023 1
21,2760       50065 1    41700 0    00006 1    63017 1    12771 0    50065 1    31700 1    00006 1
21,2770       63017 1    50065 1    41676 0    13023 1    50065 1    31700 1    00006 1    63017 1
```

```
OCTAL LISTING FOR PARAGRAPH # 126,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3000        32005 0      50065 1      61676 1      40000 0      50065 1      61700 1      00006 1      63017 1
21,3010        00006 1      50065 1      61700 1      50065 1      61676 1      40000 0      13023 1      50065 1
21,3020        41676 0      50065 1      61700 1      50065 1      56072 1      34755 1      50065 1      55702 1
21,3030        50065 1      30072 1      64754 0      50065 1      54053 0      50065 1      30072 1      50065 1

21,3040        27676 0      10065 0      12617 1      35020 0      00006 1      05014 1      01714 1      34755 1
21,3050        54001 1      12261 1      40074 0      74752 1      00006 1      13066 0      34744 1      71300 1
21,3060        10000 0      34752 0      64744 1      40000 0      00006 1      03012 1      43075 1      71300 1
21,3070        55300 1      44736 0      70075 1      54075 1      15261 0   C: 00300 1      37752 0      55630 1

21,3100        34751 0      55534 0      55535 1      34752 0      55632 0      55631 0      55633 1      30021 1
21,3110        60000 1      55505 1      34752 0      13115 0      34755 1      55747 0      51747 1      31536 0
21,3120        00006 1      74752 1      00006 1      13127 1      50000 1      44734 1      56001 0      11747 0
21,3130        50000 1      31436 1      53743 1      51747 1      31504 1      55740 1      00006 1      13575 1

21,3140        51747 1      31450 1      00006 1      71740 1      23736 1      00006 1      74747 0      53737 1
21,3150        00006 1      74747 0      27737 1      41743 1      00006 1      74736 0      00006 1      71743 1
21,3160        61740 0      00006 1      63177 0      00006 1      40001 1      61740 0      00006 1      11740 1
21,3170        57745 0      30001 0      22007 0      00006 1      11740 1      57746 0      13202 0      34733 1

21,3200        54001 1      53746 1      31742 1      00006 1      74743 1      53742 0      00006 1      31742 1
21,3210        53751 1      31743 0      00006 1      63217 0      00006 1      31746 0      13221 1      00006 1
21,3220        41746 1      21751 1      11750 0      13227 1      13226 0      13231 0      11751 1      34753 1
21,3230        13232 0      44753 0      55744 0      11744 0      13246 0      13237 0      13243 0      55741 0

21,3240        55742 0      13246 0   C: 65252 1      00006 1      41742 0      53742 0      00006 1      31746 0
21,3250        21742 0      31745 0      00006 1      73242 1      53746 1      30001 0      00006 1      73242 1
21,3260        27746 1      54001 1      13264 0      27745 1      00006 1      31742 1      21746 1      31745 0
21,3270        00006 1      71743 1      21737 1      31746 0      00006 1      71743 1      27737 1      54001 1

21,3300        13302 1      27736 0      31741 1      00006 1      71740 1      53751 1      31742 1      00006 1
21,3310        71740 1      27751 1      54001 1      13315 1      27750 0      11744 0      13523 1      13565 0
21,3320        13322 0      13565 0      00006 1      41742 0      53742 0      13523 1   C: 23146 0      34753 1
21,3330        55502 0      34752 0      22002 0      22071 1      13336 0      34755 1      54066 0      50066 1

21,3340        31507 1      00006 1      63412 0      54063 0      50066 1      41536 1      00006 1      13412 1
21,3350        54002 1      00006 1      73326 1      60002 0      54001 1      13362 1      40000 0      50066 1
21,3360        57501 1      13416 0      00006 1      63370 0      40000 0      54062 1      44753 0      13372 0
21,3370        54062 1      34753 1      50066 1      55501 0      30063 1      00006 1      74740 1      60062 0
```

```
OCTAL LISTING FOR PARAGRAPH # 127,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

21,3400        00006 1     63416 1     40062 1     00006 1     73437 0     00006 1     10063 0     00006 1
21,3410        13412 1     13424 1     34755 1     50066 1     55501 0     13426 0     36010 0     50066 1
21,3420        55631 0     34755 1     55502 0     13426 0     50066 1     55631 0     10066 0     13335 0
21,3430        52073 1     52063 0     04674 0  C: 35742 0     52063 0     52073 1     00071 1  C: 00240 1

21,3440        11750 0     13457 0     13444 1     13450 1     31751 0     00006 1     63450 0     13453 1
21,3450        34755 1     55740 1     00002 0     57750 1     57751 0     34757 0     13460 1     34755 1
21,3460        55740 1     35741 0     55743 1     13472 1     31750 1     13506 0     37751 0     27743 1
21,3470        00006 1     63464 1     41750 0     51743 0     64735 1     00006 1     63466 0     51743 0

21,3500        34735 1     57746 0     00006 1     31751 0     00006 1     11746 1     00006 1     23751 0
21,3510        00006 1     74736 0     55746 1     74737 1     10000 0     33633 1     63631 0     03635 1
21,3520        03635 1     03635 1     01751 0     03440 1     57741 1     00006 1     71741 0     53742 0
21,3530        00006 1     70001 1     27742 0     54001 1     13536 0     27741 0     31743 0     00006 1

21,3540        74736 0     27740 1     00006 1     13562 1     51740 0     34735 1     57741 1     00006 1
21,3550        71741 0     21737 1     57741 1     00006 1     71742 0     27737 1     54001 1     13561 1
21,3560        27736 0     13565 0     00006 1     31742 1     21737 1     11736 0     13572 0     13571 0
21,3570        13574 0     11737 1     34753 1     13575 1     44753 0     54001 1     51747 1     57501 1

21,3600        00006 1     70001 1     10001 1     13620 1     13615 1     13607 1     13615 1     51747 1
21,3610        55510 0     51747 1     43632 1     00006 1     03012 1     41262 1     74747 0     27262 1
21,3620        11747 0     13114 1     31505 0     54021 0     00006 1     33630 1     52006 0  C: 03270 1
21,3630     C: 36106 0  C: 26501 1  C: 01400 1  C: 11276 1  C: 06000 1     55745 1     54021 0     31746 0

21,3640        22007 0     00006 1     11745 1     60021 1     00002 0     34755 1     55536 1     55540 0
21,3650        55424 0     55425 1     04616 1  C: 40465 1     05155 0  C: 00632 0     34736 1     51505 0
21,3660        55525 0     11744 0     13702 0     13705 1     51505 0     41525 0     10000 0     00002 0
21,3670        13672 0     13672 0     51505 0     33714 0     51505 0     55767 1     34755 1     51505 0

21,3700        55525 0     00002 0     51505 0     31525 1     13666 0     51505 0     11767 1     13711 1
21,3710        00002 0     13676 1     00002 0  C: 00004 0  C: 00012 1  C: 00012 1     44753 0     55744 0
21,3720        31427 1     13725 0     34753 1     55744 0     41427 0     22000 1     40111 1     74744 0
21,3730        10000 0     34767 0     60001 0     00006 1     63744 0     13661 1     51505 0     11525 0

21,3740        13722 1     13743 0     13716 0     55744 0     31427 1     00006 1     74766 0     10000 0
21,3750        13767 0     13753 1     13656 0     31427 1     61751 0     00006 1     71411 0     00006 1
21,3760        13775 0     00006 1     63771 0     31427 1     63655 1     00006 1     63775 1     44736 0
21,3770        13657 1     43655 0     61427 1     00006 1     63656 1     34755 1     13657 1  CKSM 60324 1
```

```
OCTAL LISTING FOR PARAGRAPH # 130, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2000    C: 27533 1   C: 07571 0   C: 25004 1   C: 06702 1      06042 1   I: 77634 0   C: 44403 0   C: 03276 1
22,2010    I: 51535 0   C: 00324 1   I: 51025 1   C: 04403 1   C: 44724 0   I: 72364 0   C: 03245 1   C: 03276 1
22,2020    I: 77624 1   C: 44410 1   I: 72364 0   C: 02230 1   C: 00322 1   I: 77624 1   C: 44410 1   I: 45160 1
22,2030    C: 03245 1   C: 44326 0   I: 45575 1   C: 50460 0   I: 77626 0   C: 50466 0   I: 77626 0   C: 74474 0

22,2040    I: 75160 1   C: 03302 0   C: 02230 1   I: 77624 1   C: 44312 1   I: 45575 1   C: 51532 1   I: 77626 0
22,2050    C: 51540 1   I: 77626 0   C: 75546 1   I: 45001 1   C: 00023 0   C: 44335 1   I: 45575 1   C: 50460 0
22,2060    I: 77626 0   C: 50466 0   I: 77626 0   C: 74474 0   I: 45345 1   C: 03305 1   C: 02233 1   I: 45325 1
22,2070    C: 02235 1   C: 03307 0   I: 45325 1   C: 03315 0   C: 02243 0   I: 77666 1   C: 03325 0   I: 43345 1

22,2100    C: 02231 0   C: 02251 0   I: 43225 0   C: 06514 1   C: 02241 1   C: 03333 1   I: 77726 1   C: 03335 1
22,2110    I: 51025 1   C: 04363 0   C: 44117 0   I: 77751 1   C: 00322 1   C: 37235 1   C: 44742 0   I: 45345 1
22,2120    C: 03335 1   C: 04365 0   I: 77244 0   C: 44131 1   C: 03325 0   I: 77656 1   C: 03270 1   I: 77650 1
22,2130    C: 44744 0   I: 53375 0   C: 02231 0   C: 03303 1   I: 77762 1   C: 27303 1   C: 02237 0   I: 74455 0

22,2140    C: 03311 1   C: 27311 1   C: 02245 0   I: 74455 0   C: 03317 1   C: 03317 1   I: 70545 1   C: 03333 1
22,2150    I: 45325 1   C: 06522 1   C: 03333 1   I: 65204 1   C: 21713 1   C: 03323 0   I: 56225 1   C: 00001 0
22,2160    C: 00003 1   I: 65366 1   C: 03313 0   I: 56225 1   C: 00001 0   C: 00003 1   I: 65366 1   C: 03303 1
22,2170    I: 56225 1   C: 00001 0   C: 00003 1   I: 55566 1   I: 77656 1   C: 03270 1   I: 45345 1   C: 03270 1

22,2200    C: 03272 0   I: 71243 1   C: 44211 0   C: 03270 1   I: 50025 0   C: 03274 0   C: 44266 0   I: 77650 1
22,2210    C: 44242 0   I: 45345 1   C: 03272 0   C: 03274 0   I: 77640 0   C: 44266 0   I: 51145 0   C: 03327 1
22,2220    C: 44224 0   I: 57575 1   C: 03270 1   C: 03270 1   I: 51145 0   C: 03305 1   C: 44232 1   I: 57545 1
22,2230    C: 03270 1   C: 03270 1   I: 51145 0   C: 03315 0   C: 44744 0   I: 57545 1   C: 03274 0   C: 03274 0

22,2240    I: 77650 1   C: 44744 0   I: 51145 0   C: 03325 0   C: 44250 0   I: 57575 1   C: 03270 1   C: 03270 1
22,2250    I: 51145 0   C: 03305 1   C: 44256 0   I: 57545 1   C: 03272 0   C: 03272 0   I: 51145 0   C: 03307 0
22,2260    C: 44744 0   I: 57545 1   C: 03274 0   C: 03274 0   I: 77650 1   C: 44744 0   I: 51145 0   C: 03331 0
22,2270    C: 44274 0   I: 57575 1   C: 03270 1   C: 03270 1   I: 51145 0   C: 03307 0   C: 44302 0   I: 57545 1

22,2300    C: 03270 1   C: 03270 1   I: 51145 0   C: 03315 0   C: 44744 0   I: 57545 1   C: 03272 0   C: 03272 0
22,2310    I: 77650 1   C: 44744 0   I: 76601 1   C: 00001 0   C: 00001 0   I: 62703 1   C: 77776 1   C: 00007 0
22,2320    I: 62703 1   C: 77776 1   C: 00015 0   I: 41503 1   C: 77776 1   I: 77616 0   I: 76601 1   C: 00001 0
22,2330    C: 00001 0   I: 62713 0   C: 00007 0   C: 00015 0   I: 77606 1   I: 77776 1      50120 1      52013 1

22,2340       50120 1      52017 0      50120 1      52013 1      50120 1      52015 1      50120 1      52005 0
22,2350       50120 1      52015 1      50120 1      52003 0      50120 1      52007 1      50120 1      52003 0
22,2360       06042 1   I: 77616 0   C: 00013 0   C: 13563 0   C: 17070 0   C: 34343 1   C: 15666 0   C: 20443 0
22,2370    C: 33555 1   C: 01106 1   C: 67777 1   C: 77777 0   C: 04000 0   C: 00000 1   C: 00216 1   C: 36323 0
```

```
OCTAL LISTING FOR PARAGRAPH # 131,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,2400     C: 17773 1    C: 00057 0    C: 14344 1       30034 0       54156 1       00006 1       30033 1       16501 1
22,2410     I: 66370 0    C: 00003 1    C: 00051 0    C: 00001 0    C: 00010 0    I: 77601 0    C: 00001 0    I: 47133 0
22,2420     C: 00013 1    C: 21577 1    C: 00013 0    I: 65356 1    C: 00013 0    I: 41546 0    I: 71300 1    C: 44417 0
22,2430     C: 00007 0    I: 72405 0    C: 00013 0    C: 10001 1    I: 41345 0    C: 00005 1    C: 00001 0    I: 41325 0

22,2440     C: 00007 0    C: 00011 1    I: 72405 0    C: 00003 1    I: 72421 0    C: 00015 0    C: 10003 0    I: 41345 0
22,2450     C: 00003 1    C: 00005 1    I: 41325 0    C: 00007 0    C: 00011 1    I: 72405 0    C: 00001 0    I: 72415 1
22,2460     C: 00017 1    C: 10005 0    I: 77745 1    C: 00011 1    C: 10007 1    I: 77745 1    C: 00013 0    I: 72405 0
22,2470     C: 00003 1    C: 10011 0    I: 41345 0    C: 00013 0    C: 00001 0    I: 72476 1    C: 10013 1    I: 41345 0

22,2500     C: 00005 1    C: 00013 0    I: 72476 1    C: 10015 1    I: 77745 1    I: 72405 0    C: 00011 1    I: 41325 0
22,2510     C: 00007 0    C: 00001 0    I: 72415 1    I: 77626 0    C: 67760 1    I: 77745 1    I: 72405 0    C: 00011 1
22,2520     I: 41325 0    C: 00007 0    C: 00003 1    I: 72425 1    I: 77626 0    C: 67756 1    I: 77616 0    I: 41401 1
22,2530     C: 00001 0    I: 65356 1    I: 41546 0    I: 65302 0    I: 41021 1    C: 06522 1    C: 21713 1    I: 77725 1

22,2540     C: 03270 1    I: 41316 0    C: 00005 1    I: 52415 0    C: 00003 1    I: 77604 0    C: 21713 1    C: 16231 0
22,2550     C: 03272 0    I: 41316 0    C: 00005 1    I: 52415 0    C: 00003 1    I: 77604 0    C: 21713 1    C: 16241 1
22,2560     C: 03274 0    I: 41316 0    C: 00005 1    I: 52415 0    C: 00003 1    I: 77604 0    C: 21713 1    C: 02251 0
22,2570     I: 41345 0    C: 03270 1    C: 03272 0    I: 72405 0    C: 00005 1    I: 41325 0    C: 03274 0    C: 00001 0

22,2600     I: 43206 1    C: 00007 0    I: 41112 0    C: 21713 1    C: 16237 0    I: 62421 1    I: 77604 0    C: 21713 1
22,2610     C: 16233 1    C: 03270 1    I: 41205 0    C: 03274 0    C: 00005 1    I: 65352 0    C: 03272 0    I: 41405 0
22,2620     C: 00001 0    I: 62415 0    C: 00007 0    I: 77604 0    C: 21713 1    C: 16235 1    I: 62421 1    I: 77604 0
22,2630     C: 21713 1    C: 16245 0    C: 03272 0    I: 41205 0    C: 03274 0    C: 00005 1    I: 65352 0    C: 03270 1

22,2640     I: 41405 0    C: 00001 0    I: 62415 0    C: 00007 0    I: 77604 0    C: 21713 1    C: 16247 1    I: 62421 1
22,2650     I: 77604 0    C: 21713 1    C: 02243 0    I: 77616 0    I: 67543 1    C: 00007 0    I: 71406 0    I: 41152 1
22,2660     C: 21713 1    C: 00051 0    I: 57543 1    C: 00015 0    I: 67471 1    C: 00051 0    I: 51123 0    C: 00001 0
22,2670     C: 44702 1    I: 57545 1    I: 43244 1    C: 44677 1    C: 06522 1    I: 77650 1    C: 44701 1    I: 77625 0

22,2700     C: 06522 1    I: 77606 1    I: 57543 1    C: 00013 0    I: 67471 1    C: 00051 0    I: 51123 0    C: 00011 1
22,2710     C: 44722 0    I: 57545 1    I: 43244 1    C: 44717 0    C: 06522 1    I: 77650 1    C: 44723 1    I: 52025 1
22,2720     C: 06522 1    C: 44723 1    I: 77745 1    I: 43466 1    I: 77776 1       05567 0    C: 00401 1       12732 1
22,2730        04616 1    C: 40154 0       04616 1    C: 40166 1       34752 0       00004 0       05203 0    C: 03234 1

22,2740     C: 44066 1       15155 1    I: 77776 1       12732 1    I: 77614 1    C: 01074 0    I: 70740 0    C: 01322 0
22,2750     C: 04772 1    I: 45002 1    C: 44527 1    I: 74343 0    C: 04772 1    C: 03270 1    C: 17325 0    C: 03335 1
22,2760     I: 55605 1    C: 05002 0    C: 04772 1    I: 77661 0    C: 20606 0    C: 03333 1    I: 77614 1    C: 01035 0
22,2770     C: 45010 1    C: 00221 0    C: 24255 0    C: 00554 0    C: 02660 0    C: 02660 0    C: 13301 1    C: 16161 0
```

```
OCTAL LISTING FOR PARAGRAPH # 132,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3000    C: 30707 1  C: 00003 1  C: 04000 0     04616 1  C: 54266 1     10000 0     12730 0     06042 1
22,3010    I: 75160 1  C: 03245 1  C: 02230 1  I: 77624 1  C: 44312 1  I: 45575 1  C: 50515 0  I: 77626 0
22,3020    C: 50523 0  I: 77626 0  C: 74531 0  I: 45160 1  C: 03245 1  C: 44654 0  I: 77634 0  C: 21621 1
22,3030    C: 03303 1  I: 77414 0  C: 01215 0  C: 45122 1     34752 0     55261 1     51261 0     31675 1

22,3040       00006 1     51261 0     21702 1     00006 1     73121 1     10000 0     64753 1     13051 1
22,3050       40000 0     51261 0     55637 0     51261 0     31702 0     51261 0     57675 1     51261 0
22,3060       55634 0     11261 1     13035 0     00003 1     03075 0     13170 0     34753 1     00004 0
22,3070       05203 0  C: 03213 1  C: 44066 1     00003 1     15155 1     00006 1     40025 1     53707 1

22,3100       00006 1     31733 1     21707 1     11706 0     00002 0     13107 0     13117 1     11707 1
22,3110       00002 0     13113 0     40000 0     63166 0     00006 1     63117 0     24002 0     24002 0
22,3120       00002 0  C: 03146 1  I: 77776 1     00006 1     30025 0     21733 0     00006 1     43166 1
22,3130       21733 0     00004 0     34752 0     55700 0     60000 1     55701 1     50000 1     31724 1

22,3140       51700 1     55642 1     00006 1     63145 1     40000 0     00006 1     73167 0     00006 1
22,3150       51701 0     71724 0     00006 1     51700 1     11530 1     51700 1     55274 0     11700 0
22,3160       13133 1     30025 0     63166 0     57705 1     13034 1  C: 00000 1  C: 00144 0  C: 75777 1
22,3170       40025 1     61705 1     10000 0     64753 1     13177 1     64735 1     40000 0     00004 0

22,3200       05203 0  C: 03206 0  C: 44066 1     33166 0     27705 0     15155 1     37717 1     05105 0
22,3210    C: 03003 1  C: 44066 1     05261 1     34755 1     55641 1     55644 1     55276 1     55640 0
22,3220       55643 0     55275 1     30323 0     55636 1     30322 1     55635 1     30321 1     55634 0
22,3230       34755 1     55642 1     55637 0     55274 0     31306 0     54063 0     34755 1     53305 1

22,3240       05116 1     05261 1     06042 1  I: 52014 0  C: 03712 0  C: 45465 1  C: 45247 1  I: 77776 1
22,3250       34752 0     55050 1     34753 1     55051 0     33316 0     04616 1  C: 20334 1     05472 0
22,3260       03262 1     03254 1     34750 1     05203 0  C: 03430 0  C: 44064 0     00003 1     33320 0
22,3270       54003 0     34755 1     55537 0     35021 1     05105 0  C: 03321 1  C: 44064 0     00003 1

22,3300       36250 0     71537 0     10000 0     03310 0     34777 1     04616 1  C: 01736 1     03300 1
22,3310       33317 1     04616 1  C: 20334 1     05563 1     05563 1     03267 1  C: 01014 0  C: 04054 1
22,3320    C: 02140 0     06042 1  I: 77634 0  C: 21574 1  C: 00041 1  C: 02205 1  I: 77776 1     41051 0
22,3330       64753 1     00006 1     13356 0     06042 1  I: 77624 1  C: 27042 1  I: 77775 1  C: 00001 0

22,3340    C: 26207 0  C: 00007 0  C: 02215 0  I: 77743 1  C: 73774 1  C: 00037 0  I: 77743 1  C: 72411 0
22,3350    C: 02201 0  I: 46135 1  C: 00050 1  C: 45367 1  I: 77650 1  C: 45373 1     06042 1  I: 77624 1
22,3360    C: 27056 1  I: 77650 1  C: 45336 0  C: 00001 0  C: 11530 1  C: 00002 0  C: 31230 1  I: 43145 0
22,3370    C: 06340 0  C: 03635 1  C: 45377 0  I: 51575 1  C: 02023 1  I: 77614 1  C: 03475 1  C: 36203 0
```

```
OCTAL LISTING FOR PARAGRAPH # 133,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

22,3400      C: 45551 1    I: 45234 0    C: 21574 1    C: 02205 1    C: 02205 1    I: 53145 1    C: 02143 0    C: 45420 0
22,3410      I: 43345 1    C: 02143 0    C: 02205 1    C: 02143 0    I: 77776 1       34753 1       55537 0       05155 0
22,3420      I: 43345 1    C: 02141 1    C: 02205 1    C: 02141 1    I: 77776 1       34752 0       55537 0       05155 0
22,3430         34747 1       71043 0       10000 0       03441 0       37716 0       05072 1    C: 05472 0    C: 04062 1

22,3440         05261 1       34777 1       05203 0    C: 03430 0    C: 44064 0       36250 0       71537 0       50000 1
22,3450         03451 1       05261 1       03460 0       34777 1       54001 1       34755 1       21541 1       05261 1
22,3460         34777 1       54001 1       34755 1       21543 0       05261 1    I: 77776 1       35021 1       05105 0
22,3470      C: 03503 1    C: 44064 0       00003 1       10067 1       05122 0       33317 1       04616 1    C: 20334 1

22,3500         05563 1       05563 1       03475 1       06042 1    I: 52175 0    C: 01220 0    C: 45507 1    C: 26207 0
22,3510      C: 01226 0    C: 02215 0    I: 52014 0    C: 04304 1    C: 45516 1    C: 45527 0    I: 71214 0    C: 03475 1
22,3520      C: 04001 1    C: 14037 0    C: 05364 0    C: 26201 0    C: 02023 1    I: 52046 1    C: 45536 0    I: 71214 0
22,3530      C: 03675 0    C: 04003 0    C: 14037 0    C: 05366 1    C: 16201 0    C: 06340 0    C: 36203 0    C: 45551 1

22,3540      I: 77776 1       34747 1       71043 0       00006 1       15472 1       34777 1       04616 1    C: 01736 1
22,3550         03503 1    I: 44001 0    C: 00001 0    C: 00051 0    I: 77214 0    C: 03755 0    C: 45565 0    C: 02207 0
22,3560      I: 77752 1    C: 26207 0    C: 02215 0    I: 77752 1    C: 02215 0    I: 77624 1    C: 57362 1    I: 77624 1
22,3570      C: 57430 1    I: 77625 0    C: 02203 1    I: 64414 1    C: 03755 0    C: 45576 1    I: 77624 1    C: 45636 0

22,3600      C: 16120 0    C: 00017 1    I: 77625 0    C: 02203 1    C: 00161 1    I: 64414 1    C: 03755 0    C: 45610 1
22,3610      I: 77624 1    C: 45636 0    C: 16122 1    C: 00161 1    I: 51025 1    C: 02201 0    C: 45622 0    I: 52145 0
22,3620      C: 06524 1    C: 45626 1    I: 45145 0    C: 00017 1    C: 57466 1    I: 77676 0    C: 16143 0    C: 02201 0
22,3630      I: 45015 1    C: 02203 1    C: 57471 1    I: 77676 0    C: 36141 0    C: 00051 0    I: 51025 1    C: 05646 0

22,3640      C: 45643 1    I: 43415 0    C: 05646 0    I: 43545 1    C: 05646 0    C: 01065 0    C: 05603 1    C: 00021 1
22,3650      C: 14161 1    C: 01440 0    C: 00000 1    C: 14000 1    C: 00000 1    C: 30000 1    C: 00000 1    C: 77534 0
22,3660      C: 45074 0       31234 0       55074 1       05504 0    C: 00036 1       04616 1    C: 17301 0       44743 1
22,3670         00006 1       03011 1       05327 1    C: 00005 1    C: 05022 1    C: 20000 0       06042 1    I: 43014 0

22,3700      C: 01464 0    C: 03664 0    I: 45014 0    C: 03267 1    C: 27463 0    I: 77414 0    C: 03671 1       04635 0
22,3710      C: 10116 0    I: 51575 1    C: 02643 1    C: 24045 0    C: 02651 1    I: 41446 1    I: 50025 0    C: 00045 0
22,3720      C: 45723 0    I: 45545 1    C: 77732 1    I: 51575 1    C: 02657 1    I: 45206 1    C: 00045 0    I: 71240 1
22,3730      C: 45733 1    I: 77626 0    C: 77732 1    I: 66145 1    C: 00045 0    C: 00044 1    I: 62101 0    C: 00047 1

22,3740      C: 00002 0    I: 53775 1    C: 02643 1    C: 20201 0    C: 26643 1    C: 02651 1    I: 77657 0    C: 20201 0
22,3750      C: 26651 1    C: 02657 1    I: 66057 0    C: 20201 0    C: 00045 0    C: 02657 1    I: 54150 1    C: 02103 1
22,3760      C: 00045 0    I: 77660 1    C: 00045 0    I: 70130 1    C: 02103 1    C: 00045 0    I: 40270 0    C: 00044 1
22,3770      C: 00003 1    I: 77650 1    C: 46671 0    C: 03773 1    C: 03774 0  CKSM 21774 0          @             @
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OCTAL LISTING FOR PARAGRAPH # 134,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2000       04645 1     55112 0     34752 0     55051 0     36245 1     55050 1     32037 1     04616 1
23,2010    C: 20353 0     15472 1     12017 1     12006 1     34751 0     05464 1     05155 0     31051 1
23,2020       74752 1     10000 0     12026 0     05504 0  C: 00012 1     12034 0     05516 0  C: 00012 1
23,2030       05504 0  C: 00264 1     05504 0  C: 00126 1     00003 1     31112 1     14640 0  C: 01014 0

23,2040    C: 77757 1  I: 47135 0  C: 03753 0  C: 21577 1  I: 41401 1  C: 00001 0  I: 57556 0  C: 14043 0
23,2050    I: 41546 0  I: 47135 0  C: 03754 1  C: 21577 1  I: 71406 0  I: 72405 0  C: 00001 0  C: 14045 0
23,2060    I: 41356 1  I: 77752 1  C: 24041 1  C: 00041 1  I: 77616 0  C: 14025 0  C: 00155 0  I: 40234 0
23,2070    C: 21577 1  C: 00001 0  I: 73406 1  I: 77676 0  C: 14043 0  I: 41546 0  I: 47135 0  C: 00026 0

23,2100    C: 21577 1  I: 77650 1  C: 46054 1     35010 0     04616 1  C: 20477 1     15472 1     12111 0
23,2110       12103 0     05504 0  C: 00124 0     04616 1  C: 54123 0     15472 1     04645 1     55142 0
23,2120       05504 0  C: 00024 1     02152 0     04645 1     55142 0     05516 0  C: 00024 1     34750 1
23,2130       00006 1     02033 0     10000 0     12152 1     05504 0  C: 00063 1     04616 1  C: 53112 0

23,2140       04616 1  C: 17705 0     12143 1     04616 1  C: 53114 0     04616 1  C: 17705 0     12150 0
23,2150       05516 0  C: 00063 1     34747 1     70075 1     00006 1     12314 1     06042 1  I: 77775 1
23,2160    C: 06516 0  C: 03765 0  I: 43234 0  C: 21574 1  C: 15712 1  C: 34041 0  C: 51256 1  I: 77775 1
23,2170    C: 01101 0  C: 03773 1  I: 45034 1  C: 46322 0  C: 56032 0  C: 00322 1  I: 77776 1     05353 1

23,2200    C: 04022 0     34747 1     70075 1     00006 1     12314 1     04616 1  C: 54261 0     10000 0
23,2210       02302 1     06042 1  I: 45175 0  C: 01101 0  C: 47650 1  I: 45345 1  C: 00162 1  C: 06320 0
23,2220    I: 77440 1  C: 46236 1     35015 0     54003 0     00004 0     00006 1     30322 1     53635 1
23,2230       30323 0     55636 1     00003 1     35016 0     54003 0     02261 0  I: 77776 1     00004 0

23,2240       04674 0  C: 40154 0     04674 0  C: 40141 1     05516 0  C: 00124 0     05504 0  C: 00077 1
23,2250       04616 1  C: 54123 0     00004 0     04674 0  C: 40115 0     05353 1  C: 04022 0     05516 0
23,2260    C: 00077 1     30075 0     74742 0     10000 0     02305 0     11745 1     02270 0     02305 0
23,2270       55745 1     32321 0     05173 1  C: 02275 0     05155 0     37717 1     05105 0  C: 02127 1

23,2300    C: 46067 1     05261 1     04616 1  C: 54272 1     02261 0     31142 1     14640 0     32316 1
23,2310       70074 0     00006 1     15155 1     02261 0     04635 0  C: 50232 1  C: 00500 1  C: 17350 1
23,2320    C: 34602 1  C: 01130 1     00004 0     35015 0     56003 1     54070 1     31634 1     54154 0
23,2330       00006 1     31636 0     52156 1     30070 0     54003 0     00003 1     16502 1  C: 00302 0

23,2340    C: 17755 0  I: 53754 1  C: 02777 1  C: 57176 0  C: 26744 1  I: 53750 0  C: 02776 0  C: 57176 0
23,2350    C: 02655 0  I: 45020 1  C: 03463 0  C: 46367 1  C: 37671 0  C: 25704 0  I: 41401 1  C: 00003 1
23,2360    I: 65225 1  C: 03671 1  C: 00001 0  I: 45206 1  C: 03671 1  I: 52006 0  C: 03463 0  I: 41545 0
23,2370    C: 06340 0  I: 63133 0  C: 00047 1  C: 00002 0  I: 46135 1  C: 00050 1  C: 46402 0  I: 51575 1
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OCTAL LISTING FOR PARAGRAPH # 135,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,2400     C: 02023 1    I: 77725 1    I: 43545 1    I: 77620 0    C: 03463 0    C: 37574 0    C: 27056 1    I: 77624 1
23,2410     C: 46421 1    I: 77745 1    C: 03574 1    C: 34041 0    C: 27042 1    I: 77624 1    C: 46431 0    I: 77650 1
23,2420     C: 03463 0    I: 43175 0    C: 00001 0    C: 01352 1    C: 46435 1    C: 27536 1    C: 00007 0    C: 03544 1
23,2430     I: 77616 0    I: 43175 0    C: 00001 0    C: 01352 1    C: 46425 0    C: 27552 0    C: 00007 0    C: 03560 1

23,2440     I: 77616 0    I: 53754 1    C: 02777 1    C: 57176 0    I: 63350 1    C: 02776 0    I: 63257 1    C: 57176 0
23,2450     I: 77616 0    I: 53754 1    C: 02777 1    C: 57576 1    I: 77616 0       74745 1       10000 0       44752 1
23,2460        64753 1       27746 1       15270 0       06042 1    I: 43175 0    C: 03545 0    C: 03347 1    C: 66415 1
23,2470     I: 64252 0    C: 01734 0    C: 37521 0    C: 67067 1    I: 76575 1    C: 03553 1    I: 77721 0    C: 01734 0

23,2500     C: 27527 1    C: 01726 0    I: 53435 0    C: 01720 0    C: 03720 1    I: 77776 1       00006 1       34755 1
23,2510        52754 0       04635 0    C: 66420 1    C: 10000 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1
23,2520     C: 00000 1    C: 20000 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1
23,2530     C: 00000 1    C: 37777 1    C: 37777 1    I: 77620 0    C: 02772 1    I: 66370 0    C: 00066 1    C: 00051 0

23,2540     C: 00022 1    I: 66374 1    C: 00022 1    C: 00052 0    C: 00006 1    I: 63775 1    C: 03525 0    C: 02467 0
23,2550     C: 12665 1    I: 77775 1    C: 03533 1    I: 52717 1    C: 02555 0    C: 75112 1    C: 12665 1    I: 77775 1
23,2560     C: 03541 1    I: 52717 1    C: 02643 1    C: 75112 1    C: 12665 1    I: 77700 0    C: 46567 1    I: 43104 0
23,2570     C: 46545 1    C: 02706 1    C: 46576 1    I: 77775 1    C: 06524 1    C: 02657 1    I: 77201 1    C: 00001 0

23,2600     C: 02643 1    I: 47036 1    C: 21634 0    I: 47515 0    C: 02651 1    I: 76234 0    C: 21634 0    I: 47515 0
23,2610     C: 02657 1    I: 76234 0    C: 21634 0    I: 77171 0    C: 02707 0    C: 00000 1    C: 02665 0    I: 40151 0
23,2620     C: 02707 0    C: 46622 0    C: 02670 1    I: 77654 0    C: 46633 0    I: 40112 1    C: 46633 0    C: 02670 1
23,2630     I: 52114 1    C: 00001 0    C: 46625 1    I: 61551 1    C: 02665 0    I: 75405 1    C: 02670 1    I: 76257 0

23,2640     C: 57576 1    C: 02665 0    I: 63101 1    C: 00050 1    C: 77775 1    I: 77134 1    C: 02103 1    C: 00242 0
23,2650     I: 40265 1    C: 06514 1    C: 00001 0    C: 03500 1    I: 60351 0    C: 02665 0    C: 00047 1    I: 65345 0
23,2660     C: 00155 0    C: 03547 1    I: 77701 1    C: 00051 0    I: 70460 1    C: 00050 1    I: 41471 0    I: 77650 1
23,2670     C: 45711 1    I: 77731 1    C: 00052 0    C: 00066 1    I: 60775 1    C: 02643 1    C: 75134 0    I: 77206 0

23,2700     C: 02651 1    I: 53303 1    C: 75112 1    I: 77206 0    C: 02657 1    I: 53303 1    C: 75070 1    I: 61006 0
23,2710     C: 46674 0    I: 45575 1    C: 74260 0    I: 45575 1    C: 74266 0    I: 45575 1    C: 74274 0    I: 77214 0
23,2720     C: 02706 1    C: 46724 1    C: 06524 1    C: 03517 1    I: 66374 1    C: 00022 1    C: 00052 0    C: 00006 1
23,2730     I: 77773 1    C: 74252 1    I: 53761 1    C: 00001 0    C: 20201 0    C: 12707 1    I: 77304 0    C: 46730 1

23,2740     C: 02673 1    I: 77732 1    C: 02673 1    I: 77650 1    C: 02772 1    I: 45020 1    C: 02772 1    C: 27410 1
23,2750     I: 74375 0    C: 03503 1    C: 03500 1    C: 26713 0    C: 03511 1    I: 77761 1    C: 03500 1    C: 26721 1
23,2760     C: 03517 1    I: 77761 1    C: 03500 1    C: 02727 1    I: 77776 1       33246 1       55315 0       55316 0
23,2770        34755 1       55317 1       55320 0       05353 1    C: 04022 0       05504 0    C: 00236 0       31316 1
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OCTAL LISTING FOR PARAGRAPH # 136,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3000        55315 0      31320 1      55317 1      06042 1   I: 73150 1   C: 01315 1   C: 01317 0   I: 70731 0
23,3010     C: 00051 0   C: 00006 1   C: 75134 0   I: 60276 1   C: 00052 0   I: 65161 1   C: 02713 0   C: 00051 0
23,3020     I: 57144 1   C: 00047 1   C: 02103 1   I: 65057 0   C: 57576 1   C: 00051 0   I: 77653 1   C: 02467 0
23,3030     C: 02735 1   I: 57543 1   C: 75134 0   I: 74301 0   C: 00052 0   C: 02721 1   I: 71124 0   C: 00051 0

23,3040     C: 00047 1   I: 53674 1   C: 02103 1   C: 57576 1   I: 52724 1   C: 00051 0   C: 02555 0   C: 02743 0
23,3050     I: 77614 1   C: 02746 0   C: 47072 1   I: 57543 1   C: 75134 0   I: 74301 0   C: 00052 0   C: 02727 1
23,3060     I: 71124 0   C: 00051 0   C: 00047 1   I: 53674 1   C: 02103 1   C: 57576 1   I: 52724 1   C: 00051 0
23,3070     C: 02643 1   C: 02751 0   I: 77624 1   C: 11210 1   I: 77776 1      31315 1      63247 0      55316 0

23,3100        31317 0      67751 0      55320 0      06042 1   I: 66350 1   C: 01315 1   C: 00051 0   C: 00006 1
23,3110     I: 77775 1   C: 02735 1   C: 06467 1   I: 77775 1   C: 02743 0   C: 06555 1   I: 77214 0   C: 02746 0
23,3120     C: 47130 0   C: 02751 0   C: 06643 0   I: 52100 1   C: 47126 1   C: 47136 0   I: 77634 0   C: 46773 0
23,3130     I: 43335 0   C: 01321 0   C: 07251 0   I: 52030 0   C: 47136 0   C: 47123 1   I: 77624 1   C: 11210 1

23,3140     I: 53375 0   C: 01701 0   C: 02701 0   C: 03472 0   I: 47014 1   C: 00707 1   C: 47236 0   C: 26767 0
23,3150     I: 77004 0   C: 57754 0   C: 00000 1   I: 77014 1   C: 04344 0   C: 47157 1   C: 00002 0   I: 53775 1
23,3160     C: 02665 0   C: 57205 1   I: 40055 0   C: 01521 0   C: 47176 1   C: 25521 0   C: 02673 1   I: 53257 1
23,3170     C: 57202 0   C: 01527 0   I: 77600 1   C: 47202 1   C: 35527 1   C: 47211 0   I: 53375 0   C: 01535 0

23,3200     C: 02665 0   C: 01535 0   I: 53375 0   C: 01543 1   C: 02673 1   C: 01543 1   I: 45134 0   C: 02030 0
23,3210     C: 27671 1   I: 77624 1   C: 11210 1   I: 47014 1   C: 00707 1   C: 47241 0   C: 26746 0   I: 77624 1
23,3220     C: 26070 1   I: 77624 1   C: 11210 1   I: 77214 0   C: 02746 0   C: 47230 0   C: 03472 0   C: 01701 0
23,3230     I: 66150 0   C: 02772 1   C: 00052 0   I: 77776 1      04635 0   C: 27421 0   I: 52034 1   C: 26722 1

23,3240     C: 47150 0   I: 45034 1   C: 26673 1   C: 26114 1   I: 77650 1   C: 47221 0   C: 00066 1   C: 77771 0
23,3250     C: 00014 1   I: 71220 1   C: 00051 0   C: 02665 0   I: 65325 0   C: 06524 1   C: 02671 0   I: 55476 1
23,3260     I: 77656 1   C: 14027 1   C: 00027 1   I: 77742 0   C: 14023 0   C: 00033 1   I: 77742 0   C: 34021 0
23,3270     C: 47322 1   C: 16742 1   C: 02667 1   I: 77742 0   C: 14023 0   C: 00027 1   I: 65205 0   C: 02671 0

23,3300     C: 00033 1   I: 45205 1   C: 02665 0   I: 77626 0   C: 43756 1   C: 47322 1   C: 26744 1   C: 00027 1
23,3310     I: 77641 1   C: 027[illegible]1 0   C: 24021 1   C: 00027 1   I: 77641 1   C: 02673 1   C: 34023 1   C: 47322 1
23,3320     C: 36740 1   C: 00051 0   I: 51545 1   C: 00023 0   I: 50025 0   C: 07536 0   C: 47335 1   I: 72545 0
23,3330     C: 00021 1   I: 75326 1   C: 00023 0   C: 00025 0   I: 77616 0   I: 72545 0   C: 00023 0   I: 77736 0

23,3340     C: 14025 0   C: 00021 1   I: 77640 0   C: 47346 0   I: 43545 1   C: 00025 0   I: 75345 1   C: 06522 1
23,3350     C: 00023 0   I: 77625 0   C: 00025 0   C: 00025 0   I: 77616 0   I: 77601 0   C: 00001 0   I: 47375 0
23,3360     C: 02665 0   C: 02651 1   I: 41456 0   I: 44041 1   C: 02701 0   C: 00051 0   C: 24021 1   C: 00001 0
23,3370     I: 77641 1   C: 02673 1   C: 34023 1   C: 47322 1   C: 26740 0   C: 00001 0   I: 50235 0   C: 02665 0
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OCTAL LISTING FOR PARAGRAPH # 137,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

23,3400     C: 02651 1   I: 77752 1   C: 24021 1   C: 02651 1   I: 77641 1   C: 02665 0   C: 34023 1   C: 47322 1
23,3410     C: 02744 1   I: 45246 0   C: 07540 1   I: 77644 1   C: 47433 0   I: 50375 0   C: 02657 1   C: 00001 0
23,3420     C: 24021 1   C: 02643 1   I: 45441 1   C: 43754 0   C: 47322 1   C: 26742 1   C: 02740 0   I: 77634 0
23,3430     C: 21621 1   C: 34322 0   C: 00051 0   I: 77776 1      05567 0   C: 00401 1      05504 0   C: 00056 1

23,3440        06042 1   I: 77650 1   C: 47415 1   I: 66370 0   C: 02714 1   C: 00051 0   C: 02700 1   I: 77601 0
23,3450     C: 00001 0   I: 46773 0   C: 02723 0   C: 02731 0   I: 77656 1   C: 06731 1   I: 77773 1   C: 02723 0
23,3460     I: 76433 1   C: 02731 0   C: 06737 1   I: 77700 0   C: 47451 1   I: 66160 0   C: 00006 1   C: 00036 1
23,3470     I: 66370 0   C: 00022 1   C: 00051 0   C: 00006 1   I: 66374 1   C: 00006 1   C: 00052 0   C: 00002 0

23,3500     I: 76720 0   C: 00036 1   C: 00001 0   I: 62757 0   C: 75062 1   C: 00007 0   I: 77757 1   C: 75054 1
23,3510     C: 30031 0   C: 00015 0   I: 53357 0   C: 75046 1   I: 76455 1   C: 00031 0   I: 53520 0   C: 00036 1
23,3520     C: 06707 1   I: 77700 0   C: 47523 0   I: 77704 1   C: 47500 1   I: 77775 1   C: 02665 0   C: 26707 0
23,3530     C: 02673 1   C: 26715 0   C: 02701 0   C: 02723 0   I: 77616 0   C: 05520 0   C: 26075 1   C: 05252 1

23,3540     C: 25253 1   I: 77776 1      03551 0      06042 1   I: 77616 0   I: 77776 1      03557 0      06042 1
23,3550     I: 77616 0      30032 0      54771 1      30033 1      54765 1      30034 0      54767 0      00006 1
23,3560        22142 0      34751 0      76245 0      54143 0      50143 1      30765 0      52155 1      52127 1
23,3570        04713 0   C: 21577 1      00006 1      30155 0      50143 1      52766 1      04713 0   C: 01517 0

23,3600        52155 1      50143 1      52744 1      00006 1      50143 1      30766 0      04713 0   C: 01531 1
23,3610        52127 1      52155 1      50143 1      52736 1      10143 0      13562 1      00142 0      00004 0
23,3620        00006 1      22061 0      34751 0      76245 0      54062 1      50062 0      30765 0      05033 1
23,3630        00006 1      74736 0      50062 0      52736 1      50062 0      30765 0      05032 0      00006 1

23,3640        74736 0      50062 0      52744 1      10062 1      13623 1      30061 0      00003 1      00000 1
23,3650     I: 77776 1      03551 0      13655 0   I: 77776 1      03557 0      07535 0      46250 1      03677 1
23,3660        06042 1   I: 43575 1   C: 00123 1   I: 77776 1      03551 0      13670 1   I: 77776 1      03557 0
23,3670        07535 0      36250 0      13657 1   I: 77776 1      13655 0   I: 77776 1      13670 1      54142 1

23,3700        00006 1      22145 1      10142 1      40142 1      66250 0      00006 1      50000 1      33766 0
23,3710        52144 1      34753 1      54130 1      00006 1      50143 1      40123 0      13720 0      52131 0
23,3720        52155 1      33764 1      60143 1      54116 0      07112 1      10142 1      52155 1      13732 0
23,3730        00006 1      40155 1      52160 1      36245 1      26116 0      00006 1      50130 0      50143 1

23,3740        30123 1      52155 1      07112 1      52155 1      20160 1      52160 1      20001 1      50130 0
23,3750        50143 1      52123 0      52131 0      10000 0      13717 1      00006 1      26142 1      10142 1
23,3760        13702 0      30145 1      13702 0      00145 1   C: 00735 0   C: 00004 0   C: 00002 0   C: 00000 1
23,3770     C: 00004 0   C: 03771 0   C: 03772 0 CKSM 62325 1         @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 140,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2000       05327 1    C: 00004 0    C: 05022 1    C: 26000 0       02670 1       02007 1       02036 0       05504 0
24,2010    C: 00026 0       34753 1       55144 0       34363 0       04616 1    C: 20634 1       06001 0       02021 0
24,2020       02013 1       44753 0       61144 1       00006 1       12040 0       32311 0       04616 1    C: 20477 1
24,2030       06001 0       02033 0       02025 1       06042 1    I: 77650 1    C: 64217 1       05516 0    C: 00026 0

24,2040       04616 1    C: 11233 0       05504 0    C: 00027 1       05504 0    C: 00031 0       05504 0    C: 00010 0
24,2050       05516 0    C: 00037 0       05516 0    C: 00040 0       05516 0    C: 00063 1       05516 0    C: 00126 1
24,2060       05516 0    C: 00041 1       06011 1       05353 1    C: 04022 0       34755 1       55462 1       06042 1
24,2070    I: 77634 0    C: 21574 1    C: 34041 0    C: 51256 1    I: 77624 1    C: 53570 0    I: 77776 1       50154 1

24,2100       02101 0       02111 1       32305 0       04616 1    C: 21563 1       06025 0       02102 0       02063 0
24,2110       05155 0       05353 1    C: 04022 0       02670 1       02117 1       04616 1    C: 46116 0       05353 1
24,2120    C: 05022 1    C: 10000 0       37717 1       05146 1       30075 0       74747 0       00006 1       12232 1
24,2130       34752 0       00006 1       02033 0       00006 1       12170 1       46007 1       61010 1       00006 1

24,2140       12153 0       67751 0       00006 1       12153 0       32307 1       04616 1    C: 21563 1       06025 0
24,2150       02117 1       02117 1       05155 0       32306 0       04616 1    C: 20624 0       06025 0       02117 1
24,2160       02670 1       02166 1       03137 1       05504 0    C: 00040 0       02117 1       04364 1       02117 1
24,2170       40110 0       74737 1       00006 1       12205 0       34355 0       70076 1       00006 1       12211 0

24,2200       05516 0    C: 00037 0       05516 0    C: 00040 0       02232 0       32304 1       04616 1    C: 01736 1
24,2210       02170 0       06042 1    I: 77634 0    C: 21574 1    C: 34041 0    C: 50312 1    I: 77776 1       05353 1
24,2220    C: 04022 0       30074 1       74745 1       00006 1       15155 1       30075 0       74747 0       00006 1
24,2230       12264 1       02675 1       32304 1       05173 1    C: 02244 1       30075 0       74747 0       00006 1

24,2240       15155 1       05353 1    C: 40072 0       05155 0       30074 1       74745 1       00006 1       15261 0
24,2250       30075 0       74747 0       00006 1       12261 1       37717 1       05105 0    C: 02631 1    C: 50067 0
24,2260       05261 1       05221 0    C: 02734 0       02244 1       32667 1       05173 1    C: 02270 0       05155 0
24,2270       30075 0       74747 0       10000 0       12277 0       05221 0    C: 02734 0       02270 0       37717 1

24,2300       05105 0    C: 02211 1    C: 50067 0       05261 1    C: 00372 1    C: 00526 0    C: 00201 1    C: 00514 1
24,2310    C: 00074 1    C: 01441 1    I: 4502D 1    C: 01757 0    C: 27410 1    I: 77624 1    C: 26643 1    I: 43014 0
24,2320    C: 02756 1    C: 50332 1    C: 01476 0    I: 43014 0    C: 04307 1    C: 50327 1    C: 01475 0    I: 77614 1
24,2330    C: 00747 0    C: 50364 0    I: 77614 1    C: 01474 1    I: 77624 1    C: 27133 0    I: 77624 1    C: 11210 1

24,2340    I: 77624 1    C: 27410 1    I: 43145 0    C: 01571 0    C: 01674 0    I: 77624 1    C: 26643 1    C: 34041 0
24,2350    C: 27133 0    I: 77214 0    C: 04347 0    C: 50216 1    C: 01661 1    I: 77742 0    C: 26352 1    C: 01667 1
24,2360    I: 77742 0    C: 02360 0    I: 77650 1    C: 01757 0    I: 45014 0    C: 01674 0    C: 27133 0    I: 77624 1
24,2370    C: 11210 1    I: 77624 1    C: 27410 1    I: 71214 0    C: 01474 1    C: 01643 1    I: 77650 1    C: 50345 0
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OCTAL LISTING FOR PARAGRAPH # 141,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,2400         05327 1    C: 00004 0    C: 05022 1    C: 26000 0       04616 1    C: 11233 0       05504 0    C: 00031 0
24,2410         05504 0    C: 00006 1       05516 0    C: 00010 0       05353 1    C: 04022 0       34743 0       70074 0
24,2420         00006 1       15155 1       34747 1       70075 1       00006 1       12433 0       34757 0       55745 1
24,2430         04616 1    C: 46123 0       02414 1       32444 1       05173 1    C: 02437 0       05155 0       35024 1

24,2440         05105 0    C: 02414 1    C: 50067 0       05261 1    C: 13560 0       05353 1    C: 04022 0       34745 0
24,2450         70074 0       00006 1       15155 1       34747 1       70075 1       00006 1       12640 0       34736 1
24,2460         00006 1       02012 0       00006 1       12111 0       34752 0       00006 1       02033 0       00006 1
24,2470         12472 0       02135 1       40110 0       74737 1       00006 1       12631 0       05353 1    C: 00152 1

24,2500         04616 1    C: 64366 0       50154 1       02504 1       02525 1       02217 1       32664 1       04616 1
24,2510      C: 21563 1       06025 0       02515 1       02506 0       05155 0       05353 1    C: 04022 0       32665 0
24,2520         04616 1    C: 20510 1       06025 0       02525 1       02217 1       05353 1    C: 04022 0       02670 1
24,2530         02545 1       30075 0       74747 0       00006 1       12640 0       04616 1    C: 51334 1       50154 1

24,2540         02541 0       02545 1       04616 1    C: 46116 0       02640 1       40075 1       74746 1       00006 1
24,2550         12631 0       30075 0       74745 1       00006 1       12631 0       37717 1       55055 1       06042 1
24,2560      I: 77650 1    C: 54416 0    I: 77776 1       05353 1    C: 04022 0       12624 1    I: 77776 1       34755 1
24,2570         55746 1       05353 1    C: 04022 0       37720 0       05072 1    C: 02645 1    C: 50067 0       06042 1

24,2600      I: 77735 0    C: 03747 0    I: 50054 0    C: 50600 1    C: 50612 1    I: 77650 1    C: 03675 0       44752 1
24,2610         55746 1       05155 0    I: 77776 1       31746 0       64752 0       00006 1       12445 1       06042 1
24,2620      I: 77624 1    C: 11210 1    I: 77650 1    C: 55431 1       25462 0       02670 1       02642 0       34756 1
24,2630         02634 1       02670 1       02642 0       34752 0       55745 1       04616 1    C: 46123 0       02445 0

24,2640         32667 1       02233 1       04616 1    C: 01735 1       02445 0       32666 0       04616 1    C: 20510 1
24,2650         02607 1       44753 0       55746 1       05155 0       05353 1    C: 00152 1       04616 1    C: 53112 0
24,2660         04616 1    C: 17705 0       02217 1       02445 0    C: 00525 0    C: 01405 1    C: 01461 0    C: 02734 0
24,2670         40104 0       74744 0       10000 0       24002 0       00002 0       44736 0       00006 1       03012 1

24,2700         02670 1       02706 1       34755 1       55106 0       55107 1       02716 0       34740 0       70110 0
24,2710         10000 0       02726 0       34735 1       55106 0       44736 0       55107 1       05516 0    C: 00012 1
24,2720         04616 1    C: 52506 0       02723 0       04616 1    C: 17705 0       02761 0       05504 0    C: 00041 1
24,2730         32310 1       55113 1       36250 0       55456 0       06042 1    I: 43234 0    C: 21574 1    C: 11122 0

24,2740      C: 34041 0    C: 51256 1    I: 77776 1       05504 0    C: 00012 1       05516 0    C: 00126 1       06042 1
24,2750      I: 77624 1    C: 52404 0    I: 77776 1       03002 0       02111 1       04616 1    C: 17705 0       02761 0
24,2760         02770 0       33000 1       04616 1    C: 21563 1       06025 0       02775 0       02211 1       05155 0
24,2770         05516 0    C: 00041 1       02670 1       02232 0       03123 1       05353 1    C: 04022 0       03210 1
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OCTAL LISTING FOR PARAGRAPH # 142, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3000    C: 00503 1   C: 00527 1      32310 1      55423 1      05504 0   C: 00005 1      05516 0   C: 00041 1
24,3010       06042 1   I: 77634 0   C: 21574 1   I: 77615 0   C: 11120 1   C: 03425 1   C: 34041 0   C: 51256 1
24,3020    I: 77624 1   C: 52404 0   I: 77776 1      03035 1      05155 0      06032 0   C: 52604 1      06042 1
24,3030    I: 43014 0   C: 00345 0   C: 51045 1   C: 00225 1   C: 51042 0      11423 1      03040 0      03107 1

24,3040       55423 1      06042 1   I: 52145 0   C: 03425 1   C: 51013 1   I: 77745 1   C: 03425 1   C: 34041 0
24,3050    C: 50312 1   I: 77776 1      05504 0   C: 00264 1      05516 0   C: 00012 1      05504 0   C: 00126 1
24,3060       04616 1   C: 52506 0      03063 1      06042 1   I: 44234 1   C: 21574 1   C: 03425 1   C: 03427 0
24,3070    I: 77776 1      00006 1      31427 1      05277 0   C: 03077 1   C: 50067 0      05155 0      06032 0

24,3100    C: 52613 1      06011 1      37717 1      05105 0   C: 02726 0   C: 50067 0      05261 1      33116 1
24,3110       04616 1   C: 21563 1      06025 0      06025 0      06025 0      05155 0   C: 00530 1   C: 00000 1
24,3120    C: 01750 1   C: 00000 1   C: 00062 0      05353 1   C: 04022 0      33136 0      04616 1   C: 20711 1
24,3130       06025 0      02232 0      03125 1      34745 0      05464 1      05155 0   C: 01510 1      05504 0

24,3140    C: 00126 1      00004 0      04674 0   C: 40141 1      00003 1      34736 1      00006 1      05012 1
24,3150       33207 1      04616 1   C: 20624 0      03200 0      03156 0      03203 0      00004 0      04523 1
24,3160    C: 00035 1      03170 1      04674 0   C: 40115 0      00003 1      05516 0   C: 00126 1      02163 1
24,3170       00003 1      33206 0      04616 1   C: 21563 1      03200 0      03171 0      03203 0      05155 0

24,3200       05516 0   C: 00126 1      06025 0      04616 1   C: 46116 0      03145 1   C: 00501 0   C: 00205 0
24,3210       05504 0   C: 00037 0      05516 0   C: 00041 1      34755 1      55733 0      55734 1      55735 0
24,3220       05353 1   C: 04022 0      33255 0      04616 1   C: 20505 0      06025 0      03232 1      03236 0
24,3230       04616 1   C: 55442 0      06032 0   C: 55643 0      06011 1      12063 1      05353 1   C: 04022 0

24,3240       06032 0   C: 55643 0      06011 1      34774 1      04616 1   C: 01736 1      02670 1      03252 1
24,3250       04616 1   C: 46116 0      34755 1      55303 1      03220 1   C: 04120 0   I: 43020 1   C: 01757 0
24,3260    C: 01343 1   C: 51265 1   I: 77614 1   C: 04307 1   C: 51275 0   I: 77624 1   C: 27077 1   I: 77775 1
24,3270    C: 00001 0   C: 26352 1   C: 00007 0   C: 16360 0   C: 00015 0   C: 34041 0   C: 27065 1   I: 52375 1

24,3300    C: 00007 0   C: 02360 0   I: 76521 0   C: 01734 0   I: 77776 1      06032 0   C: 52613 1      06042 1
24,3310    C: 25761 0   C: 00001 0   I: 43051 1   C: 02352 1   C: 00350 1   C: 51322 0   I: 77604 0   C: 57754 0
24,3320    I: 77661 0   C: 20212 1   I: 41056 1   C: 50102 1   I: 76521 0   C: 01734 0   C: 15101 0   C: 00045 0
24,3330    C: 01767 0   I: 77614 1   C: 00231 1   C: 01757 0      04645 1      55737 1      06042 1   I: 65545 0

24,3340    C: 03745 1   I: 50025 0   C: 11356 1   C: 51350 0   I: 77776 1      34753 1      54154 0      13353 0
24,3350    I: 77776 1      34755 1      54154 0      31737 0      04640 1   C: 02525 1   C: 12525 0      35031 0
24,3360       05072 1   C: 02550 0   C: 64063 0      34774 1      05224 0      40110 0      74742 0      10000 0
24,3370       15261 0      40076 1      74740 1      00006 1      13377 0      26076 1      13357 1      34753 1
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OCTAL LISTING FOR PARAGRAPH # 143,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

24,3400         13364 1      37717 1      05072 1   C: 03414 0   C: 50067 0      35000 1      05224 0      30077 1
24,3410         74743 1      10000 0      13401 0      15261 0      30077 1      74741 0      10000 0      13501 1
24,3420         30110 1      74757 1      10000 0      13476 0      04616 1   C: 53112 0      04616 1   C: 17705 0
24,3430         13476 0      53105 0      52155 1      00004 0      00006 1      30036 1      52157 0      00006 1

24,3440         30034 0      52161 0      30032 0      54162 0      04616 1   C: 53114 0      04616 1   C: 17705 0
24,3450         13467 0      00004 0      53331 0      53757 1      52155 1      53755 0      52157 0      53753 0
24,3460         52161 0      53460 0      30162 1      55461 1      34753 1      55462 1      15155 1      40101 0
24,3470         74742 0      10000 0      13476 0      05516 0   C: 00120 1      13444 1      44736 0      00006 1

24,3500         03012 1      34755 1      55462 1      05516 0   C: 00063 1      15155 1      34753 1      55144 0
24,3510         34752 0      04616 1   C: 20634 1      06001 0      03516 0      03510 0      34755 1      55044 1
24,3520         55045 0      33675 0      04616 1   C: 20477 1      06001 0      03527 1      03521 1      06042 1
24,3530      I: 53145 1   C: 01045 1   C: 51667 1   C: 34041 0   C: 27410 1   I: 43014 0   C: 00304 0   C: 51555 0

24,3540      C: 01674 0   I: 70535 0   C: 01145 0   I: 43030 0   C: 51546 1   C: 01474 1   I: 43014 0   C: 01676 1
24,3550      C: 01673 1   I: 77624 1   C: 27133 0   I: 77650 1   C: 51576 1   I: 77775 1   C: 03676 0   C: 25535 0
24,3560      C: 03704 1   C: 15543 1   C: 03763 0   C: 01517 0   I: 43014 0   C: 01676 1   C: 00263 0   I: 53135 0
24,3570      C: 01163 1   C: 51574 0   I: 77614 1   C: 00063 1   I: 77624 1   C: 27106 0   I: 77745 1   C: 00015 0

24,3600      C: 27763 0   C: 00017 1   C: 27676 0   C: 00025 0   C: 03704 1   I: 53646 0   C: 57576 1   C: 27712 0
24,3610      C: 00001 0   I: 50256 0   C: 00007 0   I: 67471 1   C: 03712 0   C: 03714 0   I: 67334 1   C: 01162 0
24,3620      C: 01145 0   I: 46142 1   C: 51625 1   I: 77650 1   C: 51630 0   I: 77614 1   C: 04307 1   C: 51632 1
24,3630      I: 77614 1   C: 00064 0   I: 67214 1   C: 01663 0   C: 00050 1   I: 43054 1   C: 51640 1   C: 01463 1

24,3640      I: 77775 1   C: 00001 0   C: 16032 1   C: 00015 0   I: 45014 0   C: 00662 0   C: 26347 0   I: 77605 1
24,3650      C: 11677 1   C: 03716 1   I: 77776 1      33674 1      04616 1   C: 20477 1      06001 0      06001 0
24,3660         06042 1   I: 43345 1   C: 03763 0   C: 11673 0   C: 01045 1   I: 77634 0   C: 51521 0   I: 52034 1
24,3670      C: 21574 1   C: 51533 0   C: 00003 1   C: 25140 0   C: 01453 1   C: 01442 1   C: 00243 1   C: 32703 1

24,3700      I: 46020 1   C: 00050 1   C: 51722 1   I: 77624 1   C: 51730 1   I: 61375 1   C: 02013 1   C: 00025 0
24,3710      I: 77772 0   I: 51235 1   C: 00001 0   C: 00001 0   I: 77721 0   C: 00025 0   I: 40372 0   C: 00001 0
24,3720      I: 77650 1   C: 00050 1   I: 77624 1   C: 55743 1   I: 77624 1   C: 15761 0   I: 77650 1   C: 51711 1
24,3730      I: 40220 0   C: 00051 0   C: 00011 1   I: 77770 1   C: 00005 1   I: 65345 0   C: 14017 1   C: 14011 1

24,3740      I: 45006 0   C: 53732 1   I: 71406 0   C: 14041 1   I: 77756 0   C: 14043 0   C: 14015 0   I: 41525 0
24,3750      C: 14007 0   I: 45170 0   C: 00004 0   C: 53732 1   C: 14027 1   C: 14013 0   I: 41525 0   C: 14005 1
24,3760      I: 45170 0   C: 00005 1   C: 53732 1   I: 71406 0   I: 77606 1   C: 00025 0   I: 76405 1   C: 00041 1
24,3770      C: 14035 1   I: 76405 1   C: 00043 0   C: 14037 0   I: 41556 1   I: 52076 1   C: 53653 1  CKSM 05644 1
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OCTAL LISTING FOR PARAGRAPH # 144,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2000      C: 47777 0   C: 00001 0   C: 01150 1      11777 0      12006 1      15261 0      05203 0   C: 02003 0
25,2010      C: 52064 1      37716 0      05072 1   C: 02023 1   C: 52064 1      34736 1      00006 1      71776 1
25,2020         61775 0      55773 1      15261 0      02060 0      04616 1   C: 17705 0      25575 1      00004 0
25,2030         30101 1      74741 0      10000 0      12050 1      53101 1      51776 0      53601 0      30110 1

25,2040         00006 1      06033 1      74746 1      00006 1      12050 1      05567 0   C: 00522 1      25575 1
25,2050         41776 1      61774 1      00006 1      12056 1      31776 0      64752 0      55776 1      15155 1
25,2060         34753 1      54133 1      51773 0      32065 0      14622 1   C: 53114 0   C: 53112 0   C: 53110 1
25,2070      C: 53106 0   C: 53104 1   C: 53102 1      02102 0      05221 0   C: 00144 0      44753 0      70110 0

25,2100         54110 0      15261 0      00006 1      23312 0      34753 1      00006 1      05012 1      05221 0
25,2110      C: 00002 0      34755 1      54035 0      54036 0      44753 0      00006 1      03012 1      05221 0
25,2120      C: 01750 1      44737 1      70110 0      54110 0      30035 1      04512 0   C: 57777 1      12132 1
25,2130         34755 1      12133 0      34740 0      56110 1      77744 0      26110 0      04564 1      01312 0

25,2140         02167 0      05221 0   C: 00002 0      34740 0      70110 0      10000 0      34735 1      02252 0
25,2150         34740 0      70110 0      10000 0      44736 0      02255 1      44741 0      70110 0      54110 0
25,2160         74742 0      10010 0      12604 0      44752 1      00006 1      03012 1      15261 0      34752 0
25,2170         00006 1      02012 0      10000 0      00002 0      54112 1      54113 0      34752 0      00006 1

25,2200         05012 1      00002 0      34740 0      70110 0      10000 0      34735 1      02252 0      37743 0
25,2210         02255 1      40110 0      74740 1      10000 0      32243 0      62242 1      02252 0      40110 0
25,2220         74740 1      10000 0      34735 1      02252 0      40110 0      74740 1      10000 0      44736 0
25,2230         02255 1      02244 1      44736 0      70110 0      54110 0      34742 1      70110 0      00006 1

25,2240         13560 0      02613 1   C: 67070 1   C: 61615 1      22110 1      34740 0      00006 1      06001 0
25,2250         54110 0      00002 0      55313 0      34755 1      12257 1      55313 0      34753 1      55314 1
25,2260         00106 1      23314 0      12265 0      05221 0   C: 00062 0      40110 0      77713 1      00006 1
25,2270         12155 0      31313 1      00006 1      51314 0      20035 0      54061 1      00006 1      72316 0

25,2300         54001 1      30110 1      74752 1      56061 0      04512 0   C: 77644 1      10061 1      01312 0
25,2310         11314 1      12313 0      56001 0      53355 1      02317 0      12263 0   C: 22715 1      22002 0
25,2320         34753 1      54062 1      50000 1      31354 1      54061 1      04512 0   C: 77177 0      12346 0
25,2330         30061 0      50062 0      56112 0      40000 0      60061 0      64754 0      50062 0      54053 0

25,2340         10062 1      12321 1      35020 0      00006 1      05014 1      00001 0      10061 1      42326 0
25,2350         12352 0      32326 1      54061 1      12331 0      32403 1      70110 0      10000 0      13513 1
25,2360         00004 0      44737 1      70110 0      64737 0      54110 0      34753 1      05203 0   C: 02401 0
25,2370      C: 52067 1      40110 0      74752 1      10000 0      12377 1      05567 0   C: 00510 0      00003 1
```

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OCTAL LISTING FOR PARAGRAPH # 145,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,2400      14631 0      02102 0      13551 1   C: 02001 1   I: 43020 1   C: 01112 1   C: 00271 0   I: 77624 1
25,2410   C: 47541 1   I: 45175 0   C: 01101 0   C: 47673 0   I: 77624 1   C: 26133 1   I: 77776 1      00004 0
25,2420      04523 1   C: 01106 1      02425 0      25112 1      02443 0      40104 0      74744 0      00006 1
25,2430      12467 1      02472 1      40104 0      74744 0      00006 1      12467 1      30074 1      74745 1

25,2440      10000 0      12502 1      15155 1      25112 1      40110 0      74742 0      26110 0      74741 0
25,2450      10000 0      12457 1      02167 0      34752 0      05203 0   C: 02604 1   C: 52067 1      31303 0
25,2460      00006 1      12463 0      05155 0      00003 1      25112 1      31112 1      14640 0      34755 1
25,2470      55303 1      12463 0      02244 1      04523 1   C: 01110 0      12502 0      02244 1      34736 1

25,2500      26110 0      12423 1      02244 1      25112 1      12467 1   C: 00074 1      04645 1      55112 0
25,2510      05516 0   C: 00041 1      32505 0      55113 1      00004 0      02551 1   C: 01106 1      12534 0
25,2520      00003 1      00306 1      31107 0      53753 0      06042 1   I: 77624 1   C: 46041 0   C: 01101 0
25,2530   I: 77414 0   C: 00071 1      00004 0      12444 0      02244 1      02551 1   C: 01106 1      12544 1

25,2540      02244 1      34736 1      26110 0      12520 0      02244 1      05567 0   C: 00502 0      06011 1
25,2550      05155 0      50002 0      30000 1      24002 0      00006 1      50000 1      30001 0      52062 1
25,2560      22002 0      34740 0      70110 0      10000 0      14550 1      30061 0      04512 0   C: 66161 1
25,2570      00001 0      30062 0      00006 1      62601 1      64562 1      04512 0   C: 64420 0      00001 0

25,2600      04560 0      62603 0      12575 0   C: 03512 1      40110 0      74736 0      10000 0      02613 1
25,2610      02202 0      05221 0   C: 00062 0      34741 1      70110 0      10000 0      12634 0      10110 0
25,2620      12623 0      12623 0      12640 0      40110 0      74742 0      10000 0      13551 1      11113 1
25,2630      12637 0      42645 0      00006 1      03012 1      05516 0   C: 00271 0      13565 0      55113 1

25,2640      37717 1      35105 0   C: 02646 1   C: 52067 1      12611 1   C: 20002 1      00006 1      30036 1
25,2650      53107 1      06042 1   I: 77201 1   C: 00001 0   C: 01101 0   I: 74214 0   C: 00311 1   C: 52671 0
25,2660   C: 01767 0   I: 63372 1   C: 01761 0   I: 53361 0   C: 13101 0   I: 45056 0   C: 47541 1   I: 77624 1
25,2670   C: 47673 0   C: 14041 1   C: 01110 0   I: 41434 1   C: 21577 1   I: 65356 1   I: 41546 0   I: 65205 0

25,2700   C: 00041 1   C: 00045 0   I: 44205 0   C: 00001 0   I: 77626 0   C: 76667 1   I: 47135 0   C: 01107 0
25,2710   C: 21577 1   I: 71406 0   I: 73525 1   I: 41206 0   C: 00003 1   I: 65352 0   C: 00005 1   I: 41325 0
25,2720   C: 00007 0   C: 00001 0   I: 55552 0   I: 77441 0   C: 00041 1      40154 0      00006 1      73075 1
25,2730      55354 0      40110 0      74740 1      00006 1      12737 1      31107 0      12740 1      41107 1

25,2740      00006 1      73075 1      55355 1      06042 1   I: 41345 0   C: 00003 1   C: 00005 1   I: 65352 0
25,2750   I: 65276 1   C: 00001 0   I: 72405 0   C: 00005 1   I: 43066 0   C: 00311 1   C: 52761 0   I: 77624 1
25,2760   C: 47675 0   I: 77441 0   C: 01101 0      00006 1      43077 0      20155 1      10154 0      34755 1
25,2770      12772 0      34753 1      54155 1      10110 0      12777 0      12777 0      13027 0      10155 1
```

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OCTAL LISTING FOR PARAGRAPH # 146,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3000        13010 1     40074 0     74747 0     10000 0     13015 1     34736 1     00006 1     05012 1
25,3010        34750 1     00006 1     02033 0     10000 0     13027 0     44742 0     70110 0     00004 0
25,3020        54110 0     05516 0  C: 00041 1     44752 1     00006 1     03012 1     15155 1     30076 0
25,3030        77715 1     00006 1     13051 1     06042 1  I: 74375 0  C: 01101 0  C: 01767 0  I: 41572 1

25,3040     I: 74375 0  C: 01761 0  C: 13101 0  I: 53362 0  I: 77656 1  C: 15101 0  C: 00045 0  C: 01767 0
25,3050     I: 77776 1     00004 0     40110 0     74741 0     10000 0     02317 0     30076 0     74740 1
25,3060        00006 1     15155 1     11456 0     03073 0     06032 0  C: 52613 1     00003 1     10067 1
25,3070        05122 0     04616 1  C: 50732 1     55456 0     05155 0  C: 21122 0  C: 07777 1  C: 33005 1

25,3100     C: 00310 0  C: 00000 1     03122 0  C: 00017 1     03123 1  C: 00016 0     03123 1  C: 00015 0
25,3110        03123 1  C: 00014 1     03122 0  C: 00012 1     03122 0  C: 00011 1     55104 1     34756 1
25,3120        51104 0     13104 0     34753 1     00004 0     55104 1     00006 1     74751 1     53105 0
25,3130        10000 0     55110 1     64753 1     55077 1     33156 0     00006 1     02033 0     55112 0

25,3140        43103 1     00006 1     03013 0     50002 0     30000 1     04674 0  C: 36000 1     00006 1
25,3150        30025 0     21105 0     34755 1     54001 1     53101 1     12377 1  C: 00230 0     00006 1
25,3160        04007 1     54016 1     00006 1     22012 1     00006 1     31454 0     53272 0     34757 0
25,3170        00006 1     02013 1     55332 0     00006 1     13200 1     30046 0     51332 1     55327 1

25,3200        11077 1     13223 0     13206 1     05567 0  C: 00520 0     05270 1     30107 1     74735 0
25,3210        00006 1     13220 0     40077 0     74743 1     00006 1     13220 0     05567 0  C: 00521 1
25,3220        44753 0     55077 1     03563 1     55077 1     34751 0     00006 1     02013 1     00006 1
25,3230        13277 1     03365 1     36250 0     00006 1     06013 0     76250 1     00006 1     13273 0

25,3240        34733 1     70046 1     62000 0     54001 1     30046 0     60000 1     74753 0     52064 1
25,3250        34744 1     03425 1     11110 1     03263 0     44753 0     55077 1     40061 1     70110 0
25,3260        54110 0     03612 1     03556 1     55110 1     11077 1     13267 0     13444 1     34750 1
25,3270        04674 0  C: 36000 1     05270 1     34747 1     54061 1     34743 0     03321 1     34741 1

25,3300        70110 0     10000 0     13220 0     40110 0     74745 1     10000 0     13220 0     34750 1
25,3310        54061 1     34753 1     00006 1     02013 1     54002 1     10000 0     13320 1     13332 1
25,3320        34751 0     54001 1     00006 1     02033 0     56001 0     70110 0     00006 1     06001 0
25,3330        10000 0     03351 0     34733 1     70046 1     54064 1     30046 0     60000 1     74753 0

25,3340        54063 0     10002 1     13403 1     00006 1     42002 0     20064 1     30061 0     03426 1
25,3350        03254 1     22110 1     64753 1     00006 1     06001 0     54110 0     33156 0     00006 1
25,3360        02033 0     55112 0     05504 0  C: 00120 1     13220 0     40101 0     74741 0     10000 0
25,3370        00002 0     43402 0     70110 0     54001 1     33402 1     00006 1     02033 0     60001 0
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OCTAL LISTING FOR PARAGRAPH # 147,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

25,3400      54110 0      13556 1   C: 00220 1      10001 1      13406 1      13346 1      31332 1      74751 1
25,3410      10000 0      13420 0      52064 1      20001 1      20001 1      20001 1      52064 1      13346 1
25,3420      00006 1      30064 0      20001 1      20001 1      13345 1      54061 1      00006 1      02033 0
25,3430      54001 1      40061 1      71112 0      60001 0      57112 1      70061 1      60001 0      10000 0

25,3440      03264 1      52064 1      21101 1      00002 0      40061 1      70110 0      60061 0      54110 0
25,3450      52064 1      53101 1      03612 1      13206 1      00004 0      40110 0      74746 1      26110 0
25,3460      34745 0      00006 1      02033 0      00006 1      13513 1      34737 0      00006 1      05012 1
25,3470      33530 1      05203 0   C: 03526 0   C: 52067 1      02377 0      55077 1      05221 0   C: 00144 0

25,3500      34745 0      00006 1      02033 0      00006 1      13520 1      11077 1      13475 0      44737 1
25,3510      00006 1      03012 1      13565 0      34753 1      05203 0   C: 03560 1   C: 52067 1      02377 0
25,3520      35000 1      05224 0      44737 1      00006 1      03012 1      13560 0      34317 0      13475 0
25,3530   C: 01130 1      03454 1      04616 1   C: 17705 0      03536 1      13547 0      05567 0   C: 00523 0

25,3540      13547 0      35016 0      54003 0      34733 1      55427 0      44736 0      55430 0      04635 0
25,3550   C: 21051 0      34745 0      70110 0      10000 0      13560 0      13565 0      44755 0      54332 1
25,3560      34752 0      04635 0   C: 17656 1      44755 0      54332 1      34752 0      04635 0   C: 17653 1
25,3570   I: 45345 1   C: 01767 0   C: 13603 0   I: 77644 1   C: 53577 1   I: 43535 0   C: 06524 1   I: 43535 0

25,3600   C: 13602 1   C: 00001 0   C: 26467 0   C: 00000 1      34735 1      02252 0      44741 0      70110 0
25,3610      54110 0      15261 0      44747 0      60061 0      10000 0      44753 0      13646 1      14570 0
25,3620      54065 0      34747 1      54001 1      34747 1      70110 0      10000 0      13640 1      30107 1
25,3630      50065 1      74753 0      10000 0      14570 0      00006 1      22066 1      04602 1      00066 1

25,3640      50065 1      44753 0      70107 0      54107 0      30001 0      13634 1      54065 0      34751 0
25,3650      54001 1      34744 1      13624 0   C: 14033 1   C: 00027 1   C: 14007 0   I: 76405 1   C: 00041 1
25,3660   C: 14027 1   C: 00011 1   I: 76405 1   C: 00043 0   C: 14031 0   C: 06524 1   I: 57525 1   C: 00043 0
25,3670   I: 63325 0   C: 00041 1   C: 00033 1   I: 63361 0   C: 14003 1   C: 00011 1   I: 53361 0   C: 14001 0

25,3700   I: 77772 0   C: 24041 1   I: 63361 0   C: 14003 1   C: 00033 1   I: 52361 1   C: 14001 0   I: 65372 1
25,3710   C: 00007 0   I: 74346 0   C: 00011 1   I: 73525 1   C: 00007 0   I: 52361 1   C: 00025 0   I: 77772 0
25,3720   C: 14033 1   C: 00007 0   I: 74356 1   I: 71525 0   C: 00007 0   I: 53361 0   C: 00025 0   I: 57572 0
25,3730   C: 34025 1   C: 00051 0   I: 54345 1   C: 00007 0   C: 20617 0   I: 72371 1   C: 01707 0   C: 00155 0

25,3740   C: 14017 1   C: 00020 0   I: 77605 1   I: 43257 0   C: 20206 1   I: 67206 1   C: 00017 1   I: 41261 1
25,3750   C: 20212 1   C: 00013 0   I: 43257 0   C: 20213 0   I: 77600 1   C: 53756 0   I: 77616 0   C: 03757 1
25,3760   C: 03760 0 CKSM 25113 0        @            @            @            @            @            @
25,3770         @            @            @            @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 15[illegible],  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2000     C: 17775 1   C: 02052 1   C: 00333 1   C: 30374 0   C: 77665 1   C: 42175 1   C: 22211 0   C: 00636 1
26,2010     C: 77777 0   C: 77767 1   C: 37436 1   C: 01614 0   C: 32417 1   C: 32011 0   C: 02052 1   C: 35552 0
26,2020     C: 37116 0   C: 32631 1      04616 1   C: 11233 0      36250 0      55050 1      34753 1      55051 0
26,2030        32117 1      04616 1   C: 20477 1      05472 0      02036 0      02030 0      06042 1   I: 43234 0

26,2040     C: 21574 1   C: 14122 0   C: 02205 1   C: 34041 0   C: 27065 1   I: 77775 1   C: 00001 0   C: 16207 0
26,2050     C: 02205 1   C: 34041 0   C: 27077 1   I: 52375 1   C: 02207 0   C: 00001 0   I: 47121 0   C: 01734 0
26,2060     C: 21727 0   C: 33773 1   I: 77776 1      41051 0      64753 1      00006 1      12113 1      06042 1
26,2070     I: 77775 1   C: 06522 1   C: 37765 1   C: 56040 0   C: 00322 1   I: 77776 1      04616 1   C: 54272 1

26,2100        32120 0      04616 1   C: 20477 1      05472 0      02106 1      02036 0      05516 0   C: 00124 0
26,2110        04616 1   C: 54123 0      15472 1      06042 1   I: 52175 0   C: 06516 0   C: 54072 0   C: 01014 0
26,2120     C: 01422 1   C: 00030 1   C: 13560 0      04645 1      55163 0      34746 0      70101 0      10000 0
26,2130        12136 0      06042 1   I: 77624 1   C: 56040 0   C: 00322 1   I: 77776 1      05504 0   C: 00013 0

26,2140        05516 0   C: 00000 1      04616 1   C: 54272 1      32260 1      04616 1   C: 20711 1      02246 0
26,2150        02154 0      02201 0      02205 1      05155 0      34746 0      70101 0      10000 0      12165 0
26,2160        06042 1   I: 77624 1   C: 56040 0   C: 00322 1   I: 77776 1      04616 1   C: 54272 1      02261 0
26,2170        10000 0      12144 0      32260 1      04616 1   C: 20452 0      02205 1      04616 1   C: 17741 0

26,2200        12144 0      05516 0   C: 00124 0      31163 1      04640 1      40100 1      74740 1      10000 0
26,2210        00002 0      31012 0      54156 1      46250 1      60133 0      55054 0      05353 1   C: 00132 1
26,2220        34745 0      05464 1      00156 0      37717 1      05146 1      34747 1      70075 1      10000 0
26,2230        12243 1      34745 0      70074 0      10000 0      02240 0      05353 1   C: 40112 1      05155 0

26,2240        05353 1   C: 40072 0      05155 0      05504 0   C: 00077 1      01054 1      31010 1      00006 1
26,2250        12201 1      30100 0      74740 1      00006 1      16001 1      06025 0   C: 20100 1   C: 00203 0
26,2260     C: 01422 1      00006 1      00030 1      74742 0      10000 0      00002 0      00006 1      00031 0
26,2270        74736 0      00002 0      04645 1      55337 0      30321 1      54771 1      30322 1      54765 1

26,2300        30323 0      54767 0      06042 1   I: 45001 1   C: 00001 0   C: 47545 0   I: 41345 0   C: 00742 0
26,2310     C: 00746 1   I: 57552 1   I: 65336 1   C: 00740 1   C: 14023 0   C: 00746 1   I: 72405 0   C: 00750 0
26,2320     C: 34021 0   C: 26506 0   I: 41325 0   C: 00740 1   C: 00742 0   I: 41512 1   I: 65205 0   C: 00744 0
26,2330     I: 65205 0   C: 00736 0   C: 00750 0   I: 72405 0   C: 00744 0   I: 45425 0   C: 63756 0   C: 00736 0

26,2340     I: 72405 0   C: 00750 0   I: 45415 0   C: 43754 0   C: 26506 0   I: 55525 0   I: 77634 0   C: 21621 1
26,2350     C: 02345 1   I: 77776 1      31337 1      04640 1   I: 47375 0   C: 03254 1   C: 06522 1   I: 47256 0
26,2360     C: 03765 0   I: 40056 0   C: 54376 1   C: 17270 1   C: 00045 0   I: 50025 0   C: 14415 1   C: 54376 1
26,2370     I: 77775 1   C: 03270 1   C: 17270 1   C: 06522 1   I: 77650 1   C: 56072 1   I: 52175 0   C: 06522 1
```

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OCTAL LISTING FOR PARAGRAPH # 151,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,2400      C: 54372 0     C: 15555 0     C: 35172 0     C: 14113 1     C: 36326 0     C: 07701 0     C: 35703 0     C: 04343 1
26,2410      C: 21616 0     C: 03070 0     C: 34344 0     C: 00000 1     C: 00001 0     C: 00000 1     I: 77624 1     C: 11210 1
26,2420      I: 43014 0     C: 04307 1     C: 55200 0     C: 02466 1     I: 45014 0     C: 00747 0     C: 54460 1     C: 27410 1
26,2430      I: 45014 0     C: 01674 0     C: 26643 1     I: 77624 1     C: 55242 0     I: 77624 1     C: 11210 1     I: 77624 1

26,2440      C: 27410 1     I: 43014 0     C: 01676 1     C: 02756 1     C: 54450 1     I: 43014 0     C: 01476 0     C: 01475 0
26,2450      I: 43014 0     C: 01474 1     C: 01673 1     I: 45014 0     C: 01472 1     C: 55242 0     I: 77650 1     C: 54510 1
26,2460      I: 77624 1     C: 27410 1     I: 45014 0     C: 01474 1     C: 26643 1     I: 77624 1     C: 55242 0     I: 77624 1
26,2470      C: 11210 1     I: 77624 1     C: 27410 1     I: 43014 0     C: 01676 1     C: 02756 1     C: 54502 1     I: 43014 0

26,2500      C: 01476 0     C: 01475 0     I: 43014 0     C: 01673 1     C: 01674 0     I: 45014 0     C: 01472 1     C: 55242 0
26,2510      I: 45014 0     C: 02716 0     C: 54514 0     C: 55251 1     I: 77414 0     C: 04307 1     C: 54524 0        34755 1
26,2520         55745 1        04616 1     C: 46123 0        06042 1     I: 43174 1     C: 00000 1     C: 04304 1     C: 54532 1
26,2530      I: 77714 0     C: 00002 0     I: 45134 0     C: 03720 1     C: 11210 1     I: 66170 1     C: 00001 0     C: 01356 0

26,2540      I: 54335 0     C: 01775 0     C: 20635 0     I: 77634 0     C: 21634 0     C: 00025 0     I: 77624 1     C: 55333 1
26,2550      I: 57414 1     C: 00707 1     C: 54553 0     C: 27525 0     C: 06524 1     C: 03533 1     C: 17541 1     C: 00045 0
26,2560      I: 44257 1     C: 56174 0     C: 03757 1     I: 77657 0     C: 56574 1     C: 17547 1     C: 00045 0     I: 63501 0
26,2570      C: 00047 1     I: 53605 1     C: 01771 1     C: 20577 0     I: 53657 0     C: 20601 1     C: 57176 0     I: 47057 0

26,2600      C: 57176 0     C: 21634 0     C: 02707 0     I: 76276 0     C: 00025 0     I: 72240 1     C: 54611 0     C: 00025 0
26,2610      C: 02707 0     I: 77624 1     C: 55401 1     I: 45131 0     C: 01357 1     C: 00002 0     C: 11210 1     I: 77624 1
26,2620      C: 55333 1     I: 53725 1     C: 00045 0     C: 57202 0     C: 24045 0     I: 57414 1     C: 00707 1     C: 54630 0
26,2630      I: 77761 1     C: 00045 0     C: 27533 1     C: 01653 0     I: 53257 1     C: 57170 0     C: 01667 1     I: 53715 1

26,2640      C: 01601 1     C: 57170 0     I: 52255 1     C: 01615 1     I: 50315 0     C: 00001 0     C: 00007 0     I: 53606 1
26,2650      C: 56174 0     I: 57316 1     C: 01773 0     C: 02707 0     I: 54335 0     C: 01776 0     C: 20621 0     C: 00031 0
26,2660      I: 50025 0     C: 02707 0     C: 54666 0     I: 77745 1     C: 00031 0     C: 02707 0     I: 60545 0     I: 53725 1
26,2670      C: 03751 1     C: 56577 1     I: 77625 0     I: 77675 0     C: 00045 0     C: 27547 1     C: 00001 0     I: 47235 0

26,2700      I: 57414 1     C: 00707 1     C: 54703 1     I: 77657 0     C: 57200 1     C: 27525 0     C: 06524 1     C: 00025 0
26,2710      C: 27541 1     C: 03525 0     I: 60246 1     C: 00025 0     I: 51575 1     C: 03533 1     I: 71301 0     C: 00027 1
26,2720      C: 00027 1     I: 50025 0     C: 00025 0     C: 54727 1     I: 52150 1     C: 00026 0     C: 54731 0     I: 77750 0
26,2730      C: 00024 1     I: 53775 1     C: 03525 0     C: 20201 0     C: 27525 0     C: 03533 1     I: 77657 0     C: 20201 0

26,2740      C: 17533 1     C: 03547 1     I: 77657 0     C: 20201 0     C: 03547 1     I: 53745 1     C: 00045 0     C: 20200 1
26,2750      I: 41316 0     C: 02707 0     I: 47012 1     C: 21634 0     C: 36707 1     C: 55401 1     I: 77624 1     C: 11210 1
26,2760      I: 77414 0     C: 04307 1     C: 55176 1        33332 0        54006 0        31457 0        54765 1        31460 1
26,2770         54767 0        21461 0        54771 1        06042 1     I: 45175 0     C: 06522 1     C: 47666 1     I: 76505 0
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OCTAL LISTING FOR PARAGRAPH # 152, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3000    C: 01734 0   C: 27677 1   C: 06520 0   I: 77624 1   C: 47675 0   I: 76505 0   C: 01734 0   C: 27705 0
26,3010    C: 06516 0   I: 77624 1   C: 47675 0   I: 76505 0   C: 01734 0   C: 37713 0   C: 55361 0   I: 77331 0
26,3020    C: 01357 1   C: 00003 1   C: 03724 0   I: 72441 0   C: 03677 1   C: 24023 0   C: 03724 0   I: 72441 0
26,3030    C: 03713 1   C: 34021 0   C: 26506 0   I: 41221 0   C: 03736 0   C: 15441 1   I: 41472 0   I: 52545 1

26,3040    C: 01701 0   I: 44257 1   C: 56176 1   I: 53605 1   C: 03722 0   C: 21601 0   C: 27547 1   C: 03724 0
26,3050    I: 76435 1   C: 03705 0   I: 77656 1   I: 57414 1   C: 00747 0   C: 55056 1   C: 27525 0   C: 06524 1
26,3060    C: 03533 1   C: 17541 1   C: 03722 0   I: 53657 0   C: 20577 0   C: 56176 1   C: 03541 1   I: 77735 0
26,3070    C: 02011 0   I: 41215 1   C: 15436 1   C: 03722 0   I: 41257 1   C: 21601 0   C: 03722 0   I: 53657 0

26,3100    C: 20577 0   C: 57176 0   I: 47057 0   C: 57176 0   C: 21634 0   C: 36707 1   C: 55401 1   I: 77624 1
26,3110    C: 11210 1   I: 77624 1   C: 55361 0   I: 77331 0   C: 01357 1   C: 00004 0   C: 03724 0   I: 76435 1
26,3120    C: 03705 0   I: 76435 1   C: 03724 0   I: 57414 1   C: 00747 0   C: 55126 1   C: 27525 0   C: 06524 1
26,3130    C: 03533 1   C: 17541 1   C: 03722 0   I: 53657 0   C: 20577 0   C: 56176 1   C: 03543 0   I: 77735 0

26,3140    C: 02012 0   I: 41215 1   C: 15436 1   C: 03722 0   I: 41257 1   C: 21601 0   C: 03722 0   I: 53657 0
26,3150    C: 20577 0   C: 57176 0   I: 47057 0   C: 57176 0   C: 21634 0   C: 16707 0   C: 03732 1   I: 44336 1
26,3160    C: 03734 1   I: 56405 0   C: 15441 1   I: 52525 1   C: 01703 1   I: 44257 1   C: 56176 1   I: 53605 1
26,3170    C: 03722 0   C: 21601 0   C: 37547 0   C: 55401 1   I: 77624 1   C: 11210 1   I: 77650 1   C: 50562 0

26,3200    I: 77624 1   C: 27410 1   I: 43014 0   C: 01472 1   C: 01674 0   I: 77624 1   C: 55242 0   I: 77624 1
26,3210    C: 11210 1   I: 45014 0   C: 02666 0   C: 27410 1   I: 46145 0   C: 03463 0   C: 55231 1   I: 43014 0
26,3220    C: 01675 1   C: 01476 0   I: 43014 0   C: 01474 1   C: 01673 1   I: 77624 1   C: 55242 0   I: 77650 1
26,3230    C: 54514 0   I: 77624 1   C: 55251 1   I: 45014 0   C: 01474 1   C: 26643 1   I: 77624 1   C: 55242 0

26,3240    I: 77650 1   C: 54514 0   I: 71220 1   C: 03675 0   C: 03755 0   C: 34041 0   C: 27133 0   I: 77650 1
26,3250    C: 03675 0   I: 77776 1      33331 0      54006 0      33437 1      55256 0      34755 1      51256 1
26,3260       55400 0      11256 0      03255 0      33332 0      54006 0      06042 1   I: 67214 1   C: 04307 1
26,3270    C: 55274 0   C: 02001 1   I: 77650 1   C: 55276 1   I: 77735 0   C: 02007 1   I: 77661 0   C: 20606 0

26,3300    C: 02401 0   C: 02411 1   C: 02421 1   I: 67214 1   C: 04307 1   C: 55311 1   C: 02002 1   I: 77650 1
26,3310    C: 55313 0   I: 77735 0   C: 02010 1   C: 02511 0   C: 02521 0   C: 02531 1   I: 77735 0   C: 02003 0
26,3320    C: 02621 0   I: 77735 0   C: 02004 1   C: 02631 1   I: 66214 0   C: 02476 0   C: 03463 0   C: 00000 1
26,3330    I: 77616 0   C: 54065 0   C: 54067 1   I: 77201 1   C: 00001 0   C: 01645 1   I: 77754 1   C: 03720 1

26,3340    I: 53257 1   C: 57165 1   C: 01661 1   I: 53715 1   C: 01573 1   C: 57165 1   I: 52255 1   C: 01607 1
26,3350    I: 41434 1   C: 21725 1   C: 17724 0   C: 00045 0   I: 77657 0   C: 20201 0   C: 24045 0   C: 03724 0
26,3360    I: 77616 0   I: 45020 1   C: 03675 0   C: 55333 1   I: 50276 1   C: 03705 0   I: 41572 1   C: 03732 1
26,3370    I: 44316 0   C: 06514 1   I: 41366 1   C: 00045 0   I: 60352 0   C: 00047 1   C: 03722 0   I: 77650 1
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OCTAL LISTING FOR PARAGRAPH # 153, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

26,3400     C: 03675 0   I: 45020 1   C: 03675 0   C: 46533 0   I: 51575 1   C: 02673 1   I: 53754 1   C: 03720 1
26,3410     C: 56174 0   C: 24317 1   C: 02665 0   I: 53646 0   C: 56174 0   C: 00315 0   I: 54335 0   C: 02005 0
26,3420     C: 20613 1   I: 50025 0   C: 00315 0   C: 50566 1   I: 45335 0   C: 02006 0   C: 00317 1   I: 77640 0
26,3430     C: 50566 1   I: 77624 1   C: 46745 0   I: 77650 1   C: 03675 0   C: 00103 0   C: 03370 0   C: 00241 0

26,3440     C: 31103 1   C: 36652 0      34755 1      55736 0      34736 1      00006 1      05012 1      34736 1
26,3450        70076 1      00006 1      15155 1      33713 1      00004 0      05203 0   C: 03643 0   C: 54067 1
26,3460        00003 1      40110 0      74736 0      00006 1      15155 1      06042 1   I: 43234 0   C: 21574 1
26,3470     C: 15715 0   C: 34041 0   C: 27077 1   I: 77775 1   C: 00001 0   C: 27676 0   C: 00007 0   C: 17740 1

26,3500     C: 00015 0   C: 34041 0   C: 27065 1   I: 52375 1   C: 00001 0   C: 03676 0   I: 77656 1   C: 27712 0
26,3510     C: 00007 0   I: 47256 0   C: 00001 0   I: 77656 1   C: 03704 1   I: 52375 1   C: 00007 0   C: 03740 1
26,3520     I: 76521 0   C: 01734 0   C: 03740 1   I: 53135 0   C: 03737 1   C: 55636 1   I: 53025 0   C: 15711 1
26,3530     C: 55623 0   I: 77775 1   C: 03720 1   C: 24015 0   C: 03726 1   C: 00023 0   I: 77761 1   C: 15705 1

26,3540     C: 27720 1   C: 00015 0   I: 53361 0   C: 06522 1   C: 03720 1   I: 77656 1   C: 27720 1   C: 00015 0
26,3550     I: 77761 1   C: 15705 1   C: 27726 1   C: 00023 0   I: 52361 1   C: 06522 1   C: 03726 1   I: 77656 1
26,3560     C: 03726 1   I: 53361 0   C: 15707 0   C: 03712 0   I: 64256 1   C: 01734 0   I: 77772 0   C: 25101 0
26,3570     C: 03740 1   C: 01761 0   I: 77776 1      00004 0      06032 0   C: 52613 1      44735 0      70110 0

26,3600        64735 1      54110 0      06042 1   I: 77624 1   C: 52404 0   I: 77776 1      03675 0      03675 0
26,3610        00006 1      30036 1      53753 0      06042 1   I: 77624 1   C: 46041 0   I: 65545 0   C: 00045 0
26,3620     C: 03735 0   I: 77776 1      05155 0   I: 47375 0   C: 03704 1   C: 03712 0   I: 77656 1   C: 27720 1
26,3630     C: 03712 0   I: 53435 0   C: 03720 1   C: 03726 1   I: 77650 1   C: 55561 0   I: 64375 1   C: 03712 0

26,3640     C: 01734 0   I: 52172 1   C: 55567 0      30074 1      74745 1      00006 1      15261 0      37716 0
26,3650        05105 0   C: 03654 0   C: 54067 1      05261 1      34750 1      00006 1      02033 0      00006 1
26,3660        13667 1      46245 0      61736 1      00006 1      13442 1      25736 1      13444 1      33703 0
26,3670        55733 0      00004 0      06032 0   C: 52613 1      05155 0      05567 0   C: 00527 1      00004 0

26,3700        06032 0   C: 55643 0      05155 0   C: 25547 0   C: 33555 1   C: 01106 1   C: 01642 0   C: 11045 0
26,3710     C: 00001 0   C: 00000 1   C: 00454 1   C: 01130 1   C: 00000 1   C: 00226 1   I: 46020 1   C: 00050 1
26,3720     C: 55733 0   I: 77624 1   C: 51730 1   I: 77775 1   C: 02013 1   I: 53235 0   C: 00001 0   C: 00001 0
26,3730     I: 52105 1   C: 00025 0   C: 51716 0   I: 77624 1   C: 55743 1   I: 77624 1   C: 15761 0   I: 76521 0

26,3740     C: 00025 0   I: 77650 1   C: 55725 1   I: 40220 0   C: 00051 0   C: 00011 1   I: 77770 1   C: 00000 1
26,3750     I: 65345 0   C: 01712 1   C: 14021 1   I: 45006 0   C: 53732 1   I: 41401 1   C: 00023 0   I: 65346 0
26,3760     C: 00023 0   I: 65356 1   C: 06524 1   I: 73525 1   C: 00023 0   I: 65276 1   C: 00023 0   I: 63346 0
26,3770     C: 06524 1   I: 41525 0   C: 06522 1   I: 77650 1   C: 00051 0   C: 03775 1   C: 03776 1 CKSM 70153 1
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OCTAL LISTING FOR PARAGRAPH # 154, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2000     C: 00000 1   C: 07622 0   C: 00000 1   C: 00762 1   C: 00030 1   C: 35104 1   C: 00016 0   C: 36237 1
27,2010     C: 35711 0   C: 35663 1   C: 03631 0   C: 23146 0   C: 33226 1   C: 14632 0   C: 05306 1   C: 15503 0
27,2020     C: 26337 1   C: 30030 1   C: 55340 0   C: 61710 0   C: 00072 1   C: 16206 1   C: 00344 1   C: 24331 0
27,2030     C: 24775 1   C: 30424 0   I: 40020 1   C: 03324 1   C: 56035 1   I: 52164 0   C: 03245 1   C: 56046 0

27,2040     I: 40020 1   C: 03324 1   C: 56043 0   I: 47164 1   C: 03245 1   C: 44403 0   C: 34032 1   C: 44410 1
27,2050     I: 61375 1   C: 03773 1   C: 03246 1   I: 77656 1   C: 00035 1   I: 53435 0   C: 03765 0   I: 57400 1
27,2060     C: 56170 1   C: 17270 1   C: 00045 0   I: 50025 0   C: 14415 1   C: 56170 1   I: 50375 0   C: 03765 0
27,2070     C: 00035 1   I: 65552 0   I: 77624 1   C: 44527 1   I: 75160 1   C: 03245 1   C: 02230 1   I: 77624 1

27,2100     C: 44312 1   I: 51545 1   C: 00007 0   I: 50025 0   C: 14402 1   C: 56160 0   I: 51545 1   C: 03765 0
27,2110     I: 51025 1   C: 14404 1   C: 56160 0   I: 77775 1   I: 77626 0   C: 50515 0   I: 77626 0   C: 50523 0
27,2120     I: 77626 0   C: 50531 0   C: 03254 1   I: 57444 1   C: 56125 1   I: 50035 1   C: 03765 0   C: 56134 1
27,2130     I: 57575 1   C: 03765 0   C: 37270 0   C: 56137 1   I: 77775 1   C: 03765 0   C: 03270 1   I: 51545 1

27,2140     C: 03765 0   I: 51025 1   C: 14406 0   C: 56147 0   I: 52145 0   C: 14412 0   C: 56151 1   I: 77745 1
27,2150     C: 14410 1   I: 77624 1   C: 44527 1   I: 75160 1   C: 03245 1   C: 02230 1   I: 77624 1   C: 44312 1
27,2160     I: 45160 1   C: 00000 1   C: 44654 0   I: 40234 0   C: 21621 1   C: 00001 0   I: 77650 1   C: 03324 1
27,2170     I: 50375 0   C: 00035 1   C: 03765 0   I: 72240 1   C: 54354 1   C: 00032 0   I: 77650 1   C: 03324 1

27,2200        22062 0      24012 0      00006 1      22061 0      54063 0      75012 0      64741 1      54064 1
27,2210        45012 0      70063 0      54063 0      22007 0      50001 0      41410 1      60064 0      00006 1
27,2220        12232 1      44747 0      60001 0      00006 1      12230 0      24001 0      24001 0      12214 0
27,2230        52062 1      52006 0      45012 0      50001 0      71411 0      00006 1      60063 1      00006 1

27,2240        12242 0      12221 0      34353 0      50001 0      55410 1      12230 0   I: 71220 1   C: 03632 0
27,2250     C: 03442 0   C: 03763 0   I: 77614 1   C: 01347 0   C: 56336 1   I: 77201 1   C: 00001 0   C: 03650 1
27,2260     C: 02331 1   I: 53435 0   C: 03642 1   C: 27673 0   C: 03642 1   C: 02323 1   I: 65236 0   C: 00045 0
27,2270     I: 56205 0   C: 16412 1   I: 41205 0   C: 03664 0   C: 01244 1   I: 77671 1   C: 03735 0   C: 24017 1

27,2300     C: 03656 1   I: 74241 0   C: 03673 0   C: 03673 0   I: 41552 0   I: 65245 1   C: 03656 1   C: 00017 1
27,2310     I: 63356 1   C: 00007 0   I: 53435 0   C: 03673 0   I: 45561 1   C: 50076 0   I: 65256 0   C: 00017 1
27,2320     I: 74346 0   I: 74255 0   C: 03701 1   C: 00045 0   I: 53352 0   I: 77626 0   C: 74076 0   I: 77656 1
27,2330     C: 27673 0   C: 03701 1   I: 45006 0   C: 15741 1   I: 77650 1   C: 03632 0   I: 77745 1   C: 03442 0

27,2340     C: 00041 1   I: 77621 1   C: 03631 0   C: 37452 0   C: 27056 1   I: 40375 1   C: 00001 0   C: 00001 0
27,2350     C: 03642 1   C: 02323 1   I: 77656 1   C: 27537 0   C: 00007 0   C: 03650 1   C: 02331 1   I: 65345 0
27,2360     C: 06524 1   C: 16406 1   I: 43214 1   C: 03745 1   C: 56366 1   C: 16410 0   I: 66006 1   C: 02776 0
27,2370     I: 45134 0   C: 02777 1   C: 22000 1   I: 41575 0   C: 02366 0   C: 03701 1   I: 77656 1   C: 17673 0
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OCTAL LISTING FOR PARAGRAPH # 155, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,2400      C: 00045 0     C: 37664 1     C: 15741 1     I: 77650 1     C: 03632 0     C: 00707 1     C: 03434 1     C: 03070 0
27,2410      C: 34344 0     C: 00024 1     C: 13714 1     I: 77775 1     C: 03673 0     I: 76521 0     C: 01734 0     C: 27773 1
27,2420      C: 06522 1     C: 27765 0     C: 03673 0     C: 03607 0     I: 53435 0     C: 03642 1     I: 46125 0     C: 00045 0
27,2430      C: 56441 0     I: 45575 1     C: 74162 1     I: 76435 1     C: 03607 0     I: 77676 0     C: 03623 0     I: 43414 1

27,2440      C: 01073 1     I: 47375 0     C: 03607 0     C: 03650 1     I: 41456 0     I: 77650 1     C: 56431 1     I: 77614 1
27,2450      C: 01347 0     C: 56731 1     I: 52375 1     C: 03701 1     C: 03527 1     C: 03707 1     I: 76521 0     C: 01734 0
27,2460      C: 03253 0     I: 51575 1     C: 03707 1     C: 03664 0     I: 77201 1     C: 00001 0     C: 03707 1     C: 27701 1
27,2470      C: 03527 1     I: 57414 1     C: 01344 0     C: 00052 0     I: 77656 1     I: 41441 0     C: 03707 1     I: 56244 0

27,2500      C: 56526 0     C: 03743 1     I: 41215 1     C: 06522 1     I: 56261 1     C: 20613 1     C: 00045 0     I: 43205 1
27,2510      C: 16535 0     C: 03741 0     C: 03517 1     I: 77615 0     C: 01234 0     C: 17442 0     C: 03517 1     I: 51025 1
27,2520      C: 16537 1     C: 61100 1     I: 43014 0     C: 01066 0     C: 01224 1     C: 00052 0     I: 77776 1        05567 0
27,2530      C: 01407 0        06042 1     I: 77650 1     C: 61100 1     C: 77715 1     C: 77777 0     C: 00000 1     C: 00620 0

27,2540         06042 1     I: 43001 1     C: 00001 0     C: 01266 1     I: 51575 1     C: 03701 1     I: 41325 0     C: 21006 1
27,2550      C: 34021 0     I: 72471 0     C: 01244 1     I: 41421 0     I: 43014 0     C: 05342 1     C: 56626 0     C: 02463 1
27,2560      I: 56345 0     C: 16001 1     C: 01244 1     I: 50021 1     C: 00001 0     C: 56610 0     I: 41325 0     C: 03737 1
27,2570      C: 16700 1     I: 65221 0     C: 01244 1     C: 03735 0     I: 60405 0     C: 16702 0     I: 41471 0     I: 51021 0

27,2600      C: 00003 1     C: 56626 0     I: 55345 0     I: 43205 1     C: 16702 0     C: 16676 1     I: 77650 1     C: 56616 0
27,2610      I: 41345 0     C: 01244 1     I: 41542 1     I: 56215 1     C: 16003 0     C: 16005 0     I: 77414 0     C: 01066 0
27,2620         07262 0        30154 1        56001 0        34755 1        53517 1        12650 1     I: 41345 0     C: 00001 0
27,2630      C: 01244 1     I: 43006 0     C: 05302 0     C: 56671 1     I: 43071 0     C: 16007 1     C: 02663 0     I: 41400 0

27,2640      C: 56653 1     I: 51025 1     C: 16704 0     C: 56661 0     I: 52015 1     C: 16704 0     C: 56616 0     I: 77776 1
27,2650         05353 1     C: 00003 1        05155 0     I: 40545 1     I: 77671 1     C: 16011 0     C: 03517 1     I: 77776 1
27,2660         12650 1     I: 51025 1     C: 16706 1     C: 56666 1     I: 77614 1     C: 02463 1     I: 77745 1     I: 77776 1
27,2670         12620 0     I: 62471 1     C: 34007 1     I: 77650 1     C: 56667 0     C: 00144 0     C: 00000 1     C: 01274 1

27,2700      C: 00000 1     C: 00764 1     C: 00000 1     C: 01130 1     C: 00000 1     C: 21304 0     C: 00000 1        06042 1
27,2710      I: 77601 0     C: 00001 0     I: 71214 0     C: 01072 0     C: 06524 1     I: 77725 1     C: 16406 1     I: 43214 1
27,2720      C: 03745 1     C: 56723 1     C: 16410 0     I: 45006 0     C: 22002 0     I: 77776 1        05353 1     C: 00002 0
27,2730         15155 1     I: 51575 1     C: 01220 0     I: 53744 0     C: 02777 1     C: 57576 1     C: 27715 1     C: 03444 0

27,2740      I: 47051 0     C: 01220 0     C: 21725 1     C: 17656 1     C: 00045 0     I: 53674 1     C: 00046 0     C: 57576 1
27,2750      C: 00037 0     I: 41301 0     C: 00050 1     C: 03715 1     I: 57101 0     C: 00047 1     C: 00046 0     I: 77734 1
27,2760      C: 03766 0     C: 17725 1     C: 00037 0     I: 65342 1     C: 03715 1     I: 65342 1     C: 03723 1     I: 43342 0
27,2770      I: 45415 0     C: 74044 1     I: 41225 1     C: 00037 0     C: 03721 0     I: 77621 1     C: 03717 0     I: 45325 1
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OCTAL LISTING FOR PARAGRAPH # 156,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3000       C: 03733 0    C: 03715 1    I: 70501 1    C: 00047 1    I: 41271 0    C: 03725 1    I: 53664 0    C: 00046 0
27,3010       C: 57575 1    I: 77754 1    C: 03766 0    I: 75366 0    C: 02673 1    C: 00041 1    I: 41345 0    C: 03733 0
27,3020       C: 03721 0    I: 77621 1    C: 03717 0    I: 45325 1    C: 03733 0    C: 03723 1    I: 70501 1    C: 00047 1
27,3030       I: 41271 0    C: 03725 1    I: 53664 0    C: 00046 0    C: 57575 1    I: 65366 1    C: 03733 0    I: 56225 1

27,3040       C: 00037 0    C: 03733 0    I: 41566 1    I: 67542 0    I: 65205 0    C: 17216 1    I: 56325 0    C: 00037 0
27,3050       C: 03733 0    I: 77600 1    C: 57053 0    I: 41366 1    I: 44242 0    I: 65365 1    C: 02673 1    C: 17216 1
27,3060       I: 45302 1    I: 65205 0    C: 03733 0    C: 03733 0    I: 75442 1    I: 77605 1    I: 52525 1    C: 03717 0
27,3070       I: 55366 1    I: 43225 0    C: 03631 0    C: 01234 0    C: 14037 0    I: 77765 0    C: 00037 0    C: 00037 0

27,3100       I: 77214 0    C: 03705 0    C: 57123 0    C: 03656 1    I: 53451 1    C: 03537 0    I: 63361 0    C: 00037 0
27,3110       C: 03656 1    I: 53455 0    C: 03537 0    I: 53361 0    C: 00041 1    I: 53744 0    C: 02777 1    C: 57177 1
27,3120       C: 02337 1    I: 77650 1    C: 57166 1    I: 50375 0    C: 03656 1    C: 03537 0    I: 77240 1    C: 57146 0
27,3130       C: 03656 1    I: 63362 0    C: 03537 0    I: 53362 0    I: 77656 1    I: 57406 1    I: 75235 1    C: 02674 0

27,3140       C: 02673 1    I: 74256 0    C: 00037 0    I: 77715 1    I: 77650 1    C: 57113 0    I: 74575 0    C: 03537 0
27,3150       I: 74515 0    C: 03656 1    I: 53451 1    I: 77606 1    I: 75235 1    C: 02674 0    C: 02673 1    I: 74256 0
27,3160       C: 00041 1    I: 77715 1    I: 53361 0    C: 00037 0    I: 77650 1    C: 57115 0    I: 77651 0    C: 03553 1
27,3170       C: 02366 0    I: 53135 0    C: 03000 1    C: 57177 1    I: 52175 0    C: 02366 0    C: 57212 1    I: 53575 0

27,3200       C: 01220 0    I: 45345 1    C: 01234 0    C: 03512 1    I: 56205 0    C: 16023 1    C: 00043 0    I: 53361 0
27,3210       C: 03521 1    C: 02366 0    C: 02366 0    I: 77650 1    C: 56455 0    C: 31103 1    C: 36652 0       05516 0
27,3220       C: 00137 1       45017 0       00006 1       03012 1       35014 1       00006 1       05012 1       05221 0
27,3230       C: 13560 0       45014 0       00006 1       03012 1       35017 1       00006 1       05012 1       31402 0

27,3240          05173 1    C: 03260 0       31401 0       05224 0       44740 1       00006 1       03012 1       30102 1
27,3250          74742 0       00006 1       13264 0       34737 0       05072 1    C: 02325 1    C: 02067 1       05261 1
27,3260          44742 0       00006 1       03012 1       13247 1       05504 0    C: 00137 1       05261 1    I: 76521 0
27,3270       C: 01734 0    I: 77650 1    C: 47650 1    I: 53575 0    C: 03253 0    I: 77641 1    C: 02146 0    I: 51025 1

27,3300       C: 02571 0    C: 57310 1    I: 50375 0    C: 02146 0    C: 03537 0    I: 50025 0    C: 02573 1    C: 71450 0
27,3310       I: 77614 1    C: 04631 1    C: 60722 0    I: 50375 0    C: 03537 0    C: 03720 1    I: 41312 1    C: 03631 0
27,3320       C: 02335 0    I: 77616 0       00006 1       33360 1       53252 1       40103 1       74745 1       26103 1
27,3330          34735 1       54107 0       00006 1       34755 1       52752 0       30102 1       74744 0       10000 0

27,3340          13344 0       00006 1       34755 1       52754 0       00006 1       34755 1       52756 1       00006 1
27,3350          34755 1       52764 0       34764 0       54001 1       40000 0       52760 1       15634 1    C: 03746 1
27,3360       C: 64067 1    C: 00037 0    I: 53575 0    C: 02207 0    I: 77725 1    C: 00045 0    C: 00015 0    I: 77701 1
27,3370       C: 00047 1    C: 24041 1    C: 02215 0    I: 77761 1    C: 00037 0    C: 02170 0    I: 47361 0    C: 00041 1
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OCTAL LISTING FOR PARAGRAPH # 157,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

27,3400      I: 47572 1    C: 14035 1    C: 06514 1    I: 63271 0    C: 00041 1    C: 02170 0    I: 57436 1    C: 00025 0
27,3410      I: 43257 0    C: 20573 1    I: 77626 0    C: 77744 0    I: 41457 1    C: 20173 0    I: 75446 0    I: 77701 1
27,3420      C: 00050 1    C: 00031 0    I: 75316 1    I: 55254 1    C: 57426 0    C: 06514 1    C: 00027 1    I: 77616 0
27,3430      I: 41345 0    C: 00033 1    C: 00035 1    I: 57457 0    C: 20571 0    I: 51415 0    C: 17766 0    I: 43366 0

27,3440      C: 06514 1    I: 55206 0    C: 00035 1    I: 53657 0    C: 20601 1    C: 20572 0    C: 14017 1    I: 41005 1
27,3450      C: 00027 1    C: 57754 0    I: 53654 0    C: 57462 0    C: 57603 0    I: 40057 1    C: 57576 1    C: 57462 0
27,3460      I: 77644 1    C: 57464 0    I: 77745 1    C: 17772 0    C: 00021 1    I: 77616 0    I: 77614 1    C: 03436 0
27,3470      C: 57473 0    I: 77614 1    C: 03676 0    C: 00023 0    I: 77657 0    C: 20201 0    C: 00021 1    I: 44205 0

27,3500      C: 00033 1    C: 06514 1    I: 41206 0    C: 00021 1    I: 53725 1    C: 00035 1    C: 20573 1    I: 43276 0
27,3510      I: 77657 0    C: 20601 1    I: 71214 0    C: 03756 0    C: 57516 1    C: 06524 1    I: 75440 0    C: 57651 1
27,3520      I: 41076 0    C: 57754 0    C: 24045 0    C: 02170 0    I: 52441 1    C: 02207 0    C: 00017 1    I: 44240 1
27,3530      C: 57551 1    C: 00045 0    C: 14043 0    C: 00033 1    I: 44205 0    C: 00041 1    I: 51406 1    I: 40015 1

27,3540      C: 17760 0    C: 57562 1    I: 65345 0    C: 06524 1    I: 57545 1    C: 00033 1    I: 71240 1    C: 57656 0
27,3550      I: 77616 0    I: 77745 1    I: 45345 1    C: 00023 0    C: 00015 0    C: 14043 0    C: 00045 0    I: 52015 1
27,3560      C: 00017 1    C: 57536 0    I: 65215 1    C: 17762 1    C: 00043 0    I: 53605 1    C: 00031 0    C: 57201 0
27,3570      I: 77671 1    I: 40145 0    C: 00043 0    C: 57654 1    I: 45471 1    C: 77732 1    I: 63406 0    I: 41206 0

27,3600      C: 00035 1    I: 75261 0    C: 20206 1    C: 00045 0    C: 14045 0    I: 41206 0    C: 00033 1    I: 77657 0
27,3610      C: 20201 0    C: 00043 0    I: 41234 1    C: 57736 1    I: 44302 0    C: 00023 0    I: 41215 1    C: 00015 0
27,3620      I: 51042 0    C: 57642 0    I: 75206 1    C: 00017 1    I: 71244 0    C: 57646 1    C: 00027 1    I: 51076 1
27,3630      C: 57646 1    I: 77676 0    I: 56205 0    C: 17756 0    C: 00031 0    I: 53657 0    C: 57602 1    C: 57602 1

27,3640      I: 43257 0    C: 57576 1    I: 40005 0    C: 00037 0    C: 57652 1    I: 77616 0    I: 77745 1    I: 77650 1
27,3650      C: 57642 0    I: 77745 1    I: 43545 1    C: 17772 0    I: 77712 0    I: 41465 0    I: 45345 1    C: 00045 0
27,3660      C: 00017 1    C: 14013 0    I: 77626 0    C: 77732 1    I: 53605 1    C: 00027 1    C: 57576 1    I: 41206 0
27,3670      C: 00045 0    I: 41057 0    C: 57576 1    C: 21713 1    C: 00043 0    I: 41234 1    C: 57736 1    C: 00043 0

27,3700      I: 45242 1    C: 17764 1    I: 41405 0    I: 41345 0    C: 00045 0    C: 00015 0    I: 43312 0    C: 00017 1
27,3710      C: 14045 0    C: 00035 1    I: 53605 1    C: 00027 1    C: 57575 1    I: 53765 0    C: 00045 0    C: 57576 1
27,3720      C: 14045 0    C: 00027 1    I: 41366 1    C: 17756 0    I: 77615 0    I: 45257 0    C: 57577 0    C: 00013 0
27,3730      I: 53605 1    C: 00027 1    C: 57601 1    I: 52057 1    C: 57602 1    C: 57642 0       07225 0    C: 00004 0

27,3740      C: 12525 0    C: 12525 0    C: 71463 0    C: 57703 1    C: 04423 0    C: 17645 0    C: 74604 0    C: 43667 1
27,3750      C: 01626 1    C: 37256 1    C: 77404 1    C: 52071 0       06064 0    C: 06220 1    C: 37553 0    C: 37777 1
27,3760      C: 37700 1    C: 00000 1    C: 00100 0    C: 04000 0    C: 00000 1    C: 02000 0    C: 00000 1    C: 00305 1
27,3770      C: 11205 0    C: 37777 1    C: 37777 1    C: 03773 1    C: 03774 0   CKSM 41113 1         @             @
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OCTAL LISTING FOR PARAGRAPH # 160,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2000     C: 02445 0   C: 00274 0   I: 77615 0   C: 02201 0   C: 02201 0   I: 47573 0   C: 02555 0   I: 77615 0
30,2010     C: 02203 1   C: 02203 1   I: 47573 0   C: 02643 1   I: 77615 0   C: 02205 1   C: 02205 1   I: 75500 0
30,2020     C: 62137 0   I: 77661 0   C: 20613 1   C: 16205 1   C: 02203 1   I: 77766 0   C: 16203 1   C: 02201 0
30,2030     I: 77766 0   C: 02201 0   I: 52000 0   C: 60035 1   C: 60042 1   I: 77745 1   C: 06532 0   C: 02201 0

30,2040     C: 02203 1   C: 02205 1   I: 45345 1   C: 02201 0   C: 20060 0   I: 71240 1   C: 60051 0   C: 20060 0
30,2050     C: 02201 0   I: 66150 0   C: 00051 0   C: 00052 0   I: 77776 1      04635 0   C: 27421 0   C: 01670 1
30,2060     C: 17000 1      05353 1   C: 04024 0      04616 1   C: 11233 0      06011 1      36000 1      55250 0
30,2070        34751 0      55515 0      34755 1      55462 1      33022 1      04616 1   C: 20477 1      16001 1

30,2100        12102 1      12074 1      05353 1   C: 04024 0      06042 1   I: 43014 0   C: 03067 0   C: 06464 1
30,2110     I: 43014 0   C: 00075 0   C: 00270 1   I: 43014 0   C: 04464 0   C: 04461 0   I: 77624 1   C: 71343 0
30,2120     I: 77624 1   C: 60251 1   I: 77745 1   C: 25740 0   C: 17517 1   C: 03442 0   C: 34041 0   C: 27056 1
30,2130     I: 64375 1   C: 00007 0   C: 01734 0   I: 77772 0   C: 27601 0   C: 00001 0   I: 52521 0   C: 01734 0

30,2140     C: 37521 0   C: 57067 1   I: 53575 0   C: 03521 1   C: 37537 1   C: 57313 1   I: 57461 0   C: 20606 0
30,2150     C: 17643 0   C: 31367 1   C: 16277 1   C: 31371 0   C: 02273 0   I: 77776 1      05352 1   C: 04024 0
30,2160        33021 1      04616 1   C: 20477 1      16001 1      12166 0      12160 0      32314 0      55455 0
30,2170        05353 1   C: 04024 0      06042 1   I: 54345 1   C: 03643 0   C: 20206 1   I: 77615 0   C: 02335 0

30,2200     C: 27633 1   C: 03537 0   I: 53361 0   C: 31365 0   C: 03601 0   C: 03527 1   I: 72441 0   C: 03537 0
30,2210     C: 27474 0   C: 03537 0   I: 53435 0   C: 03720 1   C: 37726 0   C: 60315 0   I: 77745 1   C: 02361 1
30,2220     I: 65316 0   C: 02355 0   I: 43316 1   I: 75454 0   C: 60230 0   I: 55352 0   C: 02355 0   I: 77736 0
30,2230     C: 26363 0   C: 03253 0   I: 50256 0   C: 03537 0   I: 65552 0   I: 77676 0   C: 02365 0   I: 77776 1

30,2240        05353 1   C: 04024 0      00004 0      04674 0   C: 40143 0      05516 0   C: 00213 1      04635 0
30,2250     C: 74130 0   I: 77745 1   C: 16013 1   C: 03641 1   C: 03637 0   C: 17635 1   C: 16017 0   C: 16263 1
30,2260     C: 16021 0   C: 16271 1   C: 34013 1   I: 54276 0   C: 20214 1   C: 02267 0   I: 57535 0   C: 26001 1
30,2270     I: 77702 1   C: 02265 1   I: 43414 1   C: 04747 1   C: 60275 1   I: 43345 1   C: 25736 1   C: 02333 0

30,2300     C: 17631 0   C: 06524 1   C: 03654 0   C: 03633 1   C: 26275 0   C: 01563 0   I: 64235 1   C: 01555 0
30,2310     C: 01734 0   I: 77656 1   C: 03720 1   I: 77616 0   C: 02024 0   I: 51575 1   C: 03521 1   C: 26301 1
30,2320     C: 03726 1   I: 72441 0   C: 03527 1   C: 26313 1   C: 03726 1   I: 76435 1   C: 03537 0   C: 02303 0
30,2330     I: 72441 0   C: 03527 1   C: 36311 1   C: 57313 1   I: 77775 1   C: 03563 1   I: 50341 1   C: 27104 1

30,2340     C: 03537 0   I: 47315 0   C: 03537 0   C: 03527 1   I: 56236 0   C: 02301 1   I: 43352 1   I: 77626 0
30,2350     C: 75462 0   I: 45014 0   C: 04742 1   C: 60355 1   C: 71524 1   I: 45345 1   C: 02277 1   C: 02313 1
30,2360     C: 02343 1   I: 65361 0   C: 03726 1   C: 02275 0   I: 77625 0   C: 02311 0   C: 02341 0   I: 65361 0
30,2370     C: 02303 0   C: 02273 0   I: 77625 0   C: 03474 0   C: 02337 1   I: 53361 0   C: 03537 0   I: 76455 1
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OCTAL LISTING FOR PARAGRAPH # 161,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,2400     I: 77626 0    C: 74131 1    I: 41345 0    C: 03517 1    C: 02315 1    I: 76561 1    C: 03537 0    I: 77645 0
30,2410     C: 03646 0    C: 03646 0    I: 76521 0    C: 02146 0    C: 27502 0    C: 03646 0    I: 43046 1    C: 04745 0
30,2420     C: 60427 0    I: 77671 1    C: 20001 1    C: 37517 0    C: 71475 1    I: 77650 1    C: 60754 1    I: 41471 0
30,2430     C: 02265 1    I: 44342 1    C: 17772 0    I: 41205 0    C: 02271 1    I: 77625 0    C: 02267 0    C: 03517 1

30,2440     I: 57461 0    C: 20614 0    C: 17454 1    C: 03517 1    I: 45214 1    C: 03710 1    C: 60452 1    C: 21006 1
30,2450     I: 77640 0    C: 30347 1    I: 77745 1    C: 03517 1    I: 50025 0    C: 21010 0    C: 60612 1    I: 45345 1
30,2460     C: 02271 1    C: 03517 1    I: 45071 0    C: 02271 1    C: 61023 1    I: 41461 1    C: 20206 1    I: 44265 0
30,2470     C: 03517 1    C: 02271 1    I: 43006 0    C: 04703 0    C: 60503 1    I: 45345 1    C: 03517 1    C: 21012 1

30,2500     I: 43044 0    C: 60510 0    C: 04463 1    I: 77745 1    C: 06524 1    C: 02351 1    C: 36353 1    C: 60572 1
30,2510     I: 45345 1    C: 03517 1    C: 00003 1    I: 72406 0    I: 52421 1    C: 03517 1    I: 41325 0    C: 03517 1
30,2520     C: 03474 0    I: 45215 0    C: 02301 1    C: 03631 0    I: 41325 0    C: 02337 1    C: 00005 1    I: 62415 0
30,2530     I: 56271 0    C: 00007 0    C: 03517 1    C: 02351 1    I: 71240 1    C: 60541 1    C: 06524 1    C: 36351 0

30,2540     C: 60553 1    I: 56202 1    C: 02271 1    I: 51025 1    C: 26201 0    C: 60553 1    I: 41345 0    C: 26201 0
30,2550     C: 02271 1    I: 77612 1    C: 02351 1    I: 77745 1    C: 03517 1    I: 43205 1    C: 02311 0    C: 02335 0
30,2560     I: 65225 1    C: 03633 1    C: 02341 0    I: 43205 1    C: 00005 1    I: 56312 1    I: 40271 1    C: 03517 1
30,2570     C: 00005 1    C: 02353 0    I: 41345 0    C: 02351 1    C: 00003 1    I: 56325 0    C: 02337 1    C: 00001 0

30,2600     I: 45302 1    I: 77626 0    C: 61432 0    C: 02353 0    I: 65205 0    I: 60465 0    C: 02341 0    I: 77625 0
30,2610     C: 00001 0    C: 02347 0    I: 43001 1    C: 00001 0    C: 04742 1    C: 60620 0    I: 77624 1    C: 71501 0
30,2620     I: 41345 0    C: 27104 1    C: 02351 1    I: 56215 1    C: 02345 1    C: 02271 1    I: 45352 1    C: 02315 1
30,2630     C: 16357 1    C: 27104 1    I: 43205 1    C: 02353 0    C: 02347 0    I: 72471 0    C: 02271 1    C: 02355 0

30,2640     I: 65361 0    C: 02303 0    C: 02357 1    I: 53361 0    C: 03537 0    I: 41572 1    I: 65246 1    C: 02263 1
30,2650     I: 45316 1    C: 00043 0    I: 41525 0    C: 02263 1    I: 45316 1    C: 00043 0    I: 71240 1    C: 60663 1
30,2660     C: 00011 1    I: 52166 1    C: 60671 1    I: 55345 0    C: 00007 0    I: 77761 1    C: 00001 0    C: 14001 0
30,2670     C: 06524 1    I: 77765 0    C: 02343 1    C: 02361 1    I: 77761 1    C: 03726 1    I: 53372 1    C: 00001 0

30,2700     C: 03253 0    I: 43001 1    C: 00001 0    C: 04704 0    C: 60216 1    I: 77614 1    C: 04701 0    C: 60763 0
30,2710     I: 57575 1    C: 13537 0    C: 17261 1    C: 03654 0    I: 51025 1    C: 01234 0    C: 60730 0    I: 77614 1
30,2720     C: 04711 1    C: 57273 0    I: 43014 0    C: 06666 1    C: 04702 0    C: 60730 0    I: 77614 1    C: 01664 1
30,2730     I: 77776 1       30105 0       74742 0       10000 0       12755 0       06042 1    I: 77624 1    C: 61100 1

30,2740     I: 77776 1       30105 0       74742 0       10000 0       12755 0       30104 1       74742 0       10000 0
30,2750        12755 0       33020 0       04616 1    C: 20444 1    I: 77776 1       15155 1    I: 77776 1       00004 0
30,2760        04674 0    C: 40166 1       12741 0    I: 45345 1    C: 02301 1    C: 02333 0    I: 50025 0    C: 26205 1
30,2770     C: 16666 0    I: 43014 0    C: 04661 1    C: 04711 0    C: 60710 1    I: 43345 1    C: 01234 0    C: 25734 0
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OCTAL LISTING FOR PARAGRAPH # 162,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3000     C: 37654 1   C: 60710 1   I: 77614 1   C: 04631 1   C: 60771 0   C: 00062 0   C: 00000 1   C: 00031 0
30,3010     C: 00000 1   C: 00175 1   C: 00000 1   C: 00045 0   C: 20000 0   C: 00010 0   C: 14400 0   C: 00000 1
30,3020     C: 01477 1   C: 01514 0   C: 01441 1   I: 44301 0   C: 00163 0   C: 17772 0   I: 77776 1      07225 0
30,3030     C: 00006 1   C: 00000 1   C: 00002 0   C: 76777 1   C: 77175 1   C: 77400 0   C: 75416 0   C: 77507 0

30,3040     C: 65515 0   C: 77741 0   C: 63547 1   C: 77052 0   C: 55373 0   C: 01167 0   C: 30361 0   C: 76520 1
30,3050     C: 75267 0      34755 1      54156 1      00006 1      33070 0      52155 1      52132 0      30162 1
30,3060        07312 0      52156 1      52155 1      52132 0      20155 1      06042 1   I: 43476 0   C: 00542 1
30,3070     C: 34414 1   I: 77331 0   C: 03300 1   C: 00000 1   C: 06522 1   C: 03267 1   C: 03261 1   I: 77616 0

30,3100     I: 77775 1   C: 03253 0   I: 40200 1   C: 61102 0   C: 00023 0   I: 77420 1   C: 03246 1      33752 1
30,3110        56003 1      55645 0      30111 0      74737 1      10000 0      34753 1      55647 1      34743 0
30,3120        55651 0      70111 1      55650 1      00004 0      30032 0      54771 1      30033 1      54765 1
30,3130        30034 0      54767 0      34742 1      00006 1      02030 0      10000 0      13153 1      34736 1

30,3140        00006 1      02031 1      10000 0      13153 1      55651 0      31634 1      54771 1      31635 0
30,3150        54765 1      31636 0      54767 0      06042 1   I: 77634 0   C: 21727 0   C: 24001 0   C: 03261 1
30,3160     I: 47034 0   C: 21727 0   C: 47617 1   C: 24015 0   C: 00325 0   I: 53404 1   C: 61741 1   I: 45000 0
30,3170     C: 61204 0   C: 47673 0   I: 77776 1      31670 1      22157 1      03474 0      55670 0      31672 0

30,3200        22161 1      03474 0      55672 1      06042 1   I: 46135 1   C: 03251 1   C: 61212 1   I: 45175 0
30,3210     C: 00015 0   C: 61514 0   I: 77775 1   C: 02162 0   C: 34015 1   C: 61514 0   I: 57575 1   C: 02146 0
30,3220     C: 00015 0   I: 47375 0   C: 00015 0   C: 00001 0   I: 41456 0   I: 76435 1   C: 00001 0   C: 00015 0
30,3230     I: 63361 0   C: 03273 1   I: 51361 1   C: 03271 0   I: 53372 1   C: 00001 0   I: 77656 1   C: 00001 0

30,3240     I: 76435 1   C: 00015 0   C: 00007 0   I: 47276 1   C: 00001 0   I: 77772 0   C: 00015 0   I: 77624 1
30,3250     C: 61524 0   I: 77776 1      31677 0      26154 0      30156 0      54001 1      33764 1      03720 1
30,3260        56156 0      00006 1      20156 1      00006 1      13266 1      13747 1      00004 0      22007 0
30,3270        34752 0      54142 1      30001 0      00006 1      70000 0      64350 0      00006 1      63302 0

30,3300        34755 1      55650 1      50142 0      30154 1      50142 0      54321 0      00006 1      50142 0
30,3310        21634 0      40000 0      50142 0      55674 1      54001 1      10142 1      13271 1      11651 0
30,3320        13743 0      30101 1      74745 1      00006 1      13743 0      23676 1      51647 0      33760 0
30,3330        03720 1      55676 0      31675 1      00006 1      70745 0      54001 1      51647 0      33762 1

30,3340        03720 1      00006 1      10745 0      57675 1      00006 1      70737 0      20001 1      40000 0
30,3350        00006 1      21674 1      54001 1      51647 0      33760 0      03720 1      55674 1      11650 1
30,3360        41674 1      55674 1      41675 0      00006 1      70737 0      20001 1      27674 1      41674 1
30,3370        55642 1      41675 0      00006 1      70737 0      20001 1      27642 1      27642 1      41675 0
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OCTAL LISTING FOR PARAGRAPH # 163,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

30,3400        00006 1     70747 1     20001 1     00006 1     70745 0     55643 0     41676 0     00006 1
30,3410        70741 1     27643 0     27643 0     27643 0     31675 1     00006 1     70741 1     20001 1
30,3420        00006 1     70745 0     55644 1     41676 0     00006 1     70747 1     27644 1     27644 1
30,3430        27644 1     34752 0     54142 1     50142 0     31674 0     00006 1     73765 1     03734 1

30,3440        50142 0     55637 0     50142 0     11642 1     64753 1     13447 1     64753 1     00006 1
30,3450        50142 0     71642 1     00006 1     74741 0     00006 1     50142 0     11530 1     54001 1
30,3460        33762 1     03720 1     50142 0     55274 0     10142 1     13432 0     31645 1     54003 0
30,3470        06042 1  I: 52001 1  C: 00001 0  C: 03246 1     00006 1     22142 0     54143 0     40000 0

30,3500        60001 0     00006 1     51647 0     73753 1     54001 1     33755 0     03720 1     60143 1
30,3510        54001 1     33756 0     03720 1     00142 0  I: 63441 0  C: 00001 0  I: 50025 0  C: 21760 0
30,3520     C: 61221 1  I: 43531 1  C: 03251 1  C: 00000 1  I: 63545 0  C: 00003 1  I: 51021 0  C: 06514 1
30,3530     C: 61533 0  I: 77745 1  C: 06524 1  I: 77566 1     00006 1     30155 0     20001 1     54145 0

30,3540        13543 1     34733 1     54145 0     50120 1     30002 0     22154 1     03613 0     54156 1
30,3550        34755 1     03571 1     34751 0     03571 1     40141 1     03613 0     54155 1     34750 1
30,3560        03571 1     33570 0     03571 1     40141 1     03613 0     54154 0     06042 1  I: 77616 0
30,3570     C: 00016 0     60120 1     54116 0     50116 1     30000 1     00006 1     63600 1     40000 0

30,3600        60145 1     00006 1     63610 0     00006 1     50116 1     30001 0     00006 1     10145 0
30,3610        54001 1     22141 0     00002 0     00006 1     13656 0     00006 1     22144 0     54142 1
30,3620        30001 0     54143 0     34755 1     00006 1     10142 1     00006 1     13645 1     10143 0
30,3630        34755 1     13635 0     40142 1     54142 1     34735 1     54143 0     30142 0     03663 1

30,3640        03734 1     00006 1     20143 0     03734 1     00144 0     40143 0     03663 1     64736 1
30,3650        54143 0     10142 1     30143 1     13643 1     40143 0     13643 1     10001 1     34755 1
30,3660        00002 0     34735 1     00002 0     60000 1     54021 0     13671 0     50000 1     44734 1
30,3670        54021 0     00006 1     70000 0     54141 1     00006 1     73717 1     63716 1     00006 1

30,3700        70141 1     63715 1     00006 1     70141 1     63714 0     00006 1     70141 1     63713 1
30,3710        00006 1     70021 0     00002 0  C: 24406 0  C: 00660 1  C: 16204 0  C: 50744 0  C: 20315 1
30,3720        54141 1     34755 1     00006 1     10141 1     10000 0     22141 0     13730 1     13732 0
30,3730        30001 0     00002 0     40141 1     00002 0     10000 0     64753 1     00002 0     40000 0

30,3740        00002 0     05567 0  C: 00402 1     00004 0     04674 0  C: 40166 1     13466 1     05567 0
30,3750     C: 00401 1     13266 1  C: 03245 1  C: 06315 0  C: 03146 1  C: 00071 1  C: 02041 0  C: 01673 1
30,3760     C: 03434 1  C: 00266 0  C: 01616 1  C: 00133 0  C: 14344 1  C: 01463 1  C: 03766 0  C: 03767 1
30,3770   CKSM 43421 1        @           @           @           @           @           @           @
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OCTAL LISTING FOR PARAGRAPH # 164,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2000     C: 00222 0    C: 33316 0    C: 07401 0    C: 06613 0    C: 00024 1    C: 00307 0    C: 17534 0       06042 1
31,2010     I: 77624 1    C: 62120 0    I: 77776 1       00006 1       31601 1       53607 0       00006 1       31603 0
31,2020        53611 1       00006 1       31605 0       53613 0       32143 0       04616 1    C: 20334 1       15472 1
31,2030        12032 0       12024 1       22007 0       34756 1       54002 1       50002 0       41600 1       50002 0

31,2040        61606 0       26001 1       10002 1       12034 0       22000 1       00006 1       12051 0       05504 0
31,2050     C: 00160 0       06042 1    I: 77414 0    C: 03707 1    C: 62056 0       15472 1    I: 77745 1    C: 02201 0
31,2060     I: 72412 0    C: 14001 0    C: 02203 1    C: 14003 1    C: 02205 1    I: 77661 0    C: 20213 0    C: 00005 1
31,2070     I: 72014 1    C: 04307 1    C: 62102 0    C: 00000 1    I: 72130 0    C: 02000 0    C: 00002 0    I: 52130 1

31,2100     C: 02001 1    C: 62110 0    I: 66150 0    C: 00000 1    C: 02006 0    I: 66150 0    C: 00002 0    C: 02007 1
31,2110     I: 66150 0    C: 00034 0    C: 02003 0    I: 77730 0    C: 02002 1    I: 77414 0    C: 02676 1       15472 1
31,2120     I: 40020 1    C: 00051 0    C: 62123 0    I: 45014 0    C: 03667 0    C: 27410 1    I: 71331 0    C: 00051 0
31,2130     C: 00006 1    C: 06524 1    C: 02201 0    C: 02203 1    C: 02205 1    I: 77770 1    C: 00066 1    I: 47573 0

31,2140     C: 02467 0    I: 77650 1    C: 60002 0    C: 01543 1       31245 0       00006 1       72356 1       00006 1
31,2150        23607 1       02337 1       53470 1       00006 1       31464 0       02337 1       55615 0       53466 0
31,2160        32360 0       54002 1       31615 1       72357 0       00006 1       10002 1       00006 1       75003 0
31,2170        55750 0       41617 1       60025 0       74733 0       40000 0       65002 0       00006 1       62203 1

31,2200        00006 1       31611 0       21470 1       35014 1       54003 0       00006 1       31507 1       52131 0
31,2210        35016 0       54003 0       44755 0       55606 1       40131 0       61620 1       00006 1       62231 0
31,2220        40130 1       61465 1       00006 1       62226 0       31467 0       12236 0       42002 0       61467 0
31,2230        12240 1       40131 0       61465 1       00006 1       62241 1       32003 0       53466 0       34737 0

31,2240        55606 1       03677 1       00006 1       31466 1       55620 0       53613 0       00006 1       41470 1
31,2250        21613 0       41612 0       61606 0       55614 1       54055 0       34750 1       00006 1       05014 1
31,2260        30025 0       55617 1       31762 0       54130 1       41010 0       62452 0       00006 1       12274 0
31,2270        31234 0       54130 1       35003 1       12275 1       35000 1       54002 1       00006 1       74746 1

31,2300        22131 1       40130 1       60025 0       62004 1       74357 0       22007 0       00006 1       10002 1
31,2310        00006 1       71612 1       60000 1       53611 1       11612 1       64753 1       12320 0       64753 1
31,2320        00006 1       71612 1       00006 1       10131 0       22007 0       21611 1       01607 1       34737 0
31,2330        55606 1       44755 0       55620 0       55612 1       00006 1       23607 1       12251 1       00006 1

31,2340        22130 0       52155 1       07106 1    C: 01243 0       07106 1    C: 02005 0       07262 0       30154 1
31,2350        00006 1       12354 0       34733 1       00130 0       52156 1       00130 0    C: 04143 0    C: 17777 0
31,2360     C: 35074 1       12573 0       12573 0       12556 1       12547 1       12753 0       12763 0       12654 0
31,2370        12763 0       13026 1       13026 1       13026 1       13503 0       13225 0       13212 1       13212 1
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OCTAL LISTING FOR PARAGRAPH # 165,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,2400        13400 1      13275 0      13316 1      13324 0      13437 0      13442 1      13471 1      13672 0
31,2410        13674 0      13674 0   C: 00000 1   C: 00000 1   C: 00034 0   I: 77776 1      34752 0      55647 1
31,2420        12531 0      55647 1      12753 0      05353 1   C: 00035 1      30101 1      74744 0      00006 1
31,2430        13431 0      05353 1   C: 05023 0   C: 20000 0      41010 0      62452 0      00006 1      12522 1

31,2440        34737 0      00006 1      02031 1      10000 0      12527 1      31746 0      00006 1      12527 1
31,2450        03677 1      05311 1   C: 00102 1      00006 1      31474 1      53645 0      06042 1   I: 41535 1
31,2460     C: 01457 0   I: 41535 1   C: 01455 1   I: 55535 1   C: 01453 1   I: 43161 0   C: 25532 1   C: 00463 0
31,2470     C: 26621 0   C: 01254 0   I: 77676 0   C: 27764 1   C: 06524 1   C: 17767 1   C: 02540 1   C: 17757 1

31,2500     C: 01234 0   C: 03760 0   I: 77776 1      34755 1      55620 0      55610 0      55611 1      34752 0
31,2510        55647 1      55621 1      55346 0      04616 1   C: 40166 1      05516 0   C: 00311 1      05516 0
31,2520     C: 00143 1      13503 0      30075 0      74740 1      00006 1      12456 0      13503 0      34755 1
31,2530        55746 1      00006 1      31625 1      53574 1      03677 1      00006 1      31561 1      53625 0

31,2540        00006 1      31643 1      53553 1      11623 0      12573 0      51346 1      12362 0      05311 1
31,2550     C: 00101 1      34755 1      55647 1      05516 0   C: 00311 1      12573 0      05311 1   C: 00100 0
31,2560        31425 0      27552 0      00004 0      06022 1      34740 0      00006 1      05013 0      33707 1
31,2570        55343 0      05516 0   C: 00143 1      06042 1   I: 45345 1   C: 03625 0   C: 03574 1   I: 41461 1

31,2600     C: 21214 0   I: 47361 0   C: 03635 1   C: 02325 1   I: 47045 0   C: 03635 1   C: 21727 0   I: 76561 1
31,2610     C: 02333 0   C: 17545 0   I: 77776 1      52155 1      21553 1      03677 1      00006 1      31553 0
31,2620        53643 0      03643 0      37721 1      05146 1      06042 1   I: 53375 0   C: 03545 0   C: 02635 0
31,2630     C: 03635 1   I: 77646 0   C: 02333 0   I: 77776 1      03677 1      35014 1      54003 0      34755 1

31,2640        55634 0      55635 1      55636 1      55637 0      55640 0      55641 1      35016 0      54003 0
31,2650        34736 1      05146 1      51346 1      12366 1      30102 1      74746 1      00006 1      12763 0
31,2660        31666 0      00006 1      12763 0      00004 0      31446 0      55554 0      31445 0      55556 1
31,2670        03677 1      34755 1      55446 1      55445 1      55555 1      55557 0      30120 1      54166 1

31,2700        06042 1   I: 52375 1   C: 03635 1   C: 03521 1   I: 41434 1   C: 21727 0   I: 76435 1   C: 02154 0
31,2710     I: 65361 0   C: 03555 1   C: 03557 0   I: 52361 1   C: 02154 0   I: 41455 0   I: 45345 1   C: 00001 0
31,2720     C: 05660 1   I: 71240 1   C: 62725 0   C: 05660 1   C: 00001 0   I: 45345 1   C: 03635 1   C: 03521 1
31,2730     I: 74271 0   C: 00001 0   I: 53455 0   C: 03521 1   I: 76561 1   C: 02333 0   C: 03545 0   I: 77776 1

31,2740        03677 1      00006 1      31545 1      53635 1      00006 1      31547 0      53637 0      00006 1
31,2750        31551 1      53641 1      12763 0      06042 1   I: 64375 1   C: 00025 0   C: 01734 0   I: 53362 0
31,2760     C: 03253 0   C: 03527 1   I: 77776 1      06042 1   I: 47375 0   C: 03521 1   C: 02325 1   I: 70455 1
31,2770     C: 03527 1   C: 02265 1   I: 77721 0   C: 02575 1   C: 27627 1   C: 03521 1   I: 41451 1   C: 03635 1
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OCTAL LISTING FOR PARAGRAPH # 166, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3000     I: 76521 0   C: 02575 1   C: 02627 0   I: 77646 0   C: 26617 0   I: 50234 1   C: 21727 0   C: 02146 0
31,3010     I: 77776 1      30120 1      54166 1      30154 1      60000 1      04616 1   C: 61663 0      63713 1
31,3020        61356 0      00006 1      73712 1      55667 0      51346 1      12372 1      03636 1   I: 77743 1
31,3030     C: 02431 0   C: 23571 0   C: 02427 1   C: 17567 0   C: 03633 1   I: 42605 1   C: 05656 1   C: 02425 0

31,3040     C: 23565 0   C: 02407 0   I: 41225 1   C: 02633 0   C: 05654 0   C: 03563 1   I: 77776 1      34744 1
31,3050        55572 1      00006 1      31643 1      52155 1      34752 0      54001 1      33705 0      03512 1
31,3060        51346 1      12410 1      00006 1      30155 0      53643 0      03643 0      41642 1      61426 0
31,3070        64733 1      54001 1      40001 1      60001 0      22007 0      00006 1      11642 1      54130 1

31,3100        00006 1      70000 0      54131 0      60130 0      56131 1      60131 1      54154 0      60131 1
31,3110        50120 1      54032 1      60131 1      50120 1      54034 1      60130 0      64733 1      60131 1
31,3120        60131 1      50120 1      54036 0      34755 1      54163 1      03636 1   I: 65361 0   C: 03627 1
31,3130     C: 00035 1   I: 62757 0   C: 02411 1   C: 02403 1   I: 70251 0   C: 02627 0   C: 03643 0   I: 74342 1

31,3140     C: 00033 1   I: 53255 0   I: 74341 1   C: 03643 0   C: 05656 1   I: 73725 0   C: 00037 0   C: 02417 1
31,3150     I: 77655 1   I: 76505 0   C: 02575 1   I: 70315 1   C: 01236 1   C: 05652 0   I: 45445 0   C: 74524 1
31,3160     I: 77646 0   C: 17464 1   C: 03253 0   I: 65316 0   C: 03255 0   I: 65316 0   C: 05650 1   I: 63471 0
31,3170     C: 01244 1   I: 45225 0   I: 71244 0   C: 63175 1   C: 06524 1   I: 43366 0   C: 03257 1   I: 44244 0

31,3200     C: 63203 0   C: 03257 1   C: 03257 1   I: 77776 1      03677 1      31346 1      55621 1      25623 1
31,3210        51346 1      12376 0      51346 1      31423 0      61642 0      00006 1      63225 1      03677 1
31,3220        31621 0      64753 1      55346 0      34755 1      55623 0      35014 1      54003 0      00006 1
31,3230        51346 1      52413 0      31435 1      24006 1      24006 1      61642 0      56001 0      61642 0

31,3240        10000 0      10001 1      13273 0      13273 0      13245 0      03636 1   I: 53575 0   C: 03635 1
31,3250     C: 16575 1   C: 03643 0   I: 74203 0   C: 02433 1   C: 02265 1   I: 77655 1   C: 03635 1   I: 47051 0
31,3260     C: 03521 1   C: 21727 0   I: 47035 1   C: 03635 1   C: 21727 0   C: 26603 0   C: 02575 1   I: 76435 1
31,3270     C: 02603 0   C: 02611 0   I: 77776 1      51621 0      12402 1      06042 1   I: 47175 1   C: 03253 0

31,3300     C: 21727 0   I: 74361 0   C: 03423 1   C: 22001 0   C: 03253 0   I: 77776 1      11647 1      12421 0
31,3310        11646 0      13314 0      05567 0   C: 01412 1      04635 0   C: 65104 1      06042 1   I: 77775 1
31,3320     C: 03537 0   C: 03261 1   I: 77776 1      13400 1      06042 1   I: 52375 1   C: 03635 1   C: 03521 1
31,3330     I: 77634 0   C: 21727 0   C: 03261 1   I: 50235 0   C: 02146 0   C: 02603 0   I: 77776 1      40154 0

31,3340        63714 0      64733 1      54130 1      40130 1      26130 1      43715 0      60154 1      64733 1
31,3350        54131 0      40131 0      26131 0      34751 0      76245 0      54002 1      35014 1      54003 0
31,3360        30130 0      00006 1      50002 0      71610 0      24006 1      50002 0      53661 0      00006 1
31,3370        70131 0      50002 0      21661 0      10002 1      13354 1      31773 0      55677 1      24006 1
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OCTAL LISTING FOR PARAGRAPH # 167,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

31,3400        30076 0      74741 0      00006 1      13411 1      30121 0      00006 1      13421 1      05567 0
31,3410     C: 01410 0      34737 0      00006 1      02031 1      00006 1      13426 0      04616 1   C: 40166 1
31,3420        13426 0      32144 1      06042 1   I: 77624 1   C: 61100 1   I: 77776 1      00006 1      34755 1
31,3430        52756 1      40104 0      74742 0      00006 1      15155 1      51621 0      12404 1      33716 1

31,3440        04616 1   C: 20466 1      31666 0      00006 1      13465 1      40102 0      74746 1      00006 1
31,3450        13467 0      33717 0      04616 1   C: 20460 1      16001 1      13457 0      13442 1      34755 1
31,3460        55446 1      55445 1      05504 0   C: 00143 1      15155 1      05516 0   C: 00143 1      33717 0
31,3470        13440 0      33720 1      04616 1   C: 20460 1      16001 1      13477 1      13477 1      00004 0

31,3500        04616 1   C: 40154 0      15155 1      11647 1      13510 1      06042 1   I: 77650 1   C: 65272 0
31,3510        04635 0   C: 65300 1      00006 1      22132 1      54117 1      52160 1      33635 1      54141 1
31,3520        54161 0      10160 1      54162 0      34755 1      54163 1      00006 1      30155 0      52127 1
31,3530        50157 1      30005 1      07312 0      04713 0   C: 01226 0      52155 1      52125 0      00006 1

31,3540        50117 0      30004 0      52155 1      30160 0      54140 0      64753 1      07321 0      00006 1
31,3550        50117 0      30002 0      52155 1      50141 0      52004 1      44752 1      26117 1      44752 1
31,3560        26141 1      10140 0      13544 0      00006 1      30127 0      52155 1      00006 1      30162 1
31,3570        07220 0      30006 1      30127 0      52155 1      52131 0      00006 1      30160 0      07220 0

31,3600        04713 0   C: 30353 1      00006 1      40155 1      20127 1      04713 0   C: 01226 0      00006 1
31,3610        40125 0      20155 1      30163 0      74750 0      10000 0      00132 1      24163 0      10154 0
31,3620        13563 0      13623 1      13627 0      10155 1      13563 0      13627 0      13627 0      52127 1
31,3630        52155 1      30163 0      54156 1      50132 1      10002 1   C: 00147 0      51346 1      42413 1

31,3640        50120 1      54046 1      16042 0      31642 0      00006 1      74750 0      53476 1      35014 1
31,3650        54003 0      31470 0      24006 1      24006 1      61642 0      00006 1      73711 1      63706 0
31,3660        64735 1      54001 1      40001 1      60001 0      63710 1      64733 1      55666 1      41666 1
31,3670        27666 1      30002 0      05642 1   C: 21406 0      05567 0   C: 01406 1      13411 1      35007 0

31,3700        56003 1      52002 1      55442 0      22003 1      00000 1   C: 01565 0   C: 77630 1   C: 00155 0
31,3710     C: 00143 1   C: 75340 1   C: 00264 1   C: 00056 1   C: 01542 0   C: 01022 0   C: 01477 1   C: 01500 0
31,3720     C: 01474 1   C: 03721 0   C: 03722 0 CKSM 66356 1         @            @            @            @
31,3730           @            @            @            @            @            @            @            @

31,3740           @            @            @            @            @            @            @            @
31,3750           @            @            @            @            @            @            @            @
31,3760           @            @            @            @            @            @            @            @
31,3770           @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 170,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2000     C: 00044 1   C: 70123 0   C: 40702 0   C: 13337 1   C: 10776 0      34737 0      70077 0      10000 0
32,2010        02017 0      05567 0   C: 00220 1      05472 0      00006 1      30014 1      53421 0      00006 1
32,2020        31421 1      53 51 0      32172 1      04616 1   C: 20334 1      05472 0      02036 0      44746 1
32,2030        60154 1      00006 1      12014 1      00006 1      31051 1      02016 1      06042 1   I: 77614 1

32,2040     C: 01076 1   I: 77414 0   C: 02076 1      32172 1      04616 1   C: 20621 0      06042 1   I: 77634 0
32,2050     C: 21574 1   C: 34041 0   C: 27056 1   I: 77624 1   C: 64132 0   C: 16201 0   C: 00015 0   C: 34041 0
32,2060     C: 27042 1   I: 77624 1   C: 64132 0   C: 16207 0   C: 00015 0   I: 56225 1   C: 02021 0   C: 24175 1
32,2070     C: 02215 0   I: 77776 1      34753 1      54333 0      32176 0      04616 1   C: 01736 1      31321 0

32,2100        54333 0      34744 1      70074 0      10000 0      02122 1      11301 0      12111 0      12115 1
32,2110        12111 0      34363 0      04616 1   C: 01736 1      12105 0      04616 1   C: 16705 1      04616 1
32,2120     C: 17707 1      02122 1      05516 0   C: 00054 0      32173 0      04616 1   C: 20342 0      15472 1
32,2130        15472 1      05472 0   I: 64375 1   C: 00025 0   C: 01734 0   I: 72561 0   C: 24202 1   I: 53255 0

32,2140     C: 24204 1   C: 24212 0   I: 77634 0   C: 21773 1   C: 24025 0   C: 00017 1   I: 74321 1   C: 01734 0
32,2150     C: 24200 0   I: 53212 0   C: 24204 1   I: 47055 1   C: 24212 0   C: 21773 1   I: 77750 0   C: 00024 1
32,2160     I: 72130 0   C: 00155 0   C: 00026 0   I: 72130 0   C: 00160 0   C: 00030 1   I: 43530 0   C: 00162 1
32,2170     C: 00216 1   C: 14400 0   C: 01420 0   C: 14420 1   C: 03100 0   C: 00000 1   C: 03720 1   C: 15077 0

32,2200     C: 05041 1   C: 24402 1   C: 25724 1   C: 00000 1   C: 60000 1   C: 00000 1   C: 60000 1   C: 00000 1
32,2210     C: 60000 1   C: 00000 1   C: 37777 1   C: 00000 1   C: 37777 1   C: 00000 1   C: 37777 1   I: 77624 1
32,2220     C: 27410 1   I: 77745 1   C: 03442 0   C: 03661 0   C: 00041 1   I: 43014 0   C: 01674 0   C: 01673 1
32,2230     I: 43014 0   C: 01676 1   C: 01675 1   I: 77624 1   C: 27133 0   I: 77624 1   C: 11210 1   I: 77775 1

32,2240     C: 00017 1   C: 17631 0   C: 00015 0   C: 34041 0   C: 27410 1   I: 43014 0   C: 01474 1   C: 01673 1
32,2250     I: 43014 0   C: 01676 1   C: 02756 1   C: 64257 0   I: 43014 0   C: 01476 0   C: 01475 0   I: 77624 1
32,2260     C: 27133 0   I: 77624 1   C: 11210 1   I: 77775 1   C: 00025 0   C: 25761 0   C: 00017 1   C: 01101 0
32,2270     I: 53435 0   C: 01761 0   C: 24025 0   C: 03631 0   I: 53435 0   C: 00025 0   C: 27637 0   C: 01101 0

32,2300     I: 50256 0   C: 03637 0   I: 77752 1   C: 02732 0   I: 44316 0   C: 06514 1   I: 77766 0   C: 26730 1
32,2310     C: 01101 0   C: 26655 0   C: 01761 0   I: 77676 0   C: 02744 1   I: 45014 0   C: 03666 1   C: 24732 1
32,2320     I: 77676 0   C: 03645 0   I: 77745 1   C: 00037 0   C: 27663 1   C: 03645 0   I: 77646 0   C: 24025 0
32,2330     C: 00001 0   C: 03653 1   I: 53435 0   C: 03631 0   I: 53435 0   C: 03653 1   I: 76561 1   C: 00025 0

32,2340     C: 37665 0   C: 11210 1   I: 77624 1   C: 27410 1   I: 44345 0   C: 03663 1   C: 03661 0   C: 25517 0
32,2350     C: 03653 1   C: 01535 0   C: 25503 0   C: 03665 1   C: 35511 1   C: 27705 0   I: 45174 1   C: 00002 0
32,2360     C: 26660 0   I: 77624 1   C: 27417 0   I: 77776 1      04616 1   C: 50040 0      04645 1      55737 1
32,2370        05516 0   C: 00120 1      00004 0      34751 0      00306 1      02033 0      54001 1      44751 1
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OCTAL LISTING FOR PARAGRAPH # 171, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,2400      70110 0     60001 0     54110 0     00003 1     04616 1  C: 53112 0     04616 1  C: 17705 0
32,2410      12543 0     00004 0     53105 0     52162 0     53101 1     53747 0     00006 1     30034 0
32,2420      52160 1     30032 0     54156 1     00006 1     30025 0     52155 1     00006 1     30036 1
32,2430      53107 1     00003 1     04616 1  C: 53114 0     04616 1  C: 17705 0     02537 1     00004 0

32,2440      00006 1     31331 1     53761 1     52162 0     53755 0     52160 1     53460 0     00006 1
32,2450      31107 0     53753 0     30156 0     55461 1     06042 1  C: 14025 0  C: 03747 0  I: 57261 0
32,2460   C: 20217 1  C: 24002 0  C: 03751 1  I: 47135 0  C: 01107 0  C: 21577 1  C: 03734 1  I: 47135 0
32,2470   C: 01110 0  C: 21577 1  C: 17736 0  C: 01101 0  I: 66405 0  C: 24004 0  C: 37757 0  C: 46041 0

32,2500   C: 17741 0  C: 00025 0  C: 34041 0  C: 51256 1  I: 77776 1     31457 0     54765 1     31460 1
32,2510      54767 0     31461 0     54771 1     06042 1  I: 45175 0  C: 01101 0  C: 47653 1  I: 77641 1
32,2520   C: 03741 0  I: 65552 0  C: 01045 1  I: 50025 0  C: 24547 1  C: 64532 1  I: 77776 1     34752 0
32,2530      54154 0     12535 1  I: 77776 1     34755 1     54154 0     31737 0     04640 1     30101 1

32,2540      74742 0     10000 0     12404 1     34753 1     54154 0     02535 0  C: 00210 1  C: 21042 1
32,2550      34753 1     55106 0     34756 1     10000 0     54002 1     11106 0     12564 0     00006 1
32,2560      50002 0     31761 0     50002 0     21101 1     00006 1     50002 0     31101 0     50002 0
32,2570      52156 1     11106 0     12600 1     00006 1     50002 0     31761 0     50002 0     20156 1

32,2600      10002 1     12553 1     52156 1     52155 1     32776 0     54120 0     04713 0  C: 01023 1
32,2610      07535 0     11106 0     12614 1     12630 1     00004 0     00006 1     30036 1     53767 1
32,2620      30033 1     54765 1     30034 0     54767 0     30032 0     54771 1     04616 1  C: 47617 1
32,2630      46250 1     04616 1  C: 47677 1     11106 0     12636 1     12703 0     00004 0     55106 0

32,2640      31766 1     05032 0     54166 1     41766 0     05033 1     54163 1     00006 1     70124 1
32,2650      52155 1     31767 0     05033 1     55766 0     00006 1     70166 1     00006 1     70122 1
32,2660      20155 1     31767 0     05032 0     55767 1     00006 1     70166 1     00006 1     70126 0
32,2670      20155 1     00006 1     30155 0     20155 1     10000 0     34736 1     12677 1     00006 1

32,2700      05012 1     00003 1     12552 0     31767 0     00006 1     70122 1     53107 1     41766 0
32,2710      00006 1     70126 0     21107 1     40163 1     00006 1     71766 0     00006 1     70122 1
32,2720      52155 1     30166 0     00006 1     70124 1     20155 1     40163 1     00006 1     71767 1
32,2730      00006 1     70126 0     20155 1     30154 1     00006 1     72777 0     55354 0     31106 1

32,2740      00006 1     72777 0     55355 1     34750 1     00006 1     02033 0     00004 0     00006 1
32,2750      12754 1     04616 1  C: 52317 0     12772 0     44742 0     70110 0     54110 0     44752 1
32,2760      00006 1     03012 1     34743 0     26077 0     11055 1     44776 1     64777 1     05203 0
32,2770   C: 03401 1  C: 50067 0     44740 1     70076 1     54076 1     15155 1  C: 00052 0  C: 56655 1
```

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OCTAL LISTING FOR PARAGRAPH # 172,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3000        05353 1     C: 04024 0        04616 1     C: 11233 0        33255 0        55455 0        32000 0        55250 0
32,3010        34751 0        55515 0        44753 0        55346 0        34755 1        55623 0        44736 0        00006 1
32,3020        03012 1        06042 1     I: 43014 0     C: 02663 0     C: 03271 0     I: 43014 0     C: 05660 1     C: 03067 0
32,3030     I: 43014 0     C: 00266 [illegible]     C: 00270 1     I: 77201 1     C: 00001 0     C: 02023 1     I: 41525 0     C: 02401 0

32,3040     C: 37625 1     C: 55716 1     I: 64312 0     C: 01734 0     C: 37635 0     C: 71343 0     I: 45345 1     C: 02401 0
32,3050     C: 25262 0     C: 34041 0     C: 27056 1     I: 77331 0     C: 03647 1     C: 00050 1     C: 06522 1     C: 26575 1
32,3060     C: 06520 0     C: 26603 0     C: 06516 0     C: 16611 0     C: 25260 1     C: 27665 1     C: 06524 1     C: 17253 0
32,3070     C: 06524 1     C: 03643 0     I: 77745 1     C: 00015 0     C: 27561 0     C: 00017 1     I: 64312 0     C: 01734 0

32,3100     C: 37521 0     C: 67067 1     C: 35236 0     C: 62415 0        55646 0        06042 1     I: 57345 1     C: 03627 1
32,3110     C: 02501 1     I: 44232 1     C: 03633 1     I: 45325 1     C: 02477 1     C: 02633 0     I: 65222 0     C: 02631 1
32,3120     I: 57316 1     C: 02503 0     I: 65232 1     C: 02627 0     I: 57225 0     C: 02475 0     C: 02501 1     I: 51515 1
32,3130     C: 03627 1     I: 57225 0     C: 02473 0     C: 02505 0     I: 43215 0     I: 56215 1     I: 77661 0     C: 21613 0

32,3140     I: 43206 1     C: 03561 0     C: 14041 1     I: 45246 0     C: 25264 0     I: 45040 1     C: 65165 0     C: 27410 1
32,3150     I: 43014 0     C: 01473 0     C: 00063 1     I: 77745 1     C: 03561 0     C: 25517 0     C: 00017 1     C: 25535 0
32,3160     C: 00025 0     C: 35543 0     C: 27106 0     I: 77650 1     C: 65072 1     I: 54335 0     C: 03423 1     C: 20617 0
32,3170     I: 77621 1     C: 00041 1     C: 27442 0     C: 03527 1     I: 53435 0     C: 03521 1     I: 72441 0     C: 03635 1

32,3200     C: 26617 0     C: 03253 0     C: 02621 0     I: 77776 1        05353 1     C: 04024 0        44362 0        04616 1
32,3210     C: 74670 0        15155 1        06042 1     I: 47131 1     C: 02747 1     C: 65217 0     C: 31127 1     I: 53575 0
32,3220     C: 02621 0     C: 27773 1     C: 06522 1     C: 03765 0     I: 77776 1        35016 0        54003 0        00004 0
32,3230        04674 0     C: 40143 0        00003 1        04616 1     C: 54123 0        05353 1     C: 04024 0        34746 0

32,3240        00006 1        02033 0        00006 1        13251 0        33256 0        04616 1     C: 20624 0        16001 1
32,3250        13237 0        04616 1     C: 67701 0        04635 0     C: 74130 0     C: 02100 1     C: 00500 1     C: 00035 1
32,3260     C: 30373 0     C: 00[illegible]4 0     C: 01610 1     C: 00000 1     C: 00010 0        37713 0        05105 0     C: 03305 1
32,3270     C: 64067 1        15261 0     I: 52375 1     C: 02511 0     C: 03627 1     I: 52141 1     C: 02517 0     C: 63151 1

32,3300        05353 1     C: 00303 1        34777 1        05173 1     C: 03265 0        00004 0        34755 1        57746 0
32,3310        00006 1        71756 0        21645 0        00006 1        30040 0        53764 1        52071 0        30041 1
32,3320        57765 1        56072 1        00006 1        30025 0        53762 1        31763 1        61157 0        54154 0
32,3330        31764 0        61160 1        54157 0        31765 1        61161 0        54161 0        41763 0        61253 1

32,3340        60070 0        55766 0        41764 1        61254 0        60071 1        55770 1        41765 0        61255 1
32,3350        60072 1        55772 0        34755 1        54155 1        54160 1        54162 0        55253 0        55254 1
32,3360        55255 0        44753 0        54163 1        06042 1     I: 65361 0     C: 26022 0     C: 03762 1     I: 77625 0
32,3370     C: 01234 0     C: 00037 0     I: 63271 0     C: 27110 1     C: 01236 1     I: 74251 1     C: 02621 0     I: 53352 0
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OCTAL LISTING FOR PARAGRAPH # 173, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

32,3400     C: 03527 1   I: 45455 1   C: 53746 1   C: 03521 1   I: 77656 1   C: 00017 1   I: 72441 0   C: 00031 0
32,3410     C: 17474 0   C: 00037 0   I: 41261 1   C: 20214 1   C: 03474 0   I: 45215 0   C: 00045 0   C: 02333 0
32,3420     C: 17775 1   C: 03474 0   I: 56221 0   C: 03645 0   C: 02541 0   I: 51515 1   C: 01236 1   I: 60471 0
32,3430     C: 05652 0   C: 00025 0   I: 77615 0   I: 45115 0   C: 06522 1   C: 47663 1   I: 77641 1   C: 00017 1

32,3440     C: 00027 1   I: 45465 1   C: 50313 0   C: 03767 1   I: 53361 0   C: 26022 0   C: 02621 0   I: 65246 1
32,3450     C: 03762 1   I: 65225 1   C: 03760 0   C: 03762 1   C: 17760 0   I: 55271 0   C: 25530 0   I: 41325 0
32,3460     C: 03611 1   C: 25527 0   I: 56271 0   C: 01244 1   C: 22006 1   I: 65215 1   C: 00001 0   C: 00025 0
32,3470     I: 45271 1   C: 00027 1   I: 43205 1   C: 02543 1   C: 03464 1   I: 56325 0   C: 02547 0   C: 01244 1

32,3500     I: 56325 0   C: 02545 1   C: 01244 1   I: 44206 0   C: 00003 1   I: 71240 1   C: 65514 1   I: 41545 0
32,3510     I: 51021 0   C: 00003 1   C: 65514 1   I: 77745 1   I: 77745 1   I: 77601 0   C: 00003 1   C: 17464 1
32,3520     I: 77776 1      52155 1      04616 1   C: 62147 1      04616 1   C: 63431 1   C: 00001 0   C: 00000 1
32,3530     C: 04000 0   C: 00000 1   C: 05075 0      34751 0      55515 0      33743 1      55455 0      06042 1

32,3540     I: 43014 0   C: 04665 0   C: 04265 1   I: 43014 0   C: 03670 0   C: 06464 1   I: 45014 0   C: 04462 0
32,3550     C: 61071 0   I: 77776 1      05321 1   C: 00106 0      13667 1      06047 1   I: 77624 1   C: 65716 1
32,3560     I: 54345 1   C: 34003 0   C: 20205 1   I: 77665 1   C: 01244 1   C: 16271 1   C: 01244 1   I: 70471 1
32,3570     C: 16015 1   C: 03635 1   C: 03637 0   C: 03641 1   I: 77665 1   C: 25742 1   C: 16263 1   C: 34015 1

32,3600     C: 02267 0   I: 57535 0   C: 26002 1   I: 77702 1   C: 36265 0   C: 60275 1   I: 77745 1   C: 02567 1
32,3610     C: 36273 1   C: 57313 1   I: 45246 0   C: 02565 0   I: 75240 0   C: 65620 0   C: 02335 0   C: 03633 1
32,3620     I: 45345 1   C: 03633 1   C: 02335 0   I: 77661 0   C: 20606 0   C: 03643 0   I: 45014 0   C: 04461 0
32,3630     C: 71554 0   I: 51025 1   C: 02561 1   C: 65637 0   I: 52175 0   C: 02551 1   C: 65642 1   I: 43175 0

32,3640     C: 02555 0   C: 04470 0   C: 16621 0   C: 03631 0   C: 02625 1   I: 77414 0   C: 04471 1      03725 1
32,3650        05353 1   C: 04024 0      05504 0   C: 00216 1      04616 1   C: 73707 0      03725 1      35027 1
32,3660        05146 1      00006 1      33745 1      53252 1      05353 1   C: 00004 0      15155 1      05516 0
32,3670     C: 00215 1      36000 1      55250 0      06042 1   I: 77624 1   C: 60251 1   I: 45014 0   C: 04707 0

32,3700     C: 65704 1   C: 65716 1   I: 77650 1   C: 65606 1   I: 72545 0   C: 03517 1   C: 03502 0   I: 77776 1
32,3710        05353 1   C: 04024 0      00006 1      31502 1      53517 1      13654 1   I: 45234 0   C: 21574 1
32,3720     C: 03442 0   I: 77661 0   C: 20214 1   C: 03517 1   I: 77616 0      34737 0      54055 0      34750 1
32,3730        00006 1      05014 1      00002 0   C: 00000 1   C: 01750 1   C: 00021 1   C: 33400 0   C: 11021 1

32,3740     C: 00000 1   C: 00507 0   C: 25605 0   C: 02114 1   C: 03372 1   C: 70067 1      05353 1   C: 00035 1
32,3750        15155 1   C: 03751 1   C: 03752 1 CKSM 61554 1       @            @            @            @
32,3760           @            @            @            @            @            @            @            @
32,3770           @            @            @            @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 174,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2000     C: 41545 0   C: 42341 1   C: 61000 0   C: 71210 1   C: 00000 1   C: 00000 1   C: 72333 1   C: 45546 1
33,2010     C: 65363 1   C: 64451 0   C: 21241 0   C: 03216 1   C: 30153 0   C: 23101 0   C: 63105 0   C: 61733 1
33,2020     C: 01507 1   C: 00321 1   C: 26706 1   C: 00150 0   C: 33343 0   C: 02630 0   C: 25010 1   C: 24402 1
33,2030     C: 26003 0   C: 61377 0   C: 55754 1   C: 77644 1   C: 65556 1   C: 64453 1   C: 55670 0   C: 00002 0

33,2040     C: 11777 0   C: 01023 1   C: 37155 1   C: 00065 1   C: 06244 0      40110 0      74742 0      00006 1
33,2050        12123 1      00004 0      26110 0      44736 0      00006 1      03012 1      44740 1      70076 1
33,2060        54076 1      44753 0      70074 0      54074 0      04616 1   C: 52167 0      34740 0      70110 0
33,2070        10000 0      12104 1      35031 0      05072 1   C: 02113 0   C: 66067 0      44742 0      70110 0

33,2100        54110 0      34736 1      26110 0      12573 0      34753 1      05203 0   C: 03604 0   C: 52067 1
33,2110        34741 1      26110 0      12573 0      34753 1      05203 0   C: 02202 0   C: 52067 1      04616 1
33,2120     C: 17705 0      15155 1      15155 1      00006 1      41234 1      52155 1      00006 1      30025 0
33,2130        20155 1      54163 1      30155 0      00006 1      74740 1      52155 1      06042 1   I: 52315 1

33,2140     C: 01726 0   C: 03527 1   I: 74325 0   I: 52255 1   C: 01720 0   C: 03521 1   I: 77414 0   C: 01043 1
33,2150     C: 66152 1      12573 0   C: 25101 0   C: 00001 0   I: 77761 1   C: 26177 1   C: 01761 0   I: 77414 0
33,2160     C: 01263 1      40074 0      74753 0      00006 1      12573 0      00004 0      26074 0      11055 1
33,2170        44776 1      64777 1      05203 0   C: 03357 0   C: 50067 0      12573 0   C: 00006 1   C: 10000 0

33,2200     C: 75751 0   C: 41775 1   C: 00022 1   C: 07212 1   C: 00007 0   C: 16100 1      05353 1   C: 16035 0
33,2210     C: 20000 0   C: 02217 1   C: 66067 0      37721 1      55074 1      04616 1   C: 15271 1      06042 1
33,2220     I: 51575 1   C: 00325 0   I: 77776 1      30154 1      55245 1      00006 1      72020 0      53514 1
33,2230        00006 1      31244 1      53571 1      40104 0      74744 0      00006 1      12254 1      30106 0

33,2240        74737 1      10000 0      00006 1      32001 1      54002 1      00006 1      31514 0      00006 1
33,2250        10002 1      00006 1      71243 1      21571 1      32021 0      07312 0      52155 1      21510 0
33,2260        02440 0      04616 1   C: 47617 1      32414 1      04616 1   C: 20037 1      06042 1   I: 45014 0
33,2270     C: 03307 0   C: 66771 0   C: 66735 0   I: 77776 1      03512 1      02423 0      55157 1      55160 0

33,2300        55161 1      44741 0      70076 1      54076 1      34745 0      70103 1      10000 0      12342 1
33,2310        40102 0      74752 1      10000 0      12346 0      41250 0      61245 0      00006 1      62352 1
33,2320        40076 1      74741 0      26076 1      34753 1      55515 0      30106 0      74737 1      10000 0
33,2330        12375 0      34743 0      00006 1      02032 1      00006 1      12375 0      44736 0      70111 1

33,2340        54111 1      12400 0      44752 1      70102 0      54102 0      12375 0      40102 0      74752 1
33,2350        26102 0      12375 0      03512 1      11515 0      12366 1      10760 1      12400 0      05353 1
33,2360     C: 00374 1      37716 0      05072 1   C: 02575 1   C: 74067 0      12400 0      55570 0      03512 1
33,2370        31570 1      55515 0      00004 0      04674 0   C: 40166 1      40111 1      74736 0      26111 1
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OCTAL LISTING FOR PARAGRAPH # 175,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,2400       00003 1     34616 1  C: 40463 1     30167 1     75004 1     54166 1     22007 0     52121 1
33,2410       03512 1     00006 1     31252 0     52006 0  C: 02145 0  I: 77624 1  C: 66667 0  I: 77776 1
33,2420       32437 0     02424 1     05155 0     36007 0     00004 0     77752 1     54061 1     00006 1
33,2430       50061 0     31545 1     50061 0     53220 1     10061 1     12425 1     00002 0  C: 00022 1

33,2440       31155 1     54765 1     31156 1     54767 0     31154 0     54771 1     00002 0     05353 1
33,2450    C: 00051 0     37723 0     05105 0  C: 03634 0  C: 66067 0     40107 0     75015 1     26107 0
33,2460       12546 0  I: 77776 1     40107 0     74735 0     00006 1     12551 0     40107 0     74743 1
33,2470       00006 1     12506 1     00006 1     33113 1     52155 1     00006 1     31535 0     20155 1

33,2500       10000 0     12506 1     05504 0  C: 00311 1     05504 0  C: 00253 0     40107 0     74742 0
33,2510       00006 1     12545 0     40107 0     74751 1     00006 1     13115 0     40107 0     74741 0
33,2520       00006 1     12540 0     31642 0     61427 1     00006 1     62536 0     34741 1     56003 1
33,2530       54001 1     41545 0     22003 1     61430 1     00006 1     62447 1     34746 0     12541 1

33,2540       34745 0     03674 1     13115 0     05567 0  C: 00511 1     00004 0     43111 1     70107 0
33,2550       54107 0     03512 1     30077 1     75014 0     10000 0     12567 0     30110 1     72250 0
33,2560       10000 0     12567 0     30110 1     77713 1     10000 0     12573 0     12045 0     00004 0
33,2570       44742 0     70110 0     54110 0     06042 1  I: 51575 1  C: 03573 0  I: 45206 1  C: 02333 0

33,2600    C: 03535 1  C: 03775 1  I: 47075 0  C: 26026 1  C: 21613 0  C: 27742 0  C: 03537 0  I: 53435 0
33,2610    C: 03720 1  C: 27726 1  C: 03573 0  I: 60505 1  C: 01734 0  C: 27545 0  C: 03601 0  I: 76505 0
33,2620    C: 01734 0  C: 27553 1  C: 03537 0  I: 51435 1  C: 03601 0  I: 63552 0  I: 77671 1  I: 47075 0
33,2630    C: 26030 0  C: 21613 0  I: 77776 1     00004 0     31536 0     55743 1     31540 1     55744 0

33,2640       31542 0     55745 1     30154 1     55716 1     00006 1     31573 1     53521 1     00006 1
33,2650       31575 1     53523 0     00006 1     31577 0     53525 0     00006 1     31601 1     53527 1
33,2660       00006 1     31603 0     53531 0     00006 1     31605 0     53533 1     12275 1  I: 41456 0
33,2670    C: 03537 0  I: 67340 1  C: 02777 1  C: 03000 1  I: 50076 0  C: 66724 0  I: 50375 0  C: 06516 0

33,2700    C: 03537 0  I: 41552 0  I: 44316 0  C: 26766 1  I: 56325 0  C: 26040 1  C: 00043 0  C: 00041 1
33,2710    I: 41205 0  C: 26042 0  I: 65361 0  C: 03537 0  I: 41205 0  C: 26044 0  C: 00041 1  I: 76561 1
33,2720    C: 06516 0  I: 45455 1  C: 74256 0  I: 41455 0  I: 60345 0  C: 00043 0  C: 00050 1  I: 53663 1
33,2730    C: 26032 1  C: 56623 0  I: 45561 1  C: 74214 0  I: 77616 0  I: 61375 1  C: 00325 0  C: 01734 0

33,2740    I: 76561 1  C: 26022 0  C: 03527 1  I: 41562 0  I: 41455 0  C: 01236 1  I: 65255 0  C: 01226 0
33,2750    C: 01247 1  I: 74261 1  C: 20207 0  I: 44055 1  C: 01220 0  C: 00037 0  C: 37545 1  C: 66667 0
33,2760    I: 53255 0  I: 77655 1  C: 01226 0  C: 37553 0  C: 00037 0  C: 01463 1  C: 06315 0  C: 00010 0
33,2770    C: 00000 1  I: 41575 0  C: 02317 0  I: 65255 0  C: 01726 0  C: 01247 1  I: 74271 0  C: 26770 0
```

```
OCTAL LISTING FOR PARAGRAPH # 176,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3000     I: 77655 1   C: 01720 0   C: 37573 1   C: 67067 1   I: 53255 0   C: 01726 0   I: 77626 0   C: 74176 1
33,3010     I: 77776 1      03512 1      06042 1   I: 77775 1   C: 03563 1   C: 26317 0   C: 03573 0   C: 25720 0
33,3020     C: 03601 0   C: 01726 0   I: 77776 1      03512 1      06042 1   I: 74375 0   C: 00325 0   C: 26024 0
33,3030     I: 53206 0   C: 01236 1   I: 53206 0   C: 03527 1   I: 56325 0   C: 01247 1   C: 26770 0   I: 77761 1

33,3040     I: 77655 1   C: 03521 1   C: 37573 1   C: 67067 1   I: 53255 0   I: 77655 1   C: 03527 1   C: 03601 0
33,3050     I: 77646 0   C: 27472 0   C: 03537 0   I: 72441 0   C: 03601 0   C: 27474 0   C: 03573 0   I: 72435 0
33,3060     C: 02325 1   C: 17734 1   C: 00045 0   I: 77625 0   C: 02333 0   C: 37535 0   C: 66461 1   I: 77656 1
33,3070     C: 17537 0   C: 00043 0   I: 55261 1   C: 20207 0   C: 26036 0   I: 74205 0   C: 26770 0   C: 03537 0

33,3100     C: 03563 1   I: 77616 0   C: 00303 1   C: 00014 1   C: 20000 0   C: 00000 1   C: 00310 0   C: 00000 1
33,3110     C: 00620 0   C: 00110 1   C: 37767 0   C: 02200 1   C: 04445 0      34742 1      70107 0      10000 0
33,3120        12545 0      34750 1      70107 0      00006 1      13250 1      30120 1      54166 1      06042 1
33,3130     I: 61375 1   C: 02273 0   C: 02146 0   I: 72515 0   C: 03601 0   I: 50255 0   C: 03734 1   C: 00001 0

33,3140     I: 77405 0   C: 01352 1      40110 0      74743 1      00006 1      13150 1      31353 0      07312 0
33,3150        06042 1   I: 54215 0   C: 03655 1   C: 20210 0   I: 74205 0   C: 26011 0   I: 45241 1   C: 03537 0
33,3160     C: 03535 1   C: 03665 1   I: 77776 1      30107 1      74741 0      00006 1      13203 1      06042 1
33,3170     I: 45246 0   C: 02521 0   I: 45252 0   C: 03535 1   I: 77776 1      25670 1      06726 1      13520 1

33,3200        13520 1      05516 0   C: 00263 0      40107 0      74744 0      10000 0      13250 1      06042 1
33,3210     I: 40545 1   C: 03535 1   I: 77776 1      00006 1      31665 0      52155 1      07547 0      00006 1
33,3220        13222 1      13250 1      54156 1      40001 1      61420 0      00006 1      63250 0      00006 1
33,3230        71421 0      00006 1      11420 1      54135 1      07316 1      06042 1   I: 77752 1   I: 53361 0

33,3240     C: 03537 0   C: 03573 0   C: 37657 1   C: 67067 1   I: 77776 1      03512 1      34755 1      03474 0
33,3250        03512 1      40107 0      74745 1      10000 0      13454 0      41651 0      54001 1      26001 1
33,3260        60001 0      60001 0      50120 1      52047 0      34741 1      54003 0      31655 0      54765 1
33,3270        31656 0      54767 0      31654 1      54771 1      04616 1   C: 47617 1      30120 1      54166 1

33,3300        06042 1   I: 45173 0   C: 02231 0   C: 47675 0   I: 54325 1   C: 03653 1   C: 20215 0   I: 41403 0
33,3310     C: 51764 0   I: 77776 1      44753 0      54163 1      31657 1      22007 0      52155 1      31660 0
33,3320        22007 0      52160 1      31661 1      22007 0      52162 0      35016 0      54003 0      06042 1
33,3330     I: 65361 0   C: 26022 0   C: 02253 1   I: 56225 1   C: 01234 0   C: 27106 0   I: 76561 1   C: 01236 1

33,3340     I: 53255 0   C: 03527 1   I: 53352 0   C: 03734 1   I: 51406 1   I: 43202 0   C: 03372 1   C: 24025 0
33,3350     I: 44241 0   C: 00001 0   I: 51406 1   I: 77425 1   C: 00025 0      25672 0      06726 1      13535 0
33,3360        13535 0      05516 0   C: 00262 1      30107 1      74740 1      00006 1      13375 1      05516 0
33,3370     C: 00250 0      31651 1      67751 0      00006 1      13454 0      40107 0      74744 0      10000 0
```

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OCTAL LISTING FOR PARAGRAPH # 177,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS  EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

33,3400        13454 0      54155 1      31471 1      54130 1      31651 1      54131 0      35014 1      54003 0
33,3410        41527 1      60130 0      00006 1      63426 1      40130 1      61526 1      00006 1      63431 1
33,3420        00006 1      50131 1      71530 1      00006 1      11526 0      13432 0      50131 1      31533 0
33,3430        13432 0      34755 1      54154 0      44745 1      61010 1      00006 1      63441 0      31536 0

33,3440        54154 0      35016 0      54003 0      06042 1   I: 74205 0   I: 77655 1   C: 03601 0   C: 03657 0
33,3450     I: 77776 1      03512 1      36245 1      03474 0      03512 1      34747 1      70107 0      10000 0
33,3460        13467 0      41471 0      63114 0      00006 1      62545 1      05504 0   C: 00257 1      37723 0
33,3470        05072 1   C: 03556 1   C: 66067 0      12545 0      54130 1      00006 1      31657 1      50130 0

33,3500        53573 0      00006 1      31661 1      50130 0      53575 0      00006 1      31663 0      50130 0
33,3510        53577 1      00002 0      35007 0      56003 1      52002 1      55446 1      22003 1      00000 1
33,3520        41671 1      00006 1      13532 1      61670 1      77750 0      00006 1      13530 0      13532 1
33,3530        05504 0   C: 00263 0      31670 1      55671 1      13250 1      41673 0      00006 1      13547 0

33,3540        61672 0      77750 0      00006 1      13545 1      13547 0      05504 0   C: 00262 1      31672 0
33,3550        55673 0      11651 0      13454 0      05504 0   C: 00250 0      13454 0      34361 1      05203 0
33,3560     C: 03632 0   C: 70064 1      11651 0      13565 0      34752 0      60000 1      04616 1   C: 53116 1
33,3570        04616 1   C: 17705 0      13625 1      11675 0      13626 1      00004 0      00006 1      31101 0

33,3600        53653 1      34741 1      54003 0      00006 1      31653 0      53740 1      00006 1      31655 0
33,3610        53735 0      31656 0      55736 0      35016 0      54003 0      40107 0      74745 1      26107 0
33,3620        11651 0      13623 1      34752 0      55651 0      15155 1      34752 0      55675 0      13620 1
33,3630        00004 0      40107 0      75015 1      26107 0      04616 1   C: 53454 1      04616 1   C: 17705 0

33,3640        13653 0      37714 1      05146 1      03717 0      05504 0   C: 00256 0      05516 0   C: 00252 1
33,3650        05353 1   C: 00001 0      05155 0      33757 1      04616 1   C: 21563 1      13650 0      13662 1
33,3660        13670 1      05155 0      05504 0   C: 00261 1      34746 0      03674 1      03646 0      13641 0
33,3670        34745 0      03674 1      13641 0      13653 0      00006 1      02033 0      00006 1      16745 0

33,3700        16742 1      34645 1      55656 1      34752 0      55674 1      55675 0      34755 1      55670 0
33,3710        55672 1      55671 1      55673 0      55651 0      03720 1      31656 0      04640 1      34752 0
33,3720        56002 0      55650 1      35014 1      54003 0      00006 1      50002 0      31523 1      54771 1
33,3730        22765 0      34755 1      54767 0      35016 0      54003 0      06042 1   I: 45175 0   C: 06520 0

33,3740     C: 47653 1   C: 20237 0   C: 06522 1   I: 77624 1   C: 47673 0   C: 02245 0   I: 76435 1   C: 02237 0
33,3750     C: 26231 0   C: 26003 0   I: 77624 1   C: 47673 0   C: 02273 0   I: 77776 1      01650 0   C: 00523 0
33,3760     C: 03760 0   C: 03761 1 CKSM 65026 0        @            @            @            @            @
33,3770          @            @            @            @            @            @            @            @
```

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OCTAL LISTING FOR PARAGRAPH # 200,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2000      I: 71220 1   C: 03632 0   C: 03442 0   C: 34041 0   C: 27056 1   I: 67175 0   C: 00001 0   C: 02777 1
34,2010      C: 03642 1   I: 57456 1   C: 27656 1   C: 00007 0   C: 03650 1   I: 53435 0   C: 03642 1   I: 66001 0
34,2020      C: 00001 0   C: 02776 0   I: 47206 0   C: 03656 1   I: 63372 1   I: 63315 0   C: 03656 1   C: 03434 1
34,2030      I: 76505 0   C: 00001 0   C: 03656 1   I: 77646 0   C: 27664 0   C: 03642 1   I: 53315 0   C: 03650 1

34,2040      C: 03656 1   I: 77624 1   C: 46341 0   I: 77624 1   C: 46451 0   I: 77624 1   C: 45636 0   C: 16321 0
34,2050      C: 00005 1   I: 77624 1   C: 46451 0   I: 77624 1   C: 45636 0   C: 36317 1   C: 03632 0   C: 00000 1
34,2060      C: 00020 0   C: 00003 1   C: 34661 1   C: 00606 1   C: 04467 0   C: 00601 0   C: 33216 1   C: 10000 0
34,2070      C: 00000 1   C: 00000 1   C: 00001 0   C: 00004 0   C: 31566 0   C: 00000 1   C: 01177 1   C: 00002 0

34,2100      C: 27311 1   C: 77754 1   C: 57611 0   C: 00006 1   C: 12326 0   C: 00116 1   C: 00730 0   C: 00000 1
34,2110      C: 06433 0   C: 00003 1   C: 25140 0   I: 43014 0   C: 03260 0   C: 03061 0   I: 43014 0   C: 03262 1
34,2120      C: 03063 1   I: 77745 1   C: 32425 0   C: 03606 1   C: 03614 1   I: 77201 1   C: 00001 0   C: 02303 0
34,2130      I: 41446 1   I: 70501 1   C: 00050 1   I: 51515 1   C: 03552 0   I: 55301 0   C: 00047 1   I: 53664 0

34,2140      C: 00046 0   C: 57175 0   I: 41215 1   C: 30670 0   I: 65301 0   C: 00047 1   C: 02321 0   I: 56342 1
34,2150      I: 75457 0   C: 20172 1   I: 53515 0   C: 02303 0   I: 47315 0   C: 02261 0   I: 77656 1   I: 72441 0
34,2160      C: 03472 0   I: 45421 1   C: 60203 0   C: 30062 0   C: 03612 1   I: 43345 1   C: 03606 1   C: 30072 1
34,2170      C: 03606 1   I: 77025 0   C: 30060 1   C: 00006 1   I: 77644 1   C: 70776 0   I: 77601 0   C: 00001 0

34,2200      I: 51545 1   C: 03574 1   I: 50025 0   C: 30064 0   C: 70224 1   I: 43174 1   C: 00007 0   C: 03300 1
34,2210      C: 70776 0   I: 43014 0   C: 03342 1   C: 70216 0   C: 03303 1   C: 70776 0   I: 71214 0   C: 03060 1
34,2220      C: 30066 1   I: 77765 0   C: 03574 1   C: 03574 1   I: 41575 0   C: 02303 0   I: 63256 0   C: 02261 0
34,2230      I: 53435 0   I: 76561 1   C: 03574 1   C: 02267 0   I: 40055 0   C: 03472 0   C: 70237 0   C: 37566 0

34,2240      C: 46441 1   C: 26744 1   I: 77614 1   C: 03466 0   C: 26655 0   C: 32421 1   C: 36730 0   C: 24732 1
34,2250      I: 72142 0   C: 02776 0   C: 37604 1   C: 46351 1   I: 77624 1   C: 46451 0   C: 17602 0   C: 03621 1
34,2260      I: 52054 1   C: 70263 1   C: 70372 0   I: 77745 1   C: 02752 0   I: 50025 0   C: 30110 1   C: 70372 0
34,2270      I: 45145 0   C: 00041 1   C: 46451 0   I: 60201 1   C: 00003 1   C: 00047 1   I: 50315 0   C: 02303 0

34,2300      C: 03566 1   I: 56246 1   C: 00003 1   I: 45257 0   C: 20201 0   C: 30100 0   I: 71240 1   C: 70372 0
34,2310      C: 02740 0   I: 45312 0   C: 30070 0   C: 14017 1   C: 02317 0   I: 56342 1   I: 41325 0   C: 02740 0
34,2320      C: 00041 1   I: 77624 1   C: 46451 0   I: 72412 0   I: 41366 1   I: 52414 1   C: 04343 1   C: 70330 0
34,2330      I: 50315 0   C: 02303 0   C: 03566 1   C: 03617 1   I: 77646 0   I: 41301 0   C: 00050 1   I: 53660 1

34,2340      C: 00047 1   C: 20204 0   C: 14015 0   C: 32425 0   C: 00021 1   I: 53575 0   C: 00015 0   C: 26730 1
34,2350      C: 02303 0   I: 75315 1   C: 03566 1   C: 03617 1   I: 45076 1   C: 46441 1   C: 26744 1   I: 77614 1
34,2360      C: 03466 0   C: 36655 1   C: 24732 1   I: 51125 0   C: 03617 1   C: 70376 1   I: 45345 1   C: 03604 0
34,2370      I: 52006 0   C: 70376 1   I: 71201 1   C: 00001 0   C: 32425 0   I: 77606 1   I: 41345 0   C: 03467 1
```

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OCTAL LISTING FOR PARAGRAPH # 201,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,2400     C: 03604 0    I: 45261 0    C: 20217 1    I: 77615 0    C: 03634 0    C: 01777 1    I: 77021 1    C: 03636 1
34,2410     C: 00005 1    I: 40240 0    C: 70776 0    C: 00001 0    I: 63375 0    C: 03566 1    C: 02303 0    I: 77624 1
34,2420     C: 71062 0    C: 26311 0    C: 00007 0    C: 27514 1    C: 03506 1    I: 63201 1    C: 00001 0    C: 03500 1
34,2430     I: 77624 1    C: 71062 0    C: 27522 1    C: 00007 0    C: 37530 0    C: 71133 0    I: 40375 1    C: 02311 0

34,2440     C: 00001 0    I: 45115 0    C: 03544 1    C: 46341 0    I: 77624 1    C: 46451 0    C: 27604 0    C: 03544 1
34,2450     I: 63201 1    C: 00001 0    C: 02311 0    I: 65325 0    C: 01777 1    C: 03636 1    I: 41525 0    C: 33641 1
34,2460     I: 77624 1    C: 73376 1    I: 77624 1    C: 46425 0    I: 77745 1    C: 02257 0    I: 73401 0    C: 00007 0
34,2470     I: 53515 0    C: 03536 1    C: 00001 0    I: 47315 0    C: 02261 0    I: 77656 1    I: 71525 0    C: 02257 0

34,2500     I: 45561 1    C: 77754 1    I: 74345 0    I: 76455 1    C: 00023 0    I: 50206 0    C: 03536 1    I: 41552 0
34,2510     I: 72316 0    C: 00155 0    I: 50315 0    C: 03536 1    C: 03536 1    I: 57551 1    C: 00155 0    I: 50315 0
34,2520     C: 03552 0    C: 03552 0    I: 76371 0    I: 71244 0    C: 70542 0    C: 03606 1    I: 77025 0    C: 30072 1
34,2530     C: 00001 0    I: 77654 0    C: 72043 0    I: 70545 1    C: 03612 1    C: 03612 1    I: 77621 1    C: 03576 0

34,2540     C: 37574 0    C: 70165 1    I: 41566 1    I: 45276 0    C: 00007 0    C: 14013 0    I: 45425 0    C: 77762 1
34,2550     I: 77646 0    C: 14017 1    C: 00013 0    I: 45246 0    C: 00017 1    I: 71240 1    C: 70561 1    C: 00015 0
34,2560     C: 00013 0    I: 77745 1    C: 00013 0    I: 76561 1    I: 53455 0    C: 03536 1    I: 53515 0    C: 03552 0
34,2570     I: 53515 0    C: 03560 1    I: 63235 0    C: 00007 0    C: 00007 0    I: 50235 0    C: 00001 0    I: 77626 0

34,2600     C: 53762 1    I: 72441 0    I: 75326 1    C: 00015 0    I: 41542 1    I: 71214 0    C: 03301 0    C: 70644 0
34,2610     C: 00001 0    I: 65225 1    C: 03610 0    C: 03574 1    I: 60225 1    C: 03576 0    C: 00047 1    I: 65265 0
34,2620     C: 00003 1    C: 03574 1    C: 03576 0    I: 43014 0    C: 03342 1    C: 70656 0    C: 03343 0    C: 70656 0
34,2630     I: 41345 0    C: 00003 1    C: 03610 0    I: 71244 0    C: 70663 0    C: 30062 0    I: 77765 0    C: 03612 1

34,2640     C: 03612 1    I: 43014 0    C: 03062 0    C: 03263 0    I: 77745 1    C: 00001 0    C: 17610 0    C: 03574 1
34,2650     C: 03576 0    I: 43025 1    C: 03612 1    C: 03261 1    C: 37574 0    C: 70165 1    I: 43014 0    C: 03302 0
34,2660     C: 70702 0    C: 03303 1    C: 70702 0    I: 75345 1    C: 30102 1    C: 00005 1    I: 77765 0    C: 03610 0
34,2670     C: 03612 1    I: 43276 0    C: 03574 1    C: 17574 1    C: 00001 0    I: 43014 0    C: 03063 1    C: 03062 0

34,2700     C: 37610 1    C: 70176 0    I: 60345 0    C: 00005 1    C: 00050 1    I: 54065 0    C: 00001 0    C: 00047 1
34,2710     I: 77657 0    C: 20601 1    C: 17612 1    C: 00001 0    C: 03610 0    I: 51545 1    C: 03612 1    I: 45206 1
34,2720     C: 30076 0    I: 71240 1    C: 70737 0    I: 50025 0    C: 30106 0    C: 70732 0    I: 75345 1    C: 30106 0
34,2730     C: 03612 1    C: 03612 1    I: 45345 1    C: 03574 1    C: 03612 1    C: 37574 0    C: 70165 1    I: 77145 1

34,2740     C: 03602 0    C: 00002 0    I: 77750 0    C: 02776 0    I: 50023 0    C: 30072 1    C: 70776 0    I: 71374 1
34,2750     C: 00003 1    C: 03604 0    I: 50023 0    C: 30072 1    C: 70776 0    I: 45345 1    C: 01777 1    C: 03634 0
34,2760     C: 02253 1    I: 45374 0    C: 00004 0    C: 30112 0    I: 77040 0    C: 70776 0    C: 00005 1    I: 45345 1
34,2770     C: 03636 1    C: 01777 1    C: 02255 1    I: 51025 1    C: 30112 0    C: 72157 1    I: 43014 0    C: 03302 0
```

```
OCTAL LISTING FOR PARAGRAPH # 202,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3000     C: 72045 0    C: 03343 0    C: 72045 0    I: 71334 0    C: 03613 0    C: 32425 0    I: 43014 0    C: 03260 0
34,3010     C: 03061 0    I: 43014 0    C: 03262 1    C: 03263 0    C: 37606 0    C: 70125 0    I: 71220 1    C: 03470 1
34,3020     C: 03442 0    C: 34041 0    C: 46403 1    I: 77214 0    C: 01067 1    C: 03560 1    C: 03530 1    C: 27506 1
34,3030     C: 03552 0    C: 03522 1    C: 03500 1    I: 47256 0    C: 03506 1    I: 77656 1    C: 26261 0    C: 03536 1

34,3040     C: 37642 0    C: 71052 0    C: 02311 0    C: 26303 0    C: 03544 1    C: 37650 0    C: 71052 0    C: 03514 1
34,3050     C: 37472 1    C: 03470 1    I: 41406 0    I: 74241 0    C: 02261 0    C: 02261 0    I: 51352 1    I: 63256 0
34,3060     I: 74246 1    I: 43572 0    I: 65325 0    C: 03634 0    C: 01777 1    I: 41525 0    C: 33641 1    I: 77650 1
34,3070     C: 73376 1    I: 65325 0    C: 01777 1    C: 03636 1    I: 41525 0    C: 32425 0    I: 77650 1    C: 73376 1

34,3100     I: 76020 1    C: 03470 1    C: 01521 0    I: 77624 1    C: 72375 0    I: 77624 1    C: 71120 1    I: 61375 1
34,3110     C: 03434 1    C: 00001 0    I: 77772 0    C: 03656 1    I: 51406 1    C: 27664 0    I: 77650 1    C: 03470 1
34,3120     I: 77201 1    C: 00007 0    C: 02261 0    I: 63276 1    C: 02303 0    I: 57456 1    I: 47206 0    C: 02261 0
34,3130     I: 77772 0    C: 00001 0    I: 77616 0    I: 77220 1    C: 03470 1    C: 02311 0    I: 53406 0    C: 27544 1

34,3140     C: 03522 1    I: 50256 0    C: 03544 1    I: 72406 0    C: 16732 0    I: 65316 0    C: 06514 1    I: 45302 1
34,3150     I: 72566 1    I: 57515 1    I: 77635 1    C: 03522 1    I: 65241 0    C: 02261 0    I: 45565 0    C: 51047 0
34,3160     C: 03522 1    I: 45115 0    C: 03530 1    C: 46441 1    C: 26744 1    I: 77614 1    C: 03666 1    C: 36655 1
34,3170     C: 24732 1    I: 53754 1    C: 02777 1    C: 57576 1    C: 00023 0    I: 76441 1    C: 03544 1    I: 51515 1

34,3200     I: 63257 1    C: 57576 1    C: 02311 0    I: 65246 1    I: 77625 0    C: 00003 1    C: 17600 1    C: 02742 1
34,3210     I: 65301 0    C: 00047 1    C: 00041 1    I: 77624 1    C: 46451 0    I: 56362 0    I: 41457 1    C: 20174 1
34,3220     I: 65225 1    C: 03600 1    I: 56302 0    C: 00005 1    I: 75406 1    I: 41275 1    C: 00007 0    C: 00001 0
34,3230     I: 65272 0    C: 00003 1    I: 65301 0    C: 00047 1    C: 02321 0    I: 56342 1    I: 65257 1    C: 20174 1

34,3240     C: 00005 1    I: 65301 0    C: 00050 1    C: 02321 0    I: 56342 1    I: 44257 1    C: 57604 1    I: 63525 0
34,3250     C: 00011 1    I: 75421 1    I: 47315 0    C: 02261 0    C: 03544 1    I: 74256 0    C: 00013 0    I: 74315 0
34,3260     C: 03544 1    C: 00011 1    I: 76455 1    I: 77626 0    C: 74233 0    I: 77651 0    C: 03514 1    C: 36275 1
34,3270     C: 03470 1       05353 1    C: 04024 0       00004 0       04616 1    C: 40154 0       06042 1    I: 77614 1

34,3300     C: 06460 0    I: 43014 0    C: 04067 1    C: 04666 0    I: 77214 0    C: 05062 0    C: 01220 0    C: 16032 1
34,3310     C: 01234 0    I: 45014 0    C: 01463 1    C: 26347 0    I: 77201 1    C: 00001 0    C: 01220 0    I: 65352 0
34,3320     C: 01234 0    I: 45006 0    C: 51700 1    C: 02023 1    I: 77776 1       33342 1       04616 1    C: 20477 1
34,3330        16001 1       13333 0       13325 1       06042 1    I: 77775 1    C: 06522 1    C: 36231 1    C: 33471 0

34,3340     I: 77776 1       16001 1    C: 01453 1    I: 40220 0    C: 01163 1    C: 00001 0    I: 41575 0    C: 06516 0
34,3350     I: 41434 1    C: 21574 1    I: 77624 1    C: 55716 1    I: 74321 1    C: 01734 0    C: 16027 0    C: 26325 1
34,3360     C: 02023 1    I: 52446 0    C: 36333 1    C: 01163 1    C: 00046 0    C: 07374 0    C: 04145 0    C: 15527 0
34,3370     C: 00007 0    C: 23346 1       05353 1    C: 00035 1       06042 1    I: 77614 1    C: 04705 1    C: 60315 0
```

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OCTAL LISTING FOR PARAGRAPH # 203,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

34,3400      I: 45345 1    C: 03514 1    C: 26203 1    I: 43040 1    C: 60756 0    C: 04267 0    I: 67214 1    C: 02676 1
34,3410      C: 31446 0    I: 77471 0    C: 03514 1       52155 1       53641 1       53637 0       53635 1       53571 1
34,3420         06042 1    I: 43345 1    C: 03571 1    C: 03635 1    I: 43215 0    C: 03637 0    C: 03641 1    I: 41205 0
34,3430      C: 02265 1    C: 21017 1    I: 65252 1    C: 02271 1    I: 43342 0    I: 77625 0    C: 21014 1    C: 16271 1

34,3440      C: 02265 1    I: 56342 1    C: 02271 1    C: 36263 0    C: 60315 0    C: 00004 0    I: 45575 1    C: 74516 0
34,3450      I: 77775 1    C: 03537 0    C: 37253 1    C: 60730 0       05353 1    C: 04024 0       33474 0       04616 1
34,3460      C: 20477 1       13464 0       13464 0       13454 0       05353 1    C: 04024 0       00004 0       04674 0
34,3470      C: 40115 0       05516 0    C: 00215 1       16001 1    C: 04125 0    I: 77745 1    C: 06524 1    C: 02345 1

34,3500      C: 02351 1    I: 41345 0    C: 02351 1    C: 03517 1    I: 43205 1    C: 33645 0    C: 02345 1    I: 41205 0
34,3510      C: 03517 1    C: 03517 1    I: 72471 0    C: 02271 1    I: 65215 1    C: 02301 1    C: 03474 0    I: 43205 1
34,3520      C: 03517 1    I: 77626 0    C: 75152 0    I: 77616 0    I: 45020 1    C: 02574 0    C: 71554 0    I: 43205 1
34,3530      C: 02623 1    C: 02621 0    I: 41425 1    C: 02625 1    I: 51025 1    C: 02563 0    C: 71541 1    I: 65345 0

34,3540      C: 02563 0    I: 41345 0    C: 00001 0    C: 16025 1    I: 77725 1    I: 41215 1    C: 02625 1    C: 02625 1
34,3550      I: 75465 1    I: 77626 0    C: 41500 1    C: 02574 0    I: 53575 0    C: 03521 1    I: 53515 0    C: 01720 0
34,3560      I: 47206 0    C: 00001 0    I: 77641 1    C: 02325 1    C: 24037 0    I: 72441 0    I: 75326 1    C: 00037 0
34,3570      I: 77616 0       04616 1    C: 53102 1       04616 1    C: 17705 0       13620 1       11674 1       13630 0

34,3600         00004 0       00006 1       31101 0       53655 1       00006 1       31561 1       53755 0       00006 1
34,3610         31156 1       53460 0       31154 0       55461 1       40107 0       74750 0       26107 0       05155 0
34,3620         30101 1       74742 0       00006 1       13627 0       05516 0    C: 00120 1       05155 0       34752 0
34,3630         55674 1       05155 0       00006 1       30025 0       53653 1       00006 1       30033 1       53655 1

34,3640         30034 0       55656 1       30037 0       55657 0       00006 1       30041 1       53661 0       05261 1
34,3650      C: 03650 1    C: 03651 0  CKSM 72333 1          @             @             @             @             @
34,3660            @             @             @             @             @             @             @             @
34,3670            @             @             @             @             @             @             @             @

34,3700            @             @             @             @             @             @             @             @
34,3710            @             @             @             @             @             @             @             @
34,3720            @             @             @             @             @             @             @             @
34,3730            @             @             @             @             @             @             @             @

34,3740            @             @             @             @             @             @             @             @
34,3750            @             @             @             @             @             @             @             @
34,3760            @             @             @             @             @             @             @             @
34,3770            @             @             @             @             @             @             @             @
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OCTAL LISTING FOR PARAGRAPH # 204, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2000       05504 0    C: 00027 1       05504 0    C: 00031 0       32032 1       03621 1       33636 1       03621 1
35,2010       05516 0    C: 00027 1       06042 1    I: 77624 1    C: 70000 0    I: 43014 0    C: 00470 1    C: 01067 1
35,2020    I: 77776 1       32033 0       03621 1       06042 1    I: 77614 1    C: 01071 0    I: 77624 1    C: 73515 1
35,2030    I: 77650 1    C: 72026 0    C: 01441 1    C: 01452 0       02354 1       02037 1       02361 1       00006 1

35,2040       32425 0       53621 1       02060 0    I: 77734 1    C: 03613 0    I: 77740 1    C: 03613 0    I: 77533 1
35,2050    C: 32430 1       30154 1       05734 1       35006 1       04616 1    C: 20477 1       06001 0       02053 0
35,2060       02366 0       32424 1       55467 1       55633 1       55634 0       32415 0       03621 1       06042 1
35,2070    I: 57545 1    C: 03634 0    I: 71240 1    C: 72120 1    C: 01643 1    C: 34041 0    C: 46403 1    I: 53775 1

35,2100    C: 03536 1    C: 57176 0    C: 26655 0    C: 03544 1    I: 43057 1    C: 57176 0    C: 03466 0    C: 16744 1
35,2110    C: 06532 0    C: 26756 0    C: 25557 1    I: 77615 0    C: 03574 1    C: 03634 0    I: 77776 1       02065 0
35,2120    I: 77776 1       33633 1       04616 1    C: 20477 1       06001 0       02127 1       02121 1       33632 0
35,2130       03621 1       06042 1    I: 77745 1    C: 03634 0    C: 37442 1    C: 20000 0    I: 77624 1    C: 71016 0

35,2140    I: 77201 1    C: 00001 0    C: 03506 1    I: 65315 0    C: 03500 1    C: 03634 0    I: 65325 0    C: 03636 1
35,2150    C: 33641 1    I: 45006 0    C: 73376 1    I: 77624 1    C: 46435 1    I: 77624 1    C: 70113 0    I: 43014 0
35,2160    C: 01311 0    C: 72163 0    C: 00470 1    I: 77745 1    C: 02253 1    C: 02253 1    I: 51025 1    C: 32427 1
35,2170    C: 72165 0    I: 77745 1    C: 02255 1    C: 02255 1    I: 51025 1    C: 32427 1    C: 72173 1    I: 77776 1

35,2200       32417 1       03621 1       06042 1    I: 45175 0    C: 02267 0    C: 71100 0    C: 26267 0    C: 02311 0
35,2210    C: 26303 0    C: 02275 0    I: 45170 0    C: 01522 0    C: 72375 0    I: 77745 1    C: 03636 1    C: 37640 1
35,2220    C: 73515 1    I: 77650 1    C: 72136 0       02354 1       02226 0       02361 1       02366 0       32416 0
35,2230       03621 1       06042 1    I: 77745 1    C: 03640 0    C: 17636 1    C: 01777 1    C: 37442 1    C: 20000 0

35,2240    I: 77624 1    C: 71016 0    I: 77624 1    C: 71133 0    I: 77201 1    C: 00001 0    C: 03544 1    I: 45115 0
35,2250    C: 02311 0    C: 71071 1    I: 77624 1    C: 46425 0    I: 77201 1    C: 00001 0    C: 03530 1    I: 45115 0
35,2260    C: 03522 1    C: 71071 1    I: 77624 1    C: 46435 1    I: 43145 0    C: 32425 0    C: 03460 0    C: 36317 1
35,2270    C: 72674 1    I: 77454 1    C: 72307 0       05567 0    C: 00611 1       35006 1       04616 1    C: 20477 1

35,2300       06001 0       02303 0       02226 0       06042 1    I: 77745 1    C: 32425 0    C: 02317 0    I: 43014 0
35,2310    C: 01311 0    C: 72313 0    C: 00470 1    I: 43345 1    C: 02317 0    C: 03636 1    C: 03636 1    I: 77625 0
35,2320    C: 01777 1    I: 51025 1    C: 32427 1    C: 72321 1    I: 77615 0    C: 32427 1    C: 16253 1    C: 03636 1
35,2330    I: 41425 1    C: 03640 0    I: 45246 0    C: 32427 1    I: 43244 1    C: 72332 0    C: 32427 1    I: 45565 0

35,2340    C: 75522 0    I: 77776 1       32417 1       03621 1       06042 1    I: 45175 0    C: 02275 0    C: 71100 0
35,2350    C: 36275 1    C: 73515 1    I: 77650 1    C: 72240 1       00006 1       23470 0       05504 0    C: 00050 1
35,2360       01470 0       00006 1       23470 0       05516 0    C: 00050 1       01470 0       00006 1       23470 0
35,2370       05504 0    C: 00027 1       05504 0    C: 00031 0       01470 0    C: 03434 1    I: 45020 1    C: 03463 0
```

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OCTAL LISTING FOR PARAGRAPH # 205, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,2400      C: 71120 1   I: 64375 1   C: 03434 1   C: 00001 0   I: 66172 0   C: 03615 0   C: 03434 1   I: 77776 1
35,2410         31615 1      03621 1      06042 1   I: 77650 1   C: 03463 0   C: 01413 0   C: 01415 0   C: 01513 1
35,2420      C: 77776 1   C: 62460 1   C: 17777 0   C: 37776 0   C: 00000 1   C: 00000 1   C: 00025 0   C: 37100 1
35,2430      C: 00600 1   C: 00601 0   C: 00602 0   C: 00603 1   C: 00604 0   C: 00605 1   C: 00606 1      00006 1

35,2440         23465 1      34755 1      55162 1      34752 0      00004 0      05203 0   C: 02723 0   C: 74067 0
35,2450         05327 1   C: 40036 0   C: 05024 1   C: 13000 0      01465 1      02354 1      02460 1      02361 1
35,2460         02366 0      33632 0      03621 1      00006 1      33655 1      53621 1      32424 1      55466 0
35,2470         03603 1      06042 1   I: 71214 0   C: 01270 0   C: 03636 1   C: 17442 0   C: 02257 0   I: 43054 1

35,2500      C: 72502 0   C: 01070 1   I: 77624 1   C: 20000 0   I: 43145 0   C: 06524 1   C: 03460 0   I: 43014 0
35,2510      C: 01310 1   C: 72513 0   C: 03660 1   C: 02317 0   I: 43345 1   C: 03636 1   C: 02317 0   C: 34041 0
35,2520      C: 46403 1   I: 77624 1   C: 72674 1   I: 77454 1   C: 72535 1      05567 0   C: 00611 1      35006 1
35,2530         04616 1   C: 20477 1      06001 0      02460 1      02525 1   I: 43014 0   C: 03600 1   C: 72514 1

35,2540      C: 01310 1   C: 72545 0   I: 77776 1      03603 1      02550 0   I: 77776 1      33632 0      03621 1
35,2550         06042 1   I: 71201 1   C: 00001 0   C: 02777 1   C: 14047 1   C: 03621 1   I: 71406 0   C: 16732 0
35,2560      I: 77756 0   C: 26730 1   C: 03552 0   I: 77657 0   C: 57176 0   C: 26655 0   C: 03560 1   I: 43057 1
35,2570      C: 57176 0   C: 03466 0   C: 36744 0   C: 24732 1   I: 77745 1   C: 03636 1   C: 03610 0   I: 77615 0

35,2600      C: 00037 0   C: 37631 1   C: 73216 0   I: 51575 1   C: 02366 0   C: 27576 0   C: 03506 1   I: 51451 0
35,2610      C: 03566 1   C: 26350 0   C: 03536 1   I: 45115 0   C: 02337 1   C: 46341 0   I: 77624 1   C: 46451 0
35,2620      C: 17606 1   C: 03636 1   C: 03442 0   I: 77776 1      33634 0      03621 1      06042 1   I: 77624 1
35,2630      C: 73432 0   I: 77624 1   C: 73515 1   I: 77650 1   C: 72504 0      02354 1      00006 1      31401 0

35,2640         02644 0      02361 1      00006 1      31403 1      53576 0      02366 0      06042 1   I: 77624 1
35,2650      C: 20000 0   I: 77634 0   C: 21574 1   C: 03612 1   I: 77615 0   C: 03576 0   C: 03442 0   C: 03610 0
35,2660      C: 34041 0   C: 46403 1   I: 77624 1   C: 73204 0   I: 77624 1   C: 73216 0   I: 77624 1   C: 73432 0
35,2670      I: 77624 1   C: 73515 1   I: 77650 1   C: 72651 0   I: 66220 1   C: 03463 0   C: 03614 1   C: 40000 0

35,2700      I: 40345 1   C: 33643 0   C: 00001 0   C: 27574 1   C: 03536 1   C: 27500 1   C: 03544 1   C: 27506 1
35,2710      C: 03552 0   C: 27522 1   C: 03560 1   C: 03530 1   I: 77624 1   C: 73204 0   I: 63235 0   C: 03536 1
35,2720      I: 53515 0   C: 03536 1   I: 46315 1   I: 51352 1   C: 02311 0   I: 63256 0   I: 63241 0   C: 00001 0
35,2730      I: 75241 1   C: 02311 0   I: 65552 0   I: 50315 0   C: 02311 0   C: 03536 1   I: 71244 0   C: 72742 0

35,2740      C: 06532 0   I: 41425 1   I: 71214 0   C: 03740 1   C: 73171 1   C: 03576 0   C: 14033 1   I: 77625 0
35,2750      C: 02257 0   C: 03576 0   I: 45246 0   C: 33647 1   I: 77640 0   C: 73201 0   I: 70535 0   C: 03614 1
35,2760      I: 72030 1   C: 03463 0   C: 00154 1   I: 77330 1   C: 03613 0   C: 03552 0   I: 65256 0   C: 00045 0
35,2770      I: 53515 0   C: 03536 1   I: 77725 1   I: 41525 0   C: 00045 0   I: 77621 1   C: 00015 0   C: 14037 0
```

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OCTAL LISTING FOR PARAGRAPH # 206,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3000     C: 06522 1   I: 41425 1   C: 02257 0   I: 50165 0   C: 00037 0   C: 03463 0   I: 71545 0   I: 56205 0
35,3010     C: 00017 1   C: 00015 0   I: 77676 0   C: 00035 1   I: 44246 1   C: 06522 1   I: 77240 1   C: 03463 0
35,3020     C: 02261 1   I: 53435 0   C: 00007 0   I: 41241 0   C: 03544 1   C: 00015 0   I: 47315 0   C: 00001 0
35,3030     C: 03560 1   I: 53435 0   C: 00001 0   I: 41241 0   C: 03560 1   C: 00017 1   I: 77621 1   I: 63301 0

35,3040     C: 00047 1   C: 00007 0   I: 50235 0   C: 00001 0   C: 02261 0   I: 50315 0   C: 00001 0   C: 00007 0
35,3050     I: 65552 1   I: 77765 0   I: 43225 0   C: 06522 1   C: 02257 0   I: 65525 0   C: 00035 1   I: 75221 1
35,3060     C: 06522 1   C: 00037 0   I: 77615 0   I: 56205 0   C: 37641 1   I: 77605 1   I: 41257 1   C: 20176 0
35,3070     I: 51406 1   I: 50025 0   C: 03574 1   C: 73077 0   I: 75345 1   C: 03574 1   I: 77606 1   I: 51135 1

35,3100     C: 03614 1   C: 73107 0   I: 71331 0   C: 03614 1   C: 37777 1   I: 77650 1   C: 73145 0   I: 41345 0
35,3110     C: 03576 0   C: 00033 1   I: 71244 0   C: 73123 0   C: 03574 1   I: 77605 1   C: 33645 0   C: 17574 1
35,3120     I: 70446 0   I: 52076 1   C: 73133 1   I: 51545 1   C: 03576 0   I: 51525 1   C: 00033 1   I: 77625 0
35,3130     I: 71240 1   C: 73136 1   I: 77646 0   I: 52165 1   C: 03606 1   C: 73145 0   I: 57545 1   C: 03606 1

35,3140     I: 70406 1   C: 03606 1   I: 77615 0   I: 77650 1   C: 73146 0   C: 03606 1   I: 77615 0   C: 02317 0
35,3150     C: 02317 0   I: 63375 0   C: 03506 1   C: 03500 1   I: 77624 1   C: 73372 0   I: 77624 1   C: 46425 0
35,3160     I: 63375 0   C: 03530 1   C: 03522 1   I: 77624 1   C: 73372 0   I: 77624 1   C: 46435 1   I: 77650 1
35,3170     C: 72714 0   I: 43345 1   C: 03636 1   C: 02317 0   C: 17636 1   I: 77614 1   C: 01310 1   C: 73201 0

35,3200     C: 02257 0   I: 52145 0   C: 06524 1   C: 03463 0   I: 52375 1   C: 03552 0   C: 03536 1   I: 41456 0
35,3210     C: 26311 0   C: 03536 1   I: 53435 0   C: 03544 1   C: 02261 0   I: 77616 0   I: 77220 1   C: 03470 1
35,3220     C: 03560 1   I: 65315 0   C: 03552 0   C: 03610 0   I: 65325 0   C: 03631 0   C: 33641 1   I: 46125 0
35,3230     C: 03467 1   C: 73235 1   I: 77745 1   I: 41545 0   C: 06524 1   I: 77624 1   C: 73376 1   C: 27444 0

35,3240     C: 00007 0   C: 27506 1   C: 03444 0   I: 63256 0   C: 03536 1   I: 41456 0   I: 50235 0   C: 00001 0
35,3250     C: 02261 0   I: 77715 1   I: 72441 0   C: 00001 0   I: 75326 1   I: 43244 1   C: 73260 1   C: 06532 0
35,3260     C: 15756 1   C: 03631 0   I: 77625 0   C: 03610 0   C: 03452 1   I: 40335 0   C: 03467 1   C: 00001 0
35,3270     I: 63325 0   C: 33653 1   C: 03536 1   C: 26323 1   C: 03544 1   C: 36331 0   C: 22000 1   I: 77624 1

35,3300     C: 73357 1   I: 64375 1   C: 02366 0   C: 00001 0   I: 77772 0   C: 37434 0   C: 03470 1   I: 45020 1
35,3310     C: 03463 0   C: 73357 1   I: 61375 1   C: 03434 1   C: 00001 0   I: 77772 0   C: 02366 0   I: 63255 0
35,3320     C: 03544 1   C: 03536 1   I: 65325 0   C: 03442 0   C: 03631 0   I: 41525 0   C: 06532 0   I: 77624 1
35,3330     C: 73376 1   I: 77775 1   C: 00001 0   C: 03444 0   I: 41575 0   C: 02311 0   I: 57435 1   C: 02261 0

35,3340     I: 41456 0   I: 76435 1   C: 02311 0   I: 77715 1   I: 64315 1   C: 02366 0   C: 00001 0   I: 77772 0
35,3350     C: 36303 1   C: 03463 0   I: 40220 0   C: 03463 0   C: 00001 0   I: 77650 1   C: 73334 1   I: 57575 1
35,3360     C: 02261 1   C: 24007 0   C: 03536 1   I: 57456 1   C: 00015 0   I: 76435 1   C: 02261 0   C: 00001 0
35,3370     I: 43401 0   C: 00023 0   I: 65325 0   C: 06524 1   C: 02317 0   I: 41406 0   I: 45020 1   C: 03465 0
```

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OCTAL LISTING FOR PARAGRAPH # 207,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

35,3400     C: 27410 1   I: 71214 0   C: 01673 1   I: 43054 1   C: 73406 1   C: 01473 0   I: 45545 1   C: 63736 0
35,3410     I: 73014 0   C: 00063 1   C: 02777 1   I: 43014 0   C: 04303 0   C: 73417 1   C: 00263 0   C: 25517 0
35,3420     I: 77657 0   C: 57176 0   C: 25535 0   I: 77657 0   C: 57176 0   C: 35543 0   C: 27106 0   I: 52175 0
35,3430     C: 00001 0   C: 03465 0   I: 43020 1   C: 03470 1   C: 01311 0   C: 73441 1   I: 52014 0   C: 00470 1

35,3440     C: 73505 1   I: 77214 0   C: 03274 0   C: 03434 1   C: 01236 1   I: 77776 1      33636 1      04616 1
35,3450     C: 20477 1      06001 0      03454 1      03446 1      35016 0      54003 0      22007 0      34756 1
35,3460        54002 1      50002 0      41433 0      50002 0      61235 1      26001 1      10002 1      13460 1
35,3470        22000 1      00006 1      13475 0      05504 0   C: 00146 1      06042 1   I: 45014 0   C: 03354 0

35,3500     C: 73502 1   C: 73307 1   I: 77775 1   C: 02366 0   C: 03656 1   I: 77624 1   C: 73352 1   I: 77776 1
35,3510        33635 1      03621 1      06042 1   I: 77650 1   C: 03470 1   I: 71220 1   C: 03470 1   C: 33651 0
35,3520     C: 02253 1   I: 71214 0   C: 01351 1   C: 73543 1   C: 33651 0   I: 77615 0   C: 33651 0   C: 02253 1
35,3530     I: 77414 0   C: 01742 1   C: 73543 1      03613 0      03536 1      03544 1      06042 1   I: 41575 0

35,3540     C: 03656 1   I: 77624 1   C: 15725 0   I: 77776 1      02437 0      31470 0      55464 1      34777 1
35,3550        04616 1   C: 01736 1      33637 0      04616 1   C: 20477 1      03560 1      03563 1      03573 0
35,3560        30005 1      55162 1      06001 0      40076 1      74746 1      00006 1      13560 0      05353 1
35,3570     C: 04024 0      05504 0   C: 00047 1      30005 1      55162 1      05353 1   C: 04024 0      06042 1

35,3600     I: 52014 0   C: 03670 0   C: 03464 1      00006 1      23463 1      33633 1      04616 1   C: 20477 1
35,3610        16001 1      01463 1      13605 0      37747 1      71010 0      00006 1      13620 1      24002 0
35,3620        00002 0      00006 1      23465 1      55615 0      31615 1      04616 1   C: 20477 1      16001 1
35,3630        01465 1      13624 0   C: 01445 0   C: 01467 0   C: 01472 1   C: 01473 0   C: 01521 0   C: 04055 0

35,3640     C: 14441 0   C: 37325 1   C: 00001 0   C: 20650 0   C: 12525 0   C: 12525 0   C: 00004 0   C: 21505 1
35,3650     C: 77777 0   C: 61337 1   C: 01252 0   C: 25253 1   C: 13434 0   C: 16162 0      35026 0      05072 1
35,3660     C: 03245 1   C: 74067 0      05516 0   C: 00303 1      05353 1   C: 00006 1      15261 0      05321 1
35,3670     C: 00077 1      13677 0      05504 0   C: 00122 0      04674 0   C: 62327 0      13704 0      34737 0

35,3700        54055 0      34750 1      00006 1      05014 1      05353 1   C: 00003 1      15261 0      04645 1
35,3710        55163 0      04616 1   C: 54261 0      10000 0      13726 0      34737 0      70106 1      10000 0
35,3720        13733 1      34747 1      00006 1      02030 0      00006 1      13733 1      33735 0      04616 1
35,3730     C: 20624 0      16101 1      13711 1      31163 1      04640 1   C: 00203 0   C: 03736 0   C: 03737 1

35,3740   CKSM 60110 1         @            @            @            @            @            @            @
35,3750          @             @            @            @            @            @            @            @
35,3760          @             @            @            @            @            @            @            @
35,3770          @             @            @            @            @            @            @            @
```

```
OCTAL LISTING FOR PARAGRAPH # 210,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2000     C: 01056 0   C: 37167 0   C: 00457 1   C: 03250 0   C: 77777 0   C: 77731 1   C: 00307 0   C: 11040 0
36,2010     C: 00151 1   C: 05214 0   C: 77777 0   C: 77755 0   C: 00003 1   C: 00000 1   C: 00026 0   C: 30605 1
36,2020     C: 00013 0   C: 14303 1   C: 00030 1   C: 00014 1   C: 01512 0      12327 1      12616 0      13066 0
36,2030        15261 0      12150 0   C: 00000 1   C: 03746 1   C: 64067 1      12402 1      12567 0      12525 0

36,2040     C: 01450 1      12327 1      12620 0      13053 0      15261 0      12150 0   C: 04300 0   C: 03672 1
36,2050     C: 74066 1      12372 1      12567 0      12510 0      13127 1      12153 0   C: 77776 1   C: 03402 1
36,2060     C: 74066 1      12404 1      12573 0   C: 01450 1      12324 1      12620 0      13053 0      15261 0
36,2070        12150 0   C: 05120 1   C: 03672 1   C: 74066 1      12372 1      12567 0      12545 0      13424 1

36,2100     C: 01476 0      12327 1      12616 0      13003 0      15261 0      12153 0   C: 04300 0   C: 03746 1
36,2110     C: 64067 1      12402 1      12567 0      12464 1   C: 01477 1      12327 1      12616 0      13066 0
36,2120        15261 0      12122 0      12123 1      12124 0      12125 1      12402 1      12567 0      12535 1
36,2130        05353 1   C: 04024 0      34755 1      55507 0      55510 0      04616 1   C: 73707 0      00006 1

36,2140        31442 1      53512 1      00004 0      04674 0   C: 75570 1      00003 1      51455 1      10005 0
36,2150        44762 1      04616 1   C: 74670 0      06042 1   I: 45345 1   C: 03442 0   C: 35147 0   C: 34041 0
36,2160     C: 61071 0   I: 45014 0   C: 03347 1   C: 74202 1   C: 27042 1   I: 64375 1   C: 00025 0   C: 01734 0
36,2170     I: 77762 1   C: 25726 0   C: 00017 1   I: 64312 0   C: 01734 0   C: 35720 1   C: 67067 1   C: 16317 0

36,2200     C: 00015 0   C: 00041 1   I: 77624 1   C: 27553 1      12213 1      00006 1      31561 1      53442 0
36,2210        00006 1      33147 0      21442 0      52155 1      53500 1      00006 1      43762 0      21500 1
36,2220        00006 1      31500 0      05277 0   C: 02242 1   C: 74067 0      05353 1   C: 20254 0      05321 1
36,2230     C: 00077 1      15155 1      44762 1      55162 1      06042 1   I: 51575 1   C: 03553 1   C: 03472 0

36,2240     I: 77776 1      15155 1      33762 1      05173 1   C: 02300 0      05353 1   C: 40154 0      44752 1
36,2250        55162 1      51455 1      40006 0      00006 1      65261 1      33151 1      05173 1   C: 02270 0
36,2260        35027 1      05072 1   C: 02265 1   C: 74067 0      15261 0      04616 1   C: 20457 0      15155 1
36,2270        35027 1      05072 1   C: 02275 0   C: 74067 0      15261 0      33765 0      04616 1   C: 20466 1

36,2300        33150 0      05173 1   C: 02354 1      44762 1      55162 1      51455 1      30006 1      00006 1
36,2310        62327 0      55477 0      05173 1   C: 02350 0      36250 0      54001 1      46250 1      52752 0
36,2320        40025 1      55052 0      51455 1      10001 1      40106 1      74737 1      26106 1      00006 1
36,2330        51455 1      30010 0      53252 1      34752 0      54001 1      44752 1      52760 1      40025 1

36,2340        55060 1      00006 1      34755 1      52754 0      10762 0      15261 0      04635 0   C: 77410 1
36,2350        02663 0      05353 1   C: 00001 0      15261 0      00006 1      34755 1      52756 1      33762 1
36,2360        05173 1   C: 02407 0      05516 0   C: 00153 0      05516 0   C: 00154 1      05516 0   C: 00122 0
36,2370        51455 1      10011 0      10756 1      12402 1      34736 1      05105 0   C: 02540 1   C: 56067 0
```

```
OCTAL LISTING FOR PARAGRAPH # 211,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,2400        05353 1   C: 00053 1      44760 0      55162 1      05353 1   C: 40074 0      15261 0      40103 1
36,2410        74737 1      26103 1      05321 1   C: 00077 1      12425 1      31422 1      05203 0   C: 03667 0
36,2420     C: 72067 0      05327 1   C: 40033 0   C: 05014 1   C: 77777 0      34740 0      70103 1      00006 1
36,2430        51455 1      10012 0      40101 0      74745 1      26101 0      44355 1      00006 1      02011 0

36,2440        64737 0      10006 1      01011 0      00006 1      30025 0      53342 1      44735 0      70111 1
36,2450        54111 1      30006 1      31517 0      53442 0      00006 1      30025 0      21442 0      44742 0
36,2460        70104 0      54104 0      51455 1      10013 1      00006 1      33143 1      53252 1      30005 1
36,2470        55162 1      40105 1      74743 1      26105 1      40103 1      74741 0      26103 1      00006 1

36,2500        30025 0      53442 0      34755 1      55346 0      55621 1      34752 0      55623 0      12545 0
36,2510        40101 0      74740 1      00006 1      12545 0      31422 1      05203 0   C: 03667 0   C: 72067 0
36,2520        05327 1   C: 40033 0   C: 05014 1   C: 77777 0      12545 0      35015 0      54003 0      31412 1
36,2530        55536 1      31413 0      55540 0      35016 0      54003 0      30005 1      55162 1      00006 1

36,2540        33145 1      53252 1      40103 1      74741 0      26103 1      44744 0      70111 1      54111 1
36,2550        34743 0      70076 1      10000 0      13526 1      05516 0   C: 00153 0      05516 0   C: 00154 1
36,2560        05516 0   C: 00161 1      05353 1   C: 40054 1      05221 0   C: 00062 0      02657 1      00006 1
36,2570        34755 1      52760 1      15261 0      04635 0   C: 73656 0      05504 0   C: 00161 1      05504 0

36,2600     C: 00175 1      34751 0      55515 0      10764 0      12607 0      04616 1   C: 74667 0      44765 0
36,2610        55162 1      05353 1   C: 00004 0      15155 1      51455 1      10002 1      30005 1      12621 1
36,2620        44762 1      55162 1      05516 0   C: 00161 1      05516 0   C: 00175 1      15155 1      05353 1
36,2630     C: 00003 1      30004 0      06032 0   C: 73667 1      04674 0   C: 75565 0      05504 0   C: 00312 1

36,2640        02651 1   C: 00310 0      05504 0   C: 00314 1      34753 1      00004 0      05173 1   C: 02354 1
36,2650        15155 1      30002 0      05522 1      40000 0      00006 1      06001 0      15511 0      44746 1
36,2660        70111 1      54111 1      00002 0      40111 1      74746 1      26111 1      00002 0      34755 1
36,2670        55162 1      14645 1      55060 1      00006 1      31442 1      52155 1      00006 1      40025 1

36,2700        20155 1      07262 0      34777 1      54002 1      52155 1      74346 0      00006 1      10002 1
36,2710        30001 0      64752 0      00004 0      05173 1   C: 02723 0      05327 1   C: 40036 0   C: 05024 1
36,2720     C: 13000 0      31060 0      04640 1      40025 1      55064 0      11162 1      12737 1      12730 0
36,2730        37720 0      05072 1   C: 02743 0   C: 74067 0      05221 0   C: 00144 0      12723 1      00006 1

36,2740        34755 1      52764 0      15261 0      00006 1      41442 0      53454 1      00006 1      30025 0
36,2750        21454 1      00004 0      11162 1      15155 1      15155 1      40000 0      00003 1      50000 1
36,2760        13015 1      44755 0      55066 1      30371 1      04616 1   C: 20474 1      13017 0      12614 1
36,2770        12627 1      33152 1      04616 1   C: 20460 1      13017 0      13034 1      12771 0      51455 1
```

```
OCTAL LISTING FOR PARAGRAPH # 212,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3000       30000 1     04616 1  C: 20466 1     44743 1     55066 1     51455 1     30000 1     04616 1
36,3010    C: 20474 1     13017 0     13045 1     13050 0     04616 1  C: 20457 0     15155 1     03021 1
36,3020       16001 1     00004 0     00006 1     23141 1     02657 1     06032 0  C: 74350 1     05353 1
36,3030    C: 00001 0     30005 1     55162 1     01141 1     05353 1  C: 04024 0     34755 1     55162 1

36,3040       35023 0     05105 0  C: 03212 0  C: 64065 0     15155 1     05504 0  C: 00154 1     13106 1
36,3050       00004 0     51455 1     10003 0     34644 0     05105 0  C: 03227 0  C: 74067 0     00004 0
36,3060       04674 0  C: 40205 1     03021 1     05353 1  C: 00134 1     15155 1     35027 1     05105 0
36,3070    C: 02416 0  C: 30067 0     05516 0  C: 00175 1     00004 0     04674 0  C: 40205 1     03021 1

36,3100       05353 1  C: 07024 0  C: 17000 1  C: 02416 0  C: 30067 0     15155 1     40103 1     74737 1
36,3110       10000 0     13122 1     34753 1     00004 0     05173 1  C: 02432 0     34360 0     54001 1
36,3120       40000 0     52760 1     44762 1     55162 1     15155 1     05567 0  C: 01706 1     35006 1
36,3130       04616 1  C: 20477 1     16001 1     13135 1     13127 1     51455 1     10014 0  C: 02040 1

36,3140    C: 02050 0  C: 02063 0  C: 02423 0  C: 62067 1  C: 03372 1  C: 70067 1  C: 00000 1  C: 05656 1
36,3150    C: 04672 0  C: 00752 1  C: 01475 0     05353 1  C: 04024 0     33137 1     55455 0     30106 0
36,3160       74737 1     10000 0     13125 0     04616 1  C: 11233 0     40111 1     74737 1     10000 0
36,3170       32022 0     62023 1     55250 0     34751 0     55515 0     06042 1  I: 43175 0  C: 34001 1

36,3200    C: 02663 0  C: 03735 0  I: 77735 0  C: 26002 1  I: 70476 0  C: 37743 0  C: 56246 1  I: 77624 1
36,3210    C: 56413 1  I: 77776 1     00004 0     04674 0  C: 40143 0     03217 0     12130 0     00006 1
36,3220       23141 1     00003 1     05516 0  C: 00124 0     04616 1  C: 54123 0     01141 1     30005 1
36,3230       55162 1     00006 1     32060 0     53252 1     33764 1     04616 1  C: 20636 0     03262 1

36,3240       13245 0     03227 0     05353 1  C: 00014 1     15155 1     00004 0     04674 0  C: 40154 0
36,3250       04674 0  C: 40141 1     00003 1     33765 0     04616 1  C: 20463 1     03262 1     13262 0
36,3260       03253 0     13242 1     00006 1     32110 0     53252 1     34755 1     55462 1     30005 1
36,3270       55162 1     00004 0     04674 0  C: 40115 0     00003 1     06001 0     33140 1     55455 0

36,3300       04616 1  C: 11233 0     06042 1  I: 71214 0  C: 00700 0  C: 75311 0  C: 34017 0  C: 37735 1
36,3310    C: 75314 0  I: 77745 1  C: 34021 0  C: 03735 0  I: 77624 1  C: 56246 1  I: 77624 1  C: 56413 1
36,3320    I: 77776 1     00004 0     04674 0  C: 40154 0     04674 0  C: 40141 1     03217 0     06042 1
36,3330    I: 45175 0  C: 03701 1  C: 57267 0  C: 03502 0  I: 77776 1     33765 0     04616 1  C: 20447 1

36,3340       35017 1     55162 1     05105 0  C: 03365 1  C: 74067 0     05327 1  C: 00076 0  C: 04024 0
36,3350       12137 1     34777 1     04616 1  C: 01736 1     31162 0     64752 0     00006 1     13351 1
36,3360       33765 0     04616 1  C: 20447 1     35017 1     05146 1     31162 0     00006 1     65155 0
36,3370       06042 1  I: 45175 0  C: 03701 1  C: 57267 0  C: 03502 0  I: 77776 1     34777 1     04616 1
```

```
OCTAL LISTING FOR PARAGRAPH # 213,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

36,3400    C: 01736 1     13365 0     06042 1  I: 77624 1  C: 75615 1  I: 45175 0  C: 03701 1  C: 57267 0
36,3410    C: 03502 0  I: 77776 1     04635 0  C: 65746 1     05353 1  C: 04074 0     33141 0     55455 0
36,3420       40106 1     74737 1     10000 0     03125 1     04616 1  C: 11233 0     36000 1     55250 0
36,3430       34751 0     55515 0     06042 1  I: 77214 0  C: 01072 0  C: 34007 1  C: 03735 0  I: 52135 1

36,3440    C: 26001 1  C: 75204 0     04616 1  C: 11233 0     06042 1  I: 77624 1  C: 27547 1     30155 0
36,3450       05173 1  C: 03453 0     15155 1     05353 1  C: 05014 1  C: 77777 0     00006 1     33770 1
36,3460       53252 1     34736 1     05105 0  C: 03517 1  C: 74067 0     12344 1     06042 1  I: 53375 0
36,3470    C: 03502 0  C: 03527 1  C: 03656 1  I: 77624 1  C: 57267 0  C: 03623 0  I: 77776 1     05353 1

36,3500    C: 10035 0     06042 1  I: 77775 1  C: 03656 1  C: 03502 0  I: 77776 1     04635 0  C: 65746 1
36,3510       33766 0     04616 1  C: 20636 0     06001 0     06001 0     13517 0     13242 1     06042 1
36,3520    I: 77775 1  C: 06524 1  C: 03623 0  C: 03502 0  I: 77776 1     03510 0     31517 0     03741 0
36,3530       05173 1  C: 03546 0     05516 0  C: 00153 0     05516 0  C: 00154 1     05516 0  C: 00044 1

36,3540       05353 1  C: 40114 1     05221 0  C: 00062 0     02657 1     05261 1     04674 0  C: 75551 1
36,3550       05261 1     34644 0     05105 0  C: 03227 0  C: 74067 0     34753 1     05203 0  C: 03612 1
36,3560    C: 74066 1     40103 1     74745 1     26103 1     02657 1     00006 1     30025 0     53342 1
36,3570       44745 1     70101 0     54101 0     44355 1     00006 1     02011 0     64736 1     00006 1

36,3600       01011 0     40111 1     74736 0     26111 1     44737 1     54055 0     34750 1     00006 1
36,3610       05014 1     04707 0     04674 0  C: 40205 1     05261 1  I: 45020 1  C: 03665 1  C: 56447 0
36,3620    I: 43014 0  C: 013 7 1  C: 03665 1  C: 03705 0  C: 75637 1  I: 45345 1  C: 01234 0  C: 03763 0
36,3630    I: 50025 0  C: 03432 1  C: 75662 1  I: 43345 1  C: 03763 0  C: 03432 1  C: 03765 0  I: 77776 1

36,3640       10754 0     13667 1     34737 0     00004 0     05105 0  C: 02707 0  C: 56067 0     05327 1
36,3650    C: 00172 0  C: 10035 0     06042 1  I: 77745 1  C: 03765 0  C: 27763 0  C: 01220 0  C: 26323 1
36,3660    C: 01226 0  C: 02331 1  I: 45345 1  C: 03631 0  C: 01234 0  C: 37452 0  C: 03665 1     06042 1
36,3670    I: 77650 1  C: 03665 1     06042 1  I: 77624 1  C: 75615 1  I: 77776 1     00004 0     35016 0

36,3700       54003 0     40076 1     74743 1     10000 0     13711 1     40103 1     74745 1     10000 0
36,3710       13713 0     04635 0  C: 65746 1     04674 0  C: 40166 1     05516 0  C: 00044 1     05504 0
36,3720    C: 00161 1     00004 0     00006 1     31442 1     52155 1     00006 1     40025 1     20155 1
36,3730       07262 0     30155 0     03741 0     05173 1  C: 03546 0     05327 1  C: 40114 1  C: 00035 1

36,3740       15155 1     10000 0     13745 0     13745 0     34755 1     64753 1     56001 0     34755 1
36,3750       53517 1     31517 0     00002 0  C: 00000 1  C: 02734 0  C: 00000 1  C: 05670 0  C: 00000 1
36,3760    C: 10624 0  C: 00000 1  C: 00764 1  C: 05050 1  C: 04050 0  C: 04125 0  C: 04123 0  C: 03466 0
36,3770    C: 74067 0  C: 03771 0  C: 03772 0 CKSM 56715 1        @           @           @           @
```

```
OCTAL LISTING FOR PARAGRAPH # 214,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2000      C: 07623 1   C: 26552 1      05311 1   C: 00007 0      02325 1      34755 1      55414 0      55440 1
37,2010         55441 0      55576 0      34361 1      55571 1      32476 0      02367 1      34736 1      55664 0
37,2020         06042 1   I: 62545 1   C: 02403 1   C: 15046 1   C: 02401 0   I: 77434 1   C: 21615 0      56154 1
37,2030         55044 1      32473 0      04616 1   C: 20477 1      02270 0      02037 1      02031 1      06042 1

37,2040      I: 47135 0   C: 01045 1   C: 21577 1   C: 02401 0   I: 60535 1   C: 01046 1   C: 02403 1   I: 57546 1
37,2050      I: 77752 1   C: 16437 0   C: 02403 1   I: 72556 1   C: 16435 1   C: 02401 0   I: 73406 1   C: 02675 1
37,2060      C: 16705 1   I: 77746 1   C: 02677 0   I: 77676 0   C: 36703 0   C: 47355 1   I: 77776 1      04616 1
37,2070      C: 16771 1      34736 1      70077 0      00006 1      12076 0      25414 1      05516 0   C: 00056 1

37,2100         02315 1      11414 0      02126 0      02320 1      00006 1      31575 1      05277 0   C: 02113 0
37,2110      C: 76065 0      32116 0      05133 0      32116 0      05137 1      05261 1   C: 76500 0      34755 1
37,2120         55047 1      31504 1      55050 1      51416 0      55420 1      02457 0      51414 1      02130 1
37,2130         02447 1      34361 1      55476 1      32474 1      55412 0      34753 1      55537 0      34755 1

37,2140         51415 0      54037 1      55472 0      02332 1      00004 0      34752 0      05173 1   C: 02151 0
37,2150         05155 0      00006 1      27412 0      31412 1      00006 1      62161 0      34742 1      05173 1
37,2160      C: 02151 0      34736 1      05105 0   C: 02166 1   C: 76065 0      05261 1      51414 1      02170 0
37,2170         02447 1      31412 1      00006 1      62175 0      05155 0      34756 1      55537 0      02332 1

37,2200         11473 1      02205 1      05675 0      41476 1      55476 1      00006 1      41473 1      21477 0
37,2210         06042 1   I: 45345 1   C: 02501 1   C: 02475 0   I: 45044 0   C: 76217 1   C: 76275 0   I: 56325 0
37,2220      C: 02477 1   I: 47075 0   C: 37056 0   C: 21613 0   C: 01050 0   I: 77776 1      11414 0      02301 1
37,2230         02457 0      32471 1      55412 0      51416 0      41417 0      55442 0      11415 1      12245 1

37,2240         44747 0      27565 1      34747 1      27567 0      12251 1      44747 0      27565 1      34747 1
37,2250         27563 1      02447 1      34755 1      55404 1      55405 0      34733 1      55440 1      55441 0
37,2260         30032 0      55413 1      02500 0      31502 1      55050 1      34755 1      55047 1      02457 0
37,2270         05516 0   C: 00007 0      44755 0      05314 1      05472 0   I: 43215 0   C: 06532 0   C: 37064 1

37,2300      I: 77616 0      00006 1      23571 0      34755 1      54321 0      54322 0      54323 1      04616 1
37,2310      C: 16771 1      04616 1   C: 17707 1      03047 1      01571 0      00006 1      23571 0      02311 0
37,2320         00006 1      23571 0      04616 1   C: 17201 1      02311 0      00006 1      23571 0      04616 1
37,2330      C: 16705 1      02311 0      00006 1      23417 1      02342 0      00003 1      30067 0      00006 1

37,2340         62346 1      05122 0      00004 0      51415 0      40037 1      55571 1      00004 0      51415 0
37,2350         30037 0      61571 0      00006 1      12335 1      51415 0      30037 0      51537 1      55472 0
37,2360         04102 0      51537 1      55473 1      51537 1      23474 1      00003 1      01417 1      54001 1
37,2370         12372 1      55571 1      34755 1      50001 0      54000 0      24001 0      11571 1      12371 1
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OCTAL LISTING FOR PARAGRAPH # 215,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,2400        00002 0  I: 65345 0  C: 37057 1  C: 02403 1  I: 57546 1  I: 73525 1  C: 02403 1  I: 74266 0
37,2410     C: 36001 0  C: 02405 1  I: 77634 0  C: 21574 1  C: 26433 1  C: 37057 1  C: 02564 1  I: 77616 0
37,2420     I: 47020 0  C: 00051 0  C: 21574 1  C: 02431 0  I: 51025 1  C: 02433 1  C: 76431 0  I: 77624 1
37,2430     C: 76275 0  I: 74261 1  C: 20212 1  C: 02405 1  I: 53321 1  C: 02643 1  C: 02564 1  C: 16564 1

37,2440     C: 02431 0  C: 02433 1  I: 47170 1  C: 02563 0  C: 21706 0  I: 77650 1  C: 00051 0     00006 1
37,2450        23420 0     06042 1  I: 77624 1  C: 76420 0  I: 77776 1     02315 1     01420 0     00006 1
37,2460        23417 1     31416 0     55051 0     32472 1     04616 1  C: 20477 1     02270 0     01417 1
37,2470        12461 1  C: 07626 1  C: 01542 0  C: 01451 0  C: 00072 1  C: 02737 0  C: 01664 1  C: 01642 0

37,2500        00004 0     31572 0     05173 1  C: 02536 0     34755 1     54037 1     54040 1     54041 0
37,2510        00003 1     33075 0     55571 1     33076 0     02367 1     06042 1  I: 77735 0  C: 37057 1
37,2520     C: 25477 1  C: 37070 1  C: 26445 0  C: 37057 1  C: 00325 0  C: 01472 1  I: 77735 0  C: 02441 1
37,2530     I: 50076 0  C: 76534 1  I: 77624 1  C: 76401 0  I: 77776 1     03035 1     31576 1     00006 1

37,2540        12542 1     05261 1     11530 1     30000 1     55531 0     40000 0     55530 1     44753 0
37,2550        61562 1     00006 1     12556 1     31412 1     00006 1     62562 1     31572 0     05173 1
37,2560     C: 02536 0     34755 1     56037 0     54324 0     34755 1     56040 0     54326 1     34755 1
37,2570        56041 1     54330 0     34736 1     05105 0  C: 02577 0  C: 76065 0     05261 1     11562 0

37,2600        02602 1     02604 1     04616 1  C: 15271 1     06042 1  I: 77745 1  C: 37066 0  C: 24051 0
37,2610     C: 00325 0  I: 76575 0  C: 02643 1  I: 57545 1  C: 00160 0  C: 16523 1  C: 00162 1  C: 02527 0
37,2620     I: 76001 1  C: 00001 0  C: 00010 0  I: 57535 0  C: 02563 0  I: 77640 0  C: 76772 1  I: 50135 0
37,2630     C: 02532 1  C: 76644 0  I: 72174 0  C: 00014 1  C: 02444 1  I: 62143 0  C: 02243 0  C: 77775 1

37,2640     C: 12545 0  I: 66104 1  C: 76635 0  C: 02444 1  I: 77770 1  C: 00010 0  I: 41343 0  C: 02533 0
37,2650     C: 37100 1  I: 43661 1  C: 21212 0  C: 02501 1  C: 06501 0  I: 40725 0  C: 37102 0  C: 02521 0
37,2660     I: 77732 1  I: 45425 0  C: 71216 1  C: 06563 1  I: 77100 0  C: 76646 1  C: 00004 0  I: 56743 1
37,2670     C: 75324 0  C: 75240 0  C: 12453 0  I: 77104 1  C: 76667 1  C: 00010 0  I: 66140 1  C: 02445 0

37,2700     C: 02445 0  I: 56743 1  C: 02450 1  C: 75216 0  I: 77613 0  C: 75276 0  C: 12501 0  I: 42743 1
37,2710     C: 75314 0  C: 75230 1  C: 12463 0  I: 42673 0  C: 75216 0  C: 75266 1  C: 12511 1  I: 40743 0
37,2720     C: 37105 1  C: 75216 0  I: 42772 0  C: 75256 1  C: 12521 1  I: 76104 0  C: 76676 1  C: 00010 0
37,2730     I: 64743 0  C: 02523 1  C: 02521 0  I: 55523 0  C: 02531 1  I: 76521 0  C: 02001 1  I: 77745 1

37,2740     C: 00155 0  C: 06531 0  I: 77745 1  C: 00160 0  C: 06521 1  I: 77745 1  C: 00162 1  C: 06523 0
37,2750     I: 77700 0  C: 76730 1  I: 76174 1  C: 00006 1  C: 00002 0  I: 57343 1  C: 02503 0  C: 37110 0
37,2760     I: 77722 0  I: 73406 1  I: 56072 1  C: 00046 0  C: 10021 0  I: 77745 1  I: 77746 1  C: 10027 0
37,2770     I: 77704 1  C: 76755 1  I: 77776 1     35016 0     54003 0     01400 1     11412 0     03034 0
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OCTAL LISTING FOR PARAGRAPH # 216,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3000        11440 1       13003 0       03005 1       30032 0       55414 0       06042 1    I: 65345 0    C: 02473 0
37,3010     C: 02477 1    I: 55525 0    C: 02501 1    I: 74276 1    C: 37110 0    I: 74521 1    C: 02643 1    C: 02740 0
37,3020     I: 77776 1       32475 0       04616 1    C: 17314 1       02315 1       11440 1       02263 1       06042 1
37,3030     I: 77624 1    C: 76401 0    I: 77776 1       02117 1       55412 0       11440 1       02447 1       05155 0

37,3040        35014 1       54003 0       34753 1       55576 0       05567 0    C: 01600 0       02270 0       33054 0
37,3050        05734 1       05516 0    C: 00007 0       05155 0    C: 01601 1    C: 06200 0    C: 00000 1    C: 00000 1
37,3060     C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00001 0    C: 00004 0    C: 00002 0    C: 00220 1
37,3070     C: 77776 1    C: 35730 0    C: 00035 1    C: 10317 0    C: 17550 1    C: 00115 1    C: 01443 0    C: 04133 1

37,3100     C: 02265 1    C: 57223 0    C: 66451 1    C: 05427 0    C: 12577 1    C: 77567 0    C: 44202 1    C: 24276 1
37,3110     C: 14066 1    C: 23073 1    C: 11773 1       33407 1       04616 1    C: 20334 1       05563 1       05563 1
37,3120        13113 0       40103 1       74747 0       00006 1       13377 0       40104 0       74744 0       00006 1
37,3130        13403 1       06042 1    I: 77634 0    C: 21574 1    C: 34041 0    C: 27056 1    I: 77775 1    C: 00017 1

37,3140     C: 26170 0    C: 00025 0    C: 16105 1    C: 00015 0    C: 02114 1    C: 34041 0    C: 27042 1    I: 77775 1
37,3150     C: 00017 1    C: 26140 0    C: 00025 0    C: 02120 0    I: 77776 1       40103 1       74747 0       00006 1
37,3160        13326 1       40104 0       74744 0       00006 1       13370 1       06042 1    I: 77634 0    C: 21574 1
37,3170     C: 34041 0    C: 27410 1    I: 43175 0    C: 02170 0    C: 00263 0    C: 25535 0    C: 02105 1    C: 15543 1

37,3200     C: 02114 1    I: 43014 0    C:  4344 0    C: 77205 0    C: 00063 1    I: 77614 1    C: 01473 0    C: 35517 1
37,3210     C: 27106 0    I: 77775 1    C: 00001 0    C: 26207 0    C: 00007 0    C: 36215 1    C: 27410 1    I: 71214 0
37,3220     C: 01473 0    C: 00015 0    C: 00041 1    I: 43175 0    C: 02140 0    C: 00263 0    C: 25535 0    C: 02120 0
37,3230     C: 15543 1    C: 02114 1    I: 43014 0    C: 04344 0    C: 77236 0    C: 00063 1    C: 35517 1    C: 27106 0

37,3240     I: 52375 1    C: 00001 0    C: 02207 0    I: 65234 1    C: 21725 1    C: 00045 0    I: 77657 0    C: 20201 0
37,3250     C: 26201 0    C: 00007 0    I: 50251 1    C: 02215 0    I: 77752 1    C: 26203 1    C: 02207 0    I: 63256 0
37,3260     C: 06516 0    I: 77624 1    C: 47663 1    I: 41505 1    C: 01734 0    I: 72431 1    C: 00001 0    I: 53445 1
37,3270     C: 00007 0    I: 47315 0    C: 00001 0    C: 02215 0    I: 50235 0    C: 00001 0    C: 00015 0    I: 77715 1

37,3300     I: 75241 1    C: 00007 0    C: 00015 0    I: 65512 1    C: 26205 1    C: 00001 0    I: 51041 0    C: 00007 0
37,3310     C: 77315 0    I: 45345 1    C: 06532 0    C: 02205 1    C: 02205 1    I: 77776 1       34747 1       71043 0
37,3320        00006 1       15472 1       41043 0       74740 1       27043 0       13155 1       37713 0       05146 1
37,3330        06042 1    I: 40375 1    C: 01220 0    C: 00001 0    C: 26207 0    C: 01226 0    C: 26215 0    C: 01726 0

37,3340     I: 65315 0    C: 01720 0    C: 01234 0    I: 77776 1       35015 0       05146 1       06042 1    I: 77214 0
37,3350     C: 03347 1    C: 77363 1    I: 60505 1    C: 01734 0    I: 77715 1    I: 76505 0    C: 01734 0    I: 40206 1
37,3360     C: 00001 0    I: 77650 1    C: 77240 1    I: 77624 1    C: 27410 1    I: 52014 0    C: 01673 1    C: 77222 0
37,3370        06042 1    I: 77634 0    C: 21574 1    C: 34041 0    C: 27056 1    I: 77650 1    C: 77211 0       40102 0
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OCTAL LISTING FOR PARAGRAPH # 217,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

37,3400       74744 0       00006 1       13326 1       06042 1    I: 52034 1    C: 21574 1    C: 77144 0    C: 04066 0
37,3410       34757 0       03527 1       35031 0       05072 1    C: 03671 1    C: 14063 1       03541 1       40103 1
37,3420       74773 1       26103 1       44735 0       70076 1       54076 1       34751 0       55256 0       37713 0
37,3430       05105 0    C: 02463 1    C: 46067 1       34752 0       03523 0       35000 1       05224 0       43535 0

37,3440       60030 1       10010 0       44753 0       13445 0       34753 1       26030 0       03536 1       34756 1
37,3450       03527 1       34753 1       55256 0       34736 1       05105 0    C: 02206 1    C: 66067 0       34743 0
37,3460       00006 1       05011 1       30103 0       74747 0       00006 1       13515 1       30102 1       74744 0
37,3470       00006 1       13513 1       10754 0       13513 1       34757 0       55055 1       40025 1       64756 1

37,3500       64734 0       64734 0       57054 1       34361 1       54001 1       40000 0       52754 0       36007 0
37,3510       05203 0    C: 02106 0    C: 42067 0       34751 0       13434 0       00006 1       33534 0       53252 1
37,3520       34751 0       03523 0       05261 1       54001 1       40025 1       55062 0       13530 0       54001 1
37,3530       40001 1       52762 0       00002 0    C: 03661 0    C: 44067 0    C: 37771 1       00006 1       30025 0

37,3540       53561 0       44755 0       55253 0       55254 1       55255 0       34755 1       54330 0       54331 1
37,3550       54326 1       54327 0       54325 1       55256 0       00006 1       40040 1       53254 1       52040 1
37,3560       54324 0       22326 0       40041 0       57255 1       56041 1       54330 0       00006 1       31561 1
37,3570       53247 0       00006 1       41234 1       21247 0       30032 0       55154 1       30033 1       55155 0

37,3600       30034 0       55156 0       30324 1       55157 1       30326 0       55160 0       30330 1       55161 1
37,3610       30002 0       11256 0       13437 0       33651 0       54002 1       10330 0       13566 0       13622 0
37,3620       13566 0       13566 0       22007 0       10326 1       13627 0       13636 0       13627 0       22041 1
37,3630       11255 0       41255 0       13565 0       13631 1       22330 1       13566 0       11253 0       41253 0

37,3640       13643 1       13637 1       13554 1       54324 0       41254 1       54326 1       44755 0       52040 1
37,3650       13562 1    C: 03447 0       05504 0    C: 00054 0       00004 0       00006 1       30025 0       52315 1
37,3660       03711 0       03654 0       52155 1       52317 0       00004 0       04616 1    C: 17166 0       05516 0
37,3670    C: 00007 0       05516 0    C: 00010 0       34741 1       00006 1       05013 0       05353 1    C: 07024 0

37,3700    C: 20000 0    C: 03731 1    C: 76060 0       34774 1       04616 1    C: 20624 0       13703 1       13703 1
37,3710       13703 1       00006 1       22156 0       04103 1       00003 1       52155 1       34747 1       54001 1
37,3720       34755 1       20155 1       44346 0       70155 1       56155 0       74346 0       10000 0       24156 0
37,3730       00156 0       44741 0       00006 1       03013 0       00004 0       34755 1       54001 1       52025 1

37,3740       03711 0       03734 1       00006 1       40317 0       20155 1       34742 1       07312 0       34755 1
37,3750       54156 1       07262 0       10154 0       03760 0       03760 0       03756 0       34742 1       26154 0
37,3760       00006 1       30315 0       20155 1       07262 0       52155 1       20025 1       05516 0    C: 00054 0
37,3770       06001 0    C: 03771 0    C: 03772 0  CKSM 47000 1          @             @             @             @
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OCTAL LISTING FOR PARAGRAPH # 220,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2000      35017 1     05105 0  C: 02017 0  C: 60104 1     34740 0     05146 1     32076 1     04616 1
40,2010   C: 20353 0     05563 1     05563 1     05563 1     34751 0     05464 1     05155 0     00006 1
40,2020      30036 1     52155 1     06042 1  I: 77624 1  C: 46065 0  C: 00001 0  C: 14007 0  C: 06524 1
40,2030   C: 24011 1  C: 00007 0  I: 77656 1  C: 00007 0  I: 77641 1  C: 06516 0  C: 24021 1  C: 06522 1

40,2040   I: 77641 1  C: 00007 0  C: 34023 1  C: 47322 1  I: 43244 1  C: 60047 1  C: 06532 0  C: 26203 1
40,2050   C: 00001 0  I: 77641 1  C: 06520 0  C: 24023 0  C: 00001 0  I: 77641 1  C: 00007 0  C: 34021 0
40,2060   C: 47322 1  I: 43244 1  C: 60064 0  C: 06532 0  C: 02201 0  I: 77776 1     34777 1     04616 1
40,2070   C: 01736 1     34747 1     71043 0     10000 0     02017 0     05472 0  C: 04070 1     34753 1

40,2100      57011 0     54115 0     11041 1     02105 1     02112 1     42156 0     60154 1     00006 1
40,2110      12112 0     04374 0     56154 1     54117 1     50000 1     02116 0     03470 1     02175 0
40,2120      02175 0     02175 0     02175 0     02175 0     02175 0     02175 0     02161 0     02161 0
40,2130      03470 1     03470 1     03470 1     03470 1     03470 1     03470 1     02173 0     02354 1

40,2140      03646 0     03470 1     03470 1     03470 1     03470 1     03470 1     03470 1     03524 1
40,2150      02407 0     02374 0     02157 0     03470 1     02467 0     02370 1  C: 00022 1     04635 0
40,2160   C: 62002 1     10776 0     02166 1     02166 1     05155 0     05155 0     36250 0     70777 1
40,2170      10000 0     02175 0     03470 1     34755 1     54117 1     10776 0     02202 0     02202 0

40,2200      02201 0     05155 0     02324 0     11014 1     34755 1     55014 1     02207 0     50117 0
40,2210      34066 0     74346 0     54124 1     30776 1     54143 0     03356 1     36250 0     70777 1
40,2220      10000 0     02232 0     50137 1     57000 0     54022 0     40022 0     40022 0     56022 1
40,2230      60117 0     02247 1     50137 1     57000 0     54154 0     34755 1     54155 1     34363 0

40,2240      07312 0     56155 0     60117 0     54155 1     02247 1     26154 0     02265 1     50137 1
40,2250      55000 1     40776 0     50137 1     62315 1     00006 1     12257 1     02312 0     36250 0
40,2260      70777 1     10000 0     02265 1     40776 0     02313 1     44753 0     60137 1     00006 1
40,2270      62263 1     37106 1  C: 02322 0     36250 0     70777 1     50000 1     02276 0     02303 0

40,2300      00006 1     40156 1     52156 1     56156 0     50137 1     55003 1     56155 0     50137 1
40,2310      55000 1     02263 1     10776 0     54776 0     05155 0  C: 00022 1  C: 00020 0  C: 00012 1
40,2320   C: 00005 1  C: 00000 1  C: 05174 0  C: 13261 0     50776 1     32330 0     54137 0     00002 0
40,2330   C: 00004 0  C: 00004 0  C: 00004 0  C: 00004 0  C: 00004 0  C: 00003 1  C: 00003 1  C: 00003 1

40,2340   C: 00003 1  C: 00003 1  C: 00002 0  C: 00002 0  C: 00002 0  C: 00002 0  C: 00002 0     05675 0
40,2350   C: 00001 0  C: 00001 0  C: 00000 1  C: 00000 1     34755 1     55000 1     34360 0     54776 0
40,2360      02601 1     34753 1     54777 1     34755 1     55012 1     34217 1     54136 1     05155 0
40,2370      34755 1     55001 0     34361 1     02357 1     02446 0     02433 1     34752 0     50137 1
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OCTAL LISTING FOR PARAGRAPH # 221,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,2400      64745 0      26777 1      11014 1      34755 1      55014 1      02406 1      05155 0      02446 0
40,2410      02413 0      34753 1      02377 0      22002 0      02324 0      50137 1      32441 1      54123 0
40,2420      64753 1      54122 1      34755 1      54124 1      56123 1      03440 1      34741 1      54124 1
40,2430      56122 0      03440 1      00001 0      22002 0      02324 0      50137 1      32441 1      54122 1

40,2440      64753 1      54123 0      02422 1   C: 00005 1   C: 00003 1   C: 00000 1      22002 0      36250 0
40,2450      70777 1      10000 0      05155 0      44317 1      02462 0      44320 0      02462 0      44321 1
40,2460      02462 0      05155 0      60776 1      00006 1      12466 0      00002 0      00001 0      10776 0
40,2470      64753 1      02473 0      64753 1      50000 1      32330 0      54137 0      11014 1      02505 0

40,2500      02502 1      02502 1      30137 1      02527 0      02522 0      10137 0      54137 0      02527 0
40,2510      32577 0      27012 1      30137 1      54125 0      00006 1      27000 1      04616 1   C: 62342 0
40,2520      30125 1      54137 0      02525 1      25014 0      05155 0      22002 0      02540 1      67751 0
40,2530      10000 0      00002 0      05675 0      05155 0      00002 0      54776 0      22002 0      02324 0

40,2540      34755 1      50137 1      55000 1      50137 1      55003 1      54124 1      50137 1      44745 1
40,2550      70777 1      72600 1      54777 1      50137 1      32570 1      54143 0      03356 1      50137 1
40,2560      32573 1      54776 0      02601 1      44752 1      26776 0      02601 1      50137 1      34315 1
40,2570      54776 0      00001 0   C: 00016 0   C: 00005 1   C: 00004 0   C: 00015 0   C: 00011 1   C: 00003 1

40,2600   C: 77774 0      30776 1      54021 0      42614 1      00004 0      50021 1      57022 0      00006 1
40,2610      62612 0      25015 1      00003 1      00002 0   C: 04000 0      34755 1      54156 1      02706 1
40,2620      02622 0      02701 0      02717 1      02625 1      02615 1      30154 1      74733 0      00006 1
40,2630      12634 0      40154 0      64753 1      54154 0      00002 0      00006 1      00033 1      00006 1

40,2640      74742 0      40000 0      76250 1      54154 0      02733 1      02671 0      40110 0      74751 1
40,2650      10000 0      02657 1      52155 1      20001 1      20001 1      20001 1      52155 1      07106 1
40,2660   C: 00123 1      02745 0      02671 0      00006 1      42670 0      20155 1      02657 1   C: 00001 0
40,2670   C: 01150 1      34733 1      70154 0      54155 1      30154 1      60000 1      74753 0      54154 0

40,2700      00002 0      00006 1      50156 0      32730 1      52124 1      00002 0      10154 0      00002 0
40,2710      00002 0      12712 0      44735 0      70154 0      54154 0      50002 0      00001 0      00006 1
40,2720      50156 0      32730 1      52155 1      07312 0      52124 1      20155 1      02736 1   C: 05605 1
40,2730   C: 03656 1   C: 16314 0   C: 31463 1      52124 1      52155 1      04415 0      04635 0   C: 62570 1

40,2740      52124 1      52155 1      04415 0      02745 0      02757 0      56156 0      56155 0      54154 0
40,2750      02736 1      02757 0      02736 1      02757 0      36245 1      03207 1      02736 1      56002 0
40,2760      54162 0      03003 1      07262 0      07106 1   C: 00123 1      00162 1      02536 0      02413 0
40,2770      30154 1      03342 1      46250 1      50117 0      64317 0      54776 0      03003 1      30155 0
```

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OCTAL LISTING FOR PARAGRAPH # 222,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC  INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3000        03342 1      04635 0   C: 62572 0      56002 0      54144 1      50140 1      03006 1      03023 0
40,3010        50117 0      30150 0      74356 1      04313 1      00006 1      50000 1      30001 0      52155 1
40,3020        34755 1      54156 1      00144 0      30145 1      03014 1      50140 1      03026 0      03031 0
40,3030        03454 1      00006 1      50145 1      30001 0      52155 1      34317 0      54776 0      34755 1

40,3040        54156 1      07262 0      03327 1      00136 0      07106 1   C: 03130 0      10155 1      34741 1
40,3050        03052 0      44741 0      60155 0      03221 0      04404 0      04404 0      03230 0      04404 0
40,3060        10154 0      03065 1      03065 1      40000 0      54154 0      10162 0      03124 0      03077 1
40,3070        10154 0      35675 0      03122 0      03074 1      56154 1      74733 0      54154 0      50140 1

40,3100        03100 0      03104 1      03114 0      03105 0      03117 0      40000 0      64752 0      00006 1
40,3110        13112 1      02625 1      04635 0   C: 63200 0      04616 1   C: 63057 0      03103 0      04616 1
40,3120     C: 63051 0      03105 0      44733 0      03076 0      40154 0      74733 0      40000 0      03076 0
40,3130     C: 26161 0   C: 30707 1      07106 1   C: 00123 1      56156 0      56155 0      56154 1      00006 1

40,3140        13142 1      04145 0      03217 0      03230 0      03112 0      07106 1   C: 00123 1      03142 0
40,3150        07106 1   C: 00123 1      56156 0      60000 1      54156 1      34755 1      60155 0      03221 0
40,3160        03230 0      50140 1      03162 1      03173 1      30117 0      60145 1      54002 1      56155 0
40,3170        50002 0      54001 1      03112 0      34755 1      03165 0      07106 1   C: 00123 1      36245 1

40,3200        03207 1      03152 1      07106 1   C: 00123 1      34752 0      03207 1      03152 1      56002 0
40,3210        54124 1      56002 0      54123 0      04404 0      10123 0      03212 0      00124 0      56155 0
40,3220        60000 1      54155 1      00002 0      60154 1      54154 0      00002 0      54162 0      00002 0
40,3230        10162 0      04145 0      00002 0      04145 0      56002 0      54144 1      10154 0      03247 0

40,3240        03247 0      64753 1      54154 0      02433 1      40155 1      54155 1      00144 0      02413 0
40,3250        00144 0      30006 1      33315 0      20155 1      00006 1      13261 0      00006 1      34733 1
40,3260        52155 1      30002 0      56002 0      54115 0      03234 1      03251 1      34751 0      54137 0
40,3270        34363 0      07312 0      50154 1      34066 0      74346 0      54124 1      34755 1      56156 0

40,3300        56155 0      54154 0      56776 1      54143 0      10000 0      54776 0      03356 1      10137 0
40,3310        03267 1      44360 1      54776 0      00115 1   C: 00000 1   C: 02476 0      56002 0      54115 0
40,3320        03234 1      03266 0      56002 0      54115 0      03234 1      34753 1      03267 1      56002 0
40,3330        54115 0      34755 1      54124 1      36250 0      03440 1      34751 0      03440 1      03234 1

40,3340        34320 1      03267 1      00006 1      73352 1      22154 1      34755 1      54155 1      56002 0
40,3350        54115 0      03325 0   C: 00244 0      03342 1      04635 0   C: 62351 1      56002 0      54114 1
40,3360        34346 1      70143 0      54021 0      56021 1      54141 1      34753 1      70143 0      10000 0
40,3370        03372 1      03402 1      56124 0      04340 1      54124 1      34736 1      70143 0      10000 0
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OCTAL LISTING FOR PARAGRAPH # 223,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

40,3400       34752 0      64753 1      54143 0      00004 0      50141 0      11022 1      03410 1      05675 0
40,3410       64753 1      54142 1      50143 1      73434 0      00006 1      60124 0      00006 1      13432 0
40,3420       50143 1      43434 0      70142 1      60124 0      40000 0      50141 0      57022 0      00006 1
40,3430       63432 1      25015 1      00003 1      00114 0   C: 00037 0   C: 01740 0   C: 02000 0   C: 03740 1

40,3440       54141 1      34752 0      54143 0      56002 0      54114 1      03403 0      03356 1      33451 1
40,3450       04640 1   C: 63436 0      44360 1      54776 0      43475 0      60136 0      00006 1      13472 1
40,3460       43474 1      60136 0      00006 1      13465 1      03470 1      04204 0      04364 1      04124 1
40,3470       04364 1      05155 0      05642 1   C: 21501 0   C: 04124 1      04202 0      34753 1      55013 0

40,3500       04204 0      04457 0      04433 1      03612 1      44753 0      03477 0      41000 1      63523 0
40,3510       00006 1      26030 0      00006 1      13470 0      34755 1      55012 1      44360 1      54776 0
40,3520       03476 1      44755 0      03477 0   C: 00026 0      44751 1      00006 1      03011 1      10115 0
40,3530       34736 1      71020 0      10000 0      03542 1      04457 0      11041 1      03540 0      05155 0

40,3540       04635 0   C: 21051 0      34755 1      55011 1      11041 1      05155 0      04502 1      05155 0
40,3550       30776 1      54132 0      34753 1      03572 1      34317 0      02535 0      34752 0      03572 1
40,3560       34320 1      02535 0      34751 0      03572 1      34321 0      02535 0      30132 1      54776 0
40,3570       52131 0      05166 0      70123 0      10000 0      00002 0      50002 0      00002 0      34362 1

40,3600       56776 1      54140 0      11010 0      64753 1      03342 1      03607 0      02601 1      56140 1
40,3610       54776 0      05155 0      11041 1      03615 0      05155 0      34755 1      57041 0      00004 0
40,3620       05137 1      11013 0      03644 1      05155 0      03642 1      34752 0      50064 0      60164 1
40,3630       50064 0      54164 0      31001 1      54001 1      31000 0      50064 0      52155 1      00003 1

40,3640       04457 0      05155 0      34755 1      03626 0      34753 1      03626 0      56115 1      55011 1
40,3650       00004 0      34742 1      00006 1      05011 1      33735 0      71035 1      64735 1      55035 1
40,3660       45026 1      71300 1      65026 0      55300 1      44742 0      71277 0      64742 1      55277 0
40,3670       43734 0      70110 0      64745 0      54110 0      06022 1      44742 0      00006 1      03013 0

40,3700       43733 1      00006 1      03011 1      34363 0      54117 1      00004 0      50117 0      11022 1
40,3710       64753 1      03716 1      64753 1      40000 0      73736 1      03721 0      40000 0      73736 1
40,3720       40000 0      50117 0      55022 1      00003 1      10117 1      03704 1      34755 1      54375 1
40,3730       54376 1      55357 0      05155 0   C: 00104 1   C: 00330 1   C: 00050 1   C: 73777 1      35015 0

40,3740       05105 0   C: 03121 0   C: 76067 1      05221 0   C: 00144 0      31043 1      74740 1      00006 1
40,3750       13743 0      35017 1      05072 1   C: 03113 1   C: 76067 1      15261 0   C: 03756 0   C: 03757 1
40,3760  CKSM 52401 0        @            @            @            @            @            @            @
40,3770         @            @            @            @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 224,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2000       03557 0     03020 0     34755 1     55014 1     34217 1     54136 1     11012 1     02035 0
41,2010       02035 0     02012 0     32033 0     61012 0     00006 1     12027 1     36250 0     70777 1
41,2020       10000 0     02023 1     02027 0     10776 0     02353 0     02353 0     02027 0     41012 1
41,2030       55012 1     04433 1     01012 0  C: 03444 0  C: 00034 0     34755 1     54777 1     44360 1

41,2040       54776 0     41000 1     55040 0     62034 1     00006 1     62133 1     00006 1     32114 1
41,2050       52006 0     50140 1     02052 1     02055 0     02221 1     10146 0     02131 0     02353 0
41,2060       02064 1     25016 1     04311 0     02120 0     34735 1     55014 1     44217 0     60136 0
41,2070       00006 1     12073 0     02116 0     02311 0     10777 1     04145 0     44360 1     54776 0

41,2100       11041 1     02104 0     02105 1     02104 0     04427 1     57004 1     04303 0     00006 1
41,2110       32114 1     52006 0     02133 1  C: 02103 1  C: 64101 0  C: 77772 0     30156 0     04303 0
41,2120       44756 0     61000 0     00006 1     12133 0     34321 0     54776 0     31016 1     03410 1
41,2130       02133 1     64753 1     04303 0     42145 1     61000 0     10000 0     64753 1     02141 1

41,2140       02146 0     54154 0     04457 0     04635 0  C: 66000 1  C: 00050 1     51000 0     32151 0
41,2150       04640 1  C: 62353 0  C: 62367 1  C: 62375 1  C: 62402 0  C: 62362 1  C: 62355 0  C: 62525 1
41,2160    C: 61025 1  C: 62353 0  C: 62353 0  C: 61454 0  C: 63255 0  C: 63255 0  C: 63255 0  C: 63255 0
41,2170    C: 63255 0  C: 63255 0  C: 63255 0  C: 62353 0  C: 62353 0  C: 62353 0  C: 62755 1  C: 62766 1

41,2200    C: 63003 1  C: 62726 0  C: 62622 0  C: 62353 0  C: 63400 0  C: 62353 0  C: 62353 0  C: 63501 0
41,2210    C: 63525 0  C: 61521 0  C: 61476 0  C: 61504 1  C: 63626 0  C: 12447 0  C: 63443 1  C: 62353 0
41,2220    C: 62353 0     10146 0     02226 0     02353 0     02226 0     02226 0     46245 0     61000 0
41,2230       00006 1     62233 1     02133 1     34752 0     54117 1     62260 1     54145 0     50117 0

41,2240       30150 0     54122 1     03057 0     02261 0     02246 0     24122 0     30122 0     74356 1
41,2250       04313 1     50000 1     30000 1     50145 1     56000 1     10117 1     02234 0     02133 1
41,2260       00125 1     50000 1     12263 0     00002 0     00002 0     00002 0     00002 0     12303 1
41,2270       12303 1     00002 0     12303 1     00002 0     00002 0     12303 1     00002 0     00002 0

41,2300       00002 0     00002 0     00002 0     50002 0     00001 0     34317 0     12312 1     34320 1
41,2310       12312 1     34321 0     54776 0     40002 1     55012 1     04616 1  C: 60536 1     04427 1
41,2320       00136 0     55001 0     56002 0     54117 1     00006 1     32114 1     52006 0     10146 0
41,2330       64753 1     12334 0     12335 1     12335 1     04303 0     34361 1     54776 0     31001 1

41,2340       12347 1     55000 1     56002 0     54117 1     34360 0     54776 0     31000 0     04635 0
41,2350    C: 61353 0     00117 0     04145 0     04635 0  C: 61454 0     44752 1     02426 0     50145 1
41,2360       40002 1     56132 1     44753 0     02426 0     50145 1     40001 1     56131 1     02445 0
41,2370       02470 0     50145 1     40000 0     56130 0     02407 0     44753 0     02441 1     50145 1
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OCTAL LISTING FOR PARAGRAPH # 225,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,2400        40001 1     02373 1     44752 1     02441 1     50145 1     40002 1     02373 1     44752 1
41,2410        61000 0     10000 0     02415 0     00136 0     02415 0     54122 1     50000 1     34317 0
41,2420        54776 0     50122 0     40130 1     03410 1     56122 0     02411 1     54123 0     22002 0
41,2430        02517 0     04331 1     76250 1     60123 1     10000 0     00001 0     05675 0     02353 0

41,2440        00001 0     54123 0     22002 0     02445 0     02430 1     00006 1     22156 0     02517 0
41,2450        74736 0     10000 0     02353 0     00156 0     22002 0     02517 0     74736 0     10000 0
41,2460        04145 0     00001 0     22002 0     02517 0     10000 0     00001 0     00001 0     02353 0
41,2470        22002 0     30146 1     64753 1     00006 1     12506 1     50140 1     02476 0     02501 1

41,2500        00001 0     03051 0     02261 0     00001 0     24145 1     00001 0     31016 1     75004 1
41,2510        00006 1     50000 1     00000 1     40000 0     12373 0  C: 00147 0  C: 00146 1     50140 1
41,2520        32514 0     50030 1     30000 1     74350 1     00002 0     02517 0     04331 1     76250 1
41,2530        54117 1     54122 1     60145 1     50000 1     40000 0     50122 0     57002 1     10122 1

41,2540        02531 1     34755 1     54155 1     54156 1     50117 0     34317 0     54776 0     50117 0
41,2550        41002 0     54154 0     03072 1     54123 0     00006 1     32567 1     52006 0     50140 1
41,2560        02560 0     02564 1     03057 0     02577 0     03051 0     02577 0  C: 02141 1  C: 64101 0
41,2570        04616 1  C: 61262 0     10117 1     02575 1     00136 0     54117 1     02541 0     50000 1

41,2600        32602 1     04640 1  C: 61452 0  C: 62570 1  C: 60615 0  C: 60733 0  C: 60744 0  C: 60751 1
41,2610     C: 60635 1  C: 60753 0  C: 65230 0  C: 65303 1  C: 60751 1  C: 60740 1  C: 60766 0  C: 60623 0
41,2620     C: 60645 0  C: 60662 0     44752 1     02426 0     02462 0     33031 0     02341 0     02305 0
41,2630        33032 0     02341 0     02307 1     33033 1     02341 0     02311 0     46245 0     03034 0

41,2640        00006 1     32114 1     52006 0     34755 1     03120 1     50145 1     54000 0     34753 1
41,2650        03120 1     50145 1     54001 1     34752 0     03120 1     50145 1     54002 1     44757 1
41,2660        61001 1     00006 1     12664 0     03020 0     00004 0     44763 0     61002 1     00006 1
41,2670        62700 1     31002 1     04304 1     50145 1     30000 1     54001 1     34753 1     55002 0

41,2700        64361 1     00006 1     12724 0     31004 1     00006 1     62713 0     31003 0     00006 1
41,2710        51002 1     05000 1     12717 0     41003 1     00006 1     51002 1     03000 1     11002 0
41,2720        10000 0     12724 0     50145 1     22000 1     00003 1     03020 0     44753 0     02426 0
41,2730        02462 0     33031 0     02341 0     02305 0     33032 0     02341 0     02307 1     44756 0

41,2740        03034 0     00006 1     32114 1     52006 0     34755 1     03120 1     50145 1     54000 0
41,2750        34753 1     03120 1     50145 1     54001 1     03020 0     02305 0     00006 1     32114 1
41,2760        52006 0     34755 1     03120 1     50145 1     54000 0     03020 0     44753 0     02426 0
41,2770        34735 1     55014 1     02307 1     00006 1     32114 1     52006 0     34753 1     03120 1
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OCTAL LISTING FOR PARAGRAPH # 226,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3000          50145 1      54001 1      03020 0      44752 1      02426 0      34735 1      55014 1      02311 0
41,3010          00006 1      32114 1      52006 0      34752 0      03120 1      50145 1      54002 1      03020 0
41,3020          34755 1      54777 1      44755 0      55013 0      04457 0      44360 1      54776 0      04635 0
41,3030       C: 61612 0   C: 00025 0   C: 00026 0   C: 00027 1      54117 1      40777 1      54021 0      40021 0

41,3040          40021 0      10000 0      13044 0      00002 0      60117 0      00006 1      13050 0      04145 0
41,3050          00002 0      56002 0      54114 1      34347 0      70147 1      04322 0      00114 0      56002 0
41,3060          54114 1      50117 0      33111 0      54001 1      50117 0      34346 1      70153 1      50001 0
41,3070          00000 1      00114 0      56002 0      54114 1      50140 1      03075 0      03114 0      50117 0

41,3100          33111 0      54001 1      50117 0      34346 1      70147 1      50001 0      00000 1      60000 1
41,3110          00114 0      03050 1      04322 0      04331 1      34346 1      70147 1      60000 1      00114 0
41,3120          54117 1      56002 0      54115 0      34755 1      54162 0      50117 0      57005 0      54155 1
41,3130          50117 0      57002 1      54154 0      50140 1      03134 1      03162 1      50117 0      30150 0

41,3140          74356 1      04303 0      00006 1      60117 0      54145 0      10777 1      03217 0      02454 0
41,3150          03057 0      02261 0      03200 0      24145 1      30145 1      26117 1      34755 1      50117 0
41,3160          53777 0      03200 0      04311 0      10777 1      03217 0      02454 0      03051 0      02261 0
41,3170          03174 0      34755 1      54117 1      03153 0      30146 1      64753 1      00006 1      13204 0

41,3200          56154 1      00115 1   C: 02147 1   C: 64101 0      44757 1      61016 1      00006 1      13020 1
41,3210          31016 1      75004 1      56154 1      00006 1      50154 1      01000 0      03020 0      03072 1
41,3220          54123 0      00016 1      33203 0      52006 0      50140 1      03225 1      03231 1      03057 0
41,3230          03232 1      03051 0      50000 1      33235 0      04640 1   C: 62352 1   C: 61142 1   C: 61044 0

41,3240       C: 61132 0   C: 61150 1   C: 61175 0   C: 61454 0   C: 61150 1   C: 65452 1   C: 61454 0   C: 61202 0
41,3250       C: 61145 0   C: 61454 0   C: 61044 0   C: 61454 0   C: 61454 0      43264 0      71016 0      54155 1
41,3260          40136 1      64217 1      10000 0      03272 0   C: 60000 1      03272 0      34736 1      26155 1
41,3270          34755 1      55021 1      36077 1      71000 1      04331 1      54022 0      40022 0      56022 1

41,3300          61001 1      54154 0      34755 1      55011 1      11041 1      03307 0      04502 1      00004 0
41,3310          11017 1      03316 0      34753 1      05203 0   C: 03322 1   C: 62101 0      52155 1      53020 0
41,3320          00003 1      00136 0      04400 1      11020 0      03330 1      03330 1      03341 1      03341 1
41,3330          33345 0      05203 0   C: 03322 1   C: 62101 0      34355 0      05072 1   C: 03346 0   C: 62101 0

41,3340          05261 1      34755 1      55017 1      55020 0      05261 1   C: 00144 0      11020 0      03353 1
41,3350          03353 1      05155 0      05155 0      11011 1      03376 0      36077 1      71017 1      02321 0
41,3360          34144 1      71017 1      63374 1      54023 1      30023 0      55000 1      33375 0      54136 1
41,3370          43264 0      71020 0      54156 1      02046 1   C: 75377 0   C: 04124 1      04374 0      05155 0
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OCTAL LISTING FOR PARAGRAPH # 227,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

41,3400        34317 0     54776 0     31046 1     54001 1     31016 1     04651 1     03410 1     05155 0
41,3410        54022 0     56002 0     54115 0     34736 1     26776 0     34751 0     54137 0     40022 0
41,3420        40022 0     40022 0     40000 0     74757 1     50000 1     34066 0     74346 0     54124 1
41,3430        56776 1     54143 0     10000 0     54776 0     04635 0  C: 61446 0     10137 0     03416 1

41,3440        44360 1     54776 0     00115 1     03465 0     34747 1     60776 1     00006 1     13451 0
41,3450        04145 0     34755 1     57001 1     54154 0     34361 1     54776 0     04616 1  C: 60601 0
41,3460        44360 1     54776 0     30154 1     04635 0  C: 10040 1     40002 1     55012 1     34361 1
41,3470        54776 0     34755 1     55001 0     04616 1  C: 60601 0     04427 1     34753 1     54777 1

41,3500        00136 0     34753 1     71044 1     10000 0     03523 0     34351 1     54154 0     44753 0
41,3510        71044 1     54160 1     04457 0     34217 1     54157 0     00006 1     31046 1     52156 1
41,3520        30160 0     00004 0     00154 1     34354 1     03506 1     34352 1     54154 0     31044 0
41,3530        03511 1     64757 0     00004 0     54124 1     44740 1     50124 0     57022 0     10000 0

41,3540        25015 1     03542 1     10124 1     03533 1     00003 1     50123 1     03553 1     03550 1
41,3550        55000 1     55001 0     55014 1     44360 1     54776 0     04433 1     03601 0     33603 1
41,3560        54136 1     10123 0     03566 1     02353 0     03531 0     02353 0     36077 1     70123 0
41,3570        54157 0     30123 1     54023 1     30023 0     54160 1     10157 0     03604 0     30160 0

41,3600        02341 0     34755 1     55012 1     04202 0     10160 1     03611 1     30157 1     02321 0
41,3610        04202 0     30156 0     54161 0     30160 0     02341 0     30157 1     02321 0     34755 1
41,3620        55013 0     55014 1     55012 1     30161 1     54156 1     02035 0     00004 0     04616 1
41,3630     C: 66121 0     44753 0     71300 1     64753 1     55300 1     33674 1     00006 1     05011 1

41,3640        33675 0     55035 1     06022 1     34742 1     00006 1     05013 0     34363 0     54117 1
41,3650        43672 0     50117 0     55022 1     10117 1     03647 1     43673 1     55023 0     55026 0
41,3660        55030 1     34760 1     55015 0     00003 1     33677 1     00004 0     05203 0  C: 03700 0
41,3670     C: 62102 0     05155 0  C: 05675 0  C: 07675 1  C: 00175 1  C: 40674 0  C: 00115 1  C: 00764 1

41,3700        34355 0     05072 1  C: 03705 0  C: 62102 0     05261 1     43676 1     00004 0     00006 1
41,3710        03011 1     06022 1     44742 0     00006 1     03013 0     34750 1     00006 1     02012 0
41,3720        64735 1     55035 1     43745 0     71300 1     65026 0     55300 1     43747 1     71277 0
41,3730        65025 0     55277 0     43746 0     70110 0     64745 0     54110 0     00003 1     04616 1

41,3740     C: 10622 0     04204 0     04433 1     04635 0  C: 61534 1  C: 16001 1  C: 00330 1  C: 55000 1
41,3750     C: 03750 0  C: 03751 1 CKSM 61045 1       @           @           @           @           @
41,3760           @           @           @           @           @           @           @           @
41,3770           @           @           @           @           @           @           @           @
```

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OCTAL LISTING FOR PARAGRAPH # 230,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2000     C: 26723 0  C: 00450 0     35021 1     05146 1     32034 1     04616 1  C: 20334 1     05472 0
42,2010        05472 0     42033 1     60154 1     00006 1     12016 0     05472 0     00004 0     34755 1
42,2020        54156 1     54001 1     52025 1     52155 1     53051 0     20155 1     07262 0     52155 1
42,2030        20025 1     30003 1     05472 0  C: 00027 1  C: 06230 0     34752 0     54002 1     50000 1

42,2040        30321 1     00006 1     72053 1     50002 0     56050 1     10002 1     12036 1     37743 0
42,2050        00006 1     05014 1     15261 0  C: 03146 1     05516 0  C: 00027 1     05516 0  C: 00031 0
42,2060        05516 0  C: 00007 0     06042 1  I: 77624 1  C: 27410 1  I: 77776 1     05353 1  C: 00002 0
42,2070        00004 0     04674 0  C: 40166 1     04674 0  C: 40115 0     06011 1     44736 0     00006 1

42,2100        03012 1     04635 0  C: 12766 0     52152 0     51001 1     32154 0     54146 0     51001 1
42,2110        32320 1     54147 1     41001 0     64771 1     00006 1     62121 1     34753 1     54140 0
42,2120        02137 0     34752 0     54140 0     51001 1     33064 0     54153 1     35012 1     70146 0
42,2130        54002 1     50000 1     32650 0     54150 1     00006 1     50002 0     32652 1     52152 0

42,2140        52006 0     52124 1     00006 1     50000 1     32557 1     52124 1     52006 0     52124 1
42,2150        00006 1     51000 1     32465 1     12145 1  C: 00000 1  C: 40000 0  C: 40000 0  C: 40000 0
42,2160     C: 01044 0  C: 01044 0  C: 01143 0  C: 01002 1  C: 01363 0  C: 00375 0  C: 77776 1  C: 03633 1
42,2170     C: 01050 0  C: 01776 0  C: 01050 0  C: 77777 0  C: 01050 0  C: 00000 1  C: 02344 0  C: 00000 1

42,2200     C: 00032 0  C: 00037 0  C: 00321 1  C: 00000 1  C: 01050 0  C: 01044 0  C: 01044 0  C: 01362 1
42,2210     C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 02142 1  C: 03441 0  C: 01044 0  C: 03453 0
42,2220     C: 00024 1  C: 03635 1  C: 01516 1  C: 00000 1  C: 64000 0  C: 02003 0  C: 24006 1  C: 24011 1
42,2230     C: 64014 0  C: 64017 0  C: 00022 1  C: 22025 0  C: 22030 1  C: 24033 1  C: 00000 1  C: 22041 1

42,2240     C: 00044 1  C: 00000 1  C: 24052 0  C: 24055 1  C: 02060 0  C: 00000 1  C: 24066 1  C: 24071 1
42,2250     C: 24074 1  C: 64077 0  C: 64102 0  C: 24105 0  C: 64110 0  C: 24113 1  C: 62116 0  C: 04121 1
42,2260     C: 64124 1  C: 24127 0  C: 04132 0  C: 04135 1  C: 02140 0  C: 02143 0  C: 64146 0  C: 64151 0
42,2270     C: 24154 1  C: 62157 0  C: 64162 0  C: 24165 0  C: 02170 0  C: 24173 1  C: 24176 1  C: 24201 1

42,2300     C: 24204 1  C: 24207 1  C: 24212 0  C: 02215 0  C: 24220 1  C: 24223 1  C: 24226 1  C: 04231 0
42,2310     C: 04234 0  C: 04237 0  C: 00000 1  C: 00000 1  C: 00000 1  C: 04253 1  C: 04256 1  C: 24261 1
42,2320     C: 00000 1  C: 04040 1  C: 04140 0  C: 04102 0  C: 00504 0  C: 00504 0  C: 04000 0  C: 04000 0
42,2330     C: 04000 0  C: 04000 0  C: 00000 1  C: 24400 0  C: 02000 0  C: 24400 0  C: 04140 0  C: 00000 1

42,2340     C: 24400 0  C: 00000 1  C: 04102 0  C: 00000 1  C: 04102 0  C: 04140 0  C: 04102 0  C: 00000 1
42,2350     C: 24400 0  C: 04140 0  C: 04000 0  C: 00140 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1
42,2360     C: 24400 0  C: 24400 0  C: 24400 0  C: 24400 0  C: 24400 0  C: 24400 0  C: 24400 0  C: 00000 1
42,2370     C: 24500 1  C: 00542 1  C: 24410 1  C: 20204 0  C: 00410 1  C: 10000 0  C: 00000 1  C: 00306 1
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OCTAL LISTING FOR PARAGRAPH # 231,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,2400      C: 01367 1   C: 00510 0   C: 00000 1   C: 00204 1   C: 00004 0   C: 00000 1   C: 10507 1   C: 10200 1
42,2410      C: 00204 1   C: 00000 1   C: 24510 0   C: 24512 1   C: 60521 1   C: 54000 0   C: 24012 1   C: 60512 1
42,2420      C: 60500 1   C: 00000 1   C: 00016 0   C: 53223 1   C: 60026 0   C: 61430 1   C: 00000 1   C: 00000 1
42,2430      C: 00102 1   C: 00102 1   C: 10200 1   C: 00010 0   C: 20512 0   C: 00500 1   C: 00654 0   C: 00102 1

42,2440      C: 00200 0   C: 24512 1   C: 24512 1   C: 24512 1   C: 24512 1   C: 24512 1   C: 24512 1   C: 00102 1
42,2450      C: 00300 1   C: 16143 0   C: 10507 1   C: 10450 1   C: 60500 1   C: 06143 1   C: 00000 1   C: 00000 1
42,2460      C: 00000 1   C: 00000 1   C: 00000 1   C: 71572 1   C: 00006 1   C: 03240 1   C: 00000 1   C: 00000 1
42,2470      C: 00000 1   C: 00000 1   C: 10707 0   C: 03435 0   C: 13070 1   C: 34345 1   C: 00005 1   C: 21616 0

42,2500      C: 26113 0   C: 31713 0   C: 00070 0   C: 20460 1   C: 01065 0   C: 05740 1   C: 11414 0   C: 31463 1
42,2510      C: 07475 0   C: 16051 1   C: 00001 0   C: 03434 1   C: 00047 1   C: 21135 0   C: 77766 0   C: 50711 0
42,2520      C: 00005 1   C: 25006 0   C: 00002 0   C: 23224 1   C: 00014 1   C: 06500 1   C: 00001 0   C: 03315 0
42,2530      C: 04256 1   C: 07071 0   C: 77766 0   C: 60557 0   C: 00005 1   C: 01114 1   C: 00007 0   C: 01247 1

42,2540      C: 04324 0   C: 27600 1   C: 00036 1   C: 20440 0   C: 00035 1   C: 30400 0   C: 23420 0   C: 00000 1
42,2550      C: 01670 1   C: 20000 0   C: 07475 0   C: 16051 1   C: 14400 0   C: 00000 1   C: 05174 0   C: 13261 0
42,2560      C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00714 0   C: 31463 1   C: 13412 1   C: 07534 1
42,2570      C: 05605 1   C: 03656 1   C: 00001 0   C: 16170 0   C: 00441 0   C: 34306 0   C: 07176 0   C: 21603 1

42,2600      C: 15340 1   C: 15340 1   C: 01031 1   C: 21032 0   C: 34631 1   C: 23146 0   C: 00636 1   C: 14552 0
42,2610      C: 74552 0   C: 70307 1   C: 05520 0   C: 15312 0   C: 14226 1   C: 31757 0   C: 02476 0   C: 05531 0
42,2620      C: 34731 0   C: 22542 1   C: 00007 0   C: 13734 0   C: 74477 0   C: 50643 0   C: 06265 0   C: 16004 1
42,2630      C: 04426 0   C: 31433 1   C: 34772 1   C: 07016 1   C: 01030 0   C: 33675 0   C: 01046 1   C: 15700 1

42,2640      C: 00321 1   C: 26706 1   C: 04231 0   C: 27400 0   C: 01031 1   C: 21032 0   C: 12172 0   C: 34122 1
42,2650      C: 03453 0   C: 03663 1   C: 03507 0   C: 01044 0   C: 01045 1   C: 00000 1   C: 02316 1   C: 02320 1
42,2660      C: 03663 1   C: 01117 1   C: 01121 1   C: 01123 0   C: 02117 1   C: 02121 1   C: 02140 0   C: 03462 1
42,2670      C: 03453 0   C: 02252 0   C: 01340 1   C: 00000 1   C: 00000 1   C: 01326 1   C: 01327 0   C: 00000 1

42,2700      C: 03002 0   C: 03001 0   C: 00000 1   C: 00314 1   C: 00316 0   C: 01356 0   C: 00000 1   C: 00000 1
42,2710      C: 00000 1   C: 02200 1   C: 02202 0   C: 00000 1   C: 01755 1   C: 00000 1   C: 00000 1   C: 00000 1
42,2720      C: 00000 1   C: 00000 1   C: 02200 1   C: 02202 0   C: 02204 0   C: 03466 0   C: 02256 1   C: 03620 0
42,2730      C: 02700 1   C: 02202 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 03605 1   C: 03575 0

42,2740      C: 02347 0   C: 02302 1   C: 02304 1   C: 02306 0   C: 03701 1   C: 03473 1   C: 03774 0   C: 03475 1
42,2750      C: 03453 0   C: 02616 1   C: 03471 0   C: 03453 0   C: 03507 0   C: 03471 0   C: 03473 1   C: 03774 0
42,2760      C: 03666 1   C: 03473 1   C: 03534 0   C: 00013 0   C: 00013 0   C: 00013 0   C: 02206 1   C: 00000 1
42,2770      C: 00000 1   C: 02200 1   C: 02202 0   C: 02204 0   C: 02616 1   C: 03475 1   C: 03664 0   C: 02640 1
```

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OCTAL LISTING FOR PARAGRAPH # 212,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3000     C: 02636 0   C: 02634 1   C: 00734 1   C: 00735 0   C: 00736 0   C: 00734 1   C: 00735 0   C: 00736 0
42,3010     C: 00035 1   C: 00036 1   C: 00000 1   C: 01106 1   C: 01107 0   C: 00000 1   C: 03453 0   C: 02362 1
42,3020     C: 02364 1   C: 03577 1   C: 02252 0   C: 02254 0   C: 02276 0   C: 02272 1   C: 03642 1   C: 03453 0
42,3030     C: 02310 1   C: 00000 1   C: 01330 0   C: 01331 1   C: 01271 1   C: 01235 1   C: 01237 0   C: 01241 1

42,3040     C: 03733 0   C: 03734 1   C: 00000 1   C: 03433 0   C: 03435 0   C: 03437 1   C: 03433 0   C: 03435 0
42,3050     C: 03437 1   C: 03622 1   C: 03624 1   C: 03626 0   C: 02222 1   C: 02224 1   C: 02226 0   C: 03501 0
42,3060     C: 03503 1   C: 03505 1   C: 03433 0   C: 03435 0   C: 03437 1   C: 01344 0   C: 01345 1   C: 00000 1
42,3070     C: 02706 1   C: 02710 0   C: 02712 1   C: 02706 1   C: 02710 0   C: 02712 1   C: 02200 1   C: 02202 0

42,3100     C: 02204 0   C: 03715 1   C: 03711 0   C: 03713 1   C: 03750 0   C: 03473 1   C: 03774 0   C: 02737 0
42,3110     C: 02741 1   C: 02743 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
42,3120     C: 00000 1   C: 00000 1   C: 00000 1   C: 01044 0   C: 01045 1   C: 01046 1   C: 01047 0   C: 01050 0
42,3130     C: 01051 1   C: 02200 1   C: 02202 0   C: 02204 0   C: 16351 1   C: 00142 0   C: 16347 0   C: 16512 0

42,3140     C: 22347 1   C: 24443 1   C: 00000 1   C: 00553 1   C: 00143 1   C: 06347 1   C: 00000 1   C: 00512 1
42,3150     C: 00012 1   C: 00000 1   C: 24344 1   C: 24503 1   C: 00512 1   C: 00000 1   C: 16347 0   C: 16347 0
42,3160     C: 10343 1   C: 24451 1   C: 16447 1   C: 10347 0   C: 10354 1   C: 20410 0   C: 00304 0   C: 10204 0
42,3170     C: 10452 0   C: 10204 0   C: 00000 1   C: 00000 1   C: 00115 1   C: 00115 1   C: 24511 1   C: 22447 0

42,3200     C: 16347 0   C: 00351 0   C: 22756 0   C: 06102 1   C: 00503 1   C: 16347 0   C: 16347 0   C: 16347 0
42,3210     C: 16347 0   C: 16347 0   C: 16347 0   C: 00102 1   C: 02041 0   C: 10347 0   C: 24344 1   C: 24507 0
42,3220     C: 10343 1   C: 16347 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 06143 1   C: 06043 0   C: 24247 0
42,3230        04616 1   C: 61003 0      07262 0      03417 0      07106 1   C: 03271 0      34321 0      54776 0

42,3240        04616 1   C: 61262 0      03435 0      33273 1      56154 1      55006 1      33274 0      56155 0
42,3250        04415 0      34320 1      54776 0      04616 1   C: 61262 0      00006 1      33300 1      52155 1
42,3260        31006 0      04415 0      34317 0      54776 0      04616 1   C: 61262 0      00136 0   C: 25660 0
42,3270     C: 31742 1   C: 01727 1   C: 01217 1   C: 00011 1   C: 32445 0   C: 02104 0   C: 10422 1   C: 05174 0

42,3300     C: 13261 0   C: 00000 1   C: 00062 0      04616 1   C: 61003 0      07262 0      10154 0      03311 1
42,3310        03342 1      63377 1      10000 0      03326 0      03342 1      03342 1      10155 1      03321 1
42,3320        03342 1      63400 0      10000 0      03326 0      03342 1      03342 1      10154 0      33402 1
42,3330        03337 0      43402 0      54154 0      43403 1      54155 1      33401 1      03420 1      54154 0

42,3340        33403 0      03334 0      03404 1      33375 0      07312 0      46250 1      26776 0      04616 1
42,3350     C: 61322 0      34755 1      54124 1      44752 1      50117 0      64317 0      54143 0      04616 1
42,3360     C: 61356 0      03435 0      56155 0      00006 1      73376 1      52155 1      50117 0      34317 0
42,3370        54776 0      04616 1   C: 61322 0      04635 0   C: 62572 0   C: 23147 1   C: 23346 1   C: 77753 0
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OCTAL LISTING FOR PARAGRAPH # 233,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

42,3400    C: 41126 1   C: 03343 0   C: 00025 0   C: 37016 1      10155 1      13414 1      13414 1      13410 0
42,3410       00006 1      43302 1      20155 1      13417 1      00006 1      33302 0      13412 1      56002 0
42,3420       54144 1      07106 1   C: 03267 1      00006 1      30155 0      53007 0      04404 0      04404 0
42,3430       34755 1      56156 0      56155 0      56154 1      00144 0      56002 0      54144 1      31007 1

42,3440       00006 1      74751 1      00006 1      74737 1      22155 0      31006 0      54154 0      07106 1
42,3450    C: 03275 1      00144 0      03573 0      07106 1   C: 03534 0      03543 0      34755 1      54156 1
42,3460       33536 1      54154 0      33537 0      56155 0      07312 0      03554 0      52156 1      52124 1
42,3470       31003 0      23006 0      52155 1      07106 1   C: 03534 0      03543 0      43541 0      03561 0

42,3500       56155 0      00006 1      73540 1      20124 1      00006 1      13507 1      04145 0      31004 1
42,3510       23007 1      52155 1      07106 1   C: 03534 0      03543 0      43542 0      03561 0      52124 1
42,3520       20155 1      00006 1      13524 0      04145 0      34755 1      54156 1      07262 0      52155 1
42,3530       50145 1      52001 1      04635 0   C: 63020 0   C: 00006 1   C: 03240 1   C: 00025 0   C: 37100 1

42,3540    C: 13560 0   C: 00073 0   C: 13557 1      56156 0      60000 1      54156 1      34755 1      60155 0
42,3550       54155 1      34755 1      60154 1      56154 1      10154 0      04145 0      00002 0      04145 0
42,3560       00002 0      54156 1      10155 1      64753 1      13566 0      64753 1      60156 0      00006 1
42,3570       63572 1      04145 0      00002 0      43600 0      70777 1      63600 1      10000 0      03603 1

42,3600    C: 77743 1      03603 1      00002 0      46010 1      55040 0      04145 0      06042 1   I: 47001 0
42,3610    C: 00001 0   C: 21574 1   C: 34041 0   C: 27077 1   I: 46135 1   C: 00050 1   C: 65634 0   I: 77775 1
42,3620    C: 00001 0   C: 16205 1   C: 00015 0   I: 77624 1   C: 33647 1   I: 74375 0   C: 02723 0   C: 24001 0
42,3630    I: 53372 1   C: 02205 1   I: 77650 1   C: 65636 1   I: 77775 1   C: 00001 0   I: 53401 1   C: 00001 0

42,3640    I: 45076 1   C: 47541 1   I: 76521 0   C: 01734 0   I: 71206 0   C: 06524 1   C: 02201 0   C: 26203 1
42,3650    I: 77624 1   C: 47673 0   C: 16205 1   C: 02207 0   I: 45206 1   C: 02205 1   I: 77605 1   C: 25767 0
42,3660    C: 16207 0   I: 41215 1   C: 02205 1   C: 25767 0   C: 26205 1   C: 02205 1   I: 63256 0   C: 02205 1
42,3670    I: 72431 1   C: 06520 0   I: 40045 1   C: 02205 1   C: 65675 0   I: 40056 0   C: 65743 1   I: 47206 0

42,3700    C: 06516 0   I: 57572 0   C: 02205 1   I: 63241 0   C: 06520 0   C: 02205 1   I: 75246 0   I: 77736 0
42,3710    C: 26201 0   C: 00007 0   I: 51041 0   C: 06516 0   C: 65721 0   I: 45345 1   C: 06522 1   C: 02201 0
42,3720    C: 02201 0   I: 47375 0   C: 00001 0   C: 00007 0   I: 77772 0   C: 16205 1   C: 02201 0   I: 74356 1
42,3730    C: 06516 0   I: 71525 0   C: 02201 0   I: 52361 1   C: 06522 1   I: 63241 0   C: 02205 1   C: 02205 1

42,3740    I: 75246 0   I: 77736 0   C: 02203 1   I: 77776 1      31043 1      74747 0      00006 1      15472 1
42,3750       35017 1      05146 1      33765 0      04616 1   C: 20353 0      05563 1      05563 1      05155 0
42,3760       34751 0      05464 1      34740 0      05146 1      03606 1   C: 01463 1   C: 26501 1   C: 07463 1
42,3770    C: 03770 1   C: 33771 0 CKSM 51024 0         @            @            @            @            @
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OCTAL LISTING FOR PARAGRAPH # 234,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2000        50154 1     02002 1     02126 0     02200 1     02371 0     02733 1     02305 0     02116 0
43,2010        02116 0     02430 1     03156 0     13036 0     02422 1     02116 0     02422 1     02422 1
43,2020        02422 1     02442 1     03045 0     02325 1     02366 0     02147 1     02175 0     02165 1
43,2030        02170 0     02455 1     02725 0     03246 1     03163 0     03240 1     02116 0     02037 1

43,2040        03751 1     03753 0     03755 0     03757 1     03066 1     03251 1     03025 0     03030 1
43,2050        02445 0     02655 0     03072 1     03075 0     02772 1     03002 0     02116 0     03254 1
43,2060        02116 0     02116 0     02116 0     03010 0     03017 1     03121 0     03105 0     03114 0
43,2070        02116 0     03102 1     03233 0     02422 1     02116 0     02422 1     11043 0     02116 0

43,2100        30100 0     72125 1     10000 0     02116 0     34362 1     55043 0     30002 0     54155 1
43,2110        44752 1     04154 0     02113 0     10067 1     05122 0     00155 0     04364 1     04635 0
43,2120     C: 21051 0     31010 1     00006 1     16745 0     02116 0  C: 24100 0     02203 1     02131 0
43,2130        02140 0     02436 1     04616 1  C: 16705 1     04616 1  C: 17707 1     02137 0     02117 1

43,2140        02700 1     04616 1  C: 52354 1     04616 1  C: 17705 0     12146 1     02117 1     06042 1
43,2150     I: 77614 1  C: 03752 1  C: 66161 1  I: 77776 1     05321 1  C: 00077 1     12162 1     04616 1
43,2160     C: 53541 1  I: 77776 1     02700 1     04616 1  C: 53531 0     05516 0  C: 00013 0     12172 0
43,2170        05504 0  C: 00013 0     05516 0  C: 00000 1     02117 1     05504 0  C: 00000 1     02117 1

43,2200        02203 1     02214 1     02236 1     46007 1     61001 1     00006 1     16745 0     62213 0
43,2210        00006 1     16742 1     02116 0  C: 77713 1     02436 1     02076 1     32234 0     04616 1
43,2220     C: 20334 1     05472 0     12223 1     32235 1     04616 1  C: 20621 0     04616 1  C: 16771 1
43,2230        04616 1  C: 17707 1     05472 0     05472 0  C: 06226 1  C: 12200 0     02700 1     02076 1

43,2240        42324 1     00004 0     70110 0     54110 0     32263 1     04616 1  C: 20334 1     05472 0
43,2250        12244 0     04616 1  C: 46000 0     32235 1     04616 1  C: 20621 0     34736 1     05105 0
43,2260     C: 02264 0  C: 66107 1     15472 1  C: 06111 0     04616 1  C: 52506 0     02267 0     30167 1
43,2270        75004 1     10000 0     50000 1     54000 0     40000 0     26167 0     04616 1  C: 17705 0

43,2300        02302 1     05155 0     05567 0  C: 00503 1     05155 0     10110 0     12117 0     12117 0
43,2310        12311 1     42324 1     00004 0     70110 0     54110 0     06011 1     34777 1     04616 1
43,2320     C: 01736 1     05516 0  C: 00126 1     12117 0  C: 41000 1     02076 1     32365 0     04616 1
43,2330     C: 20353 0     12363 0     02354 1     05155 0     04616 1  C: 01735 1     34361 1     71043 0

43,2340        00006 1     15472 1     74747 0     10000 0     12326 0     32365 0     04616 1  C: 20361 1
43,2350        12363 1     12363 1     12357 0     12334 0     05504 0  C: 00254 1     15563 0     05516 0
43,2360     C: 00254 1     34362 1     05565 1     44361 0     15564 1  C: 01504 1     05516 0  C: 00254 1
43,2370        12117 0     02436 1     02076 1     32420 0     04616 1  C: 20334 1     05472 0     02400 1
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OCTAL LISTING FOR PARAGRAPH # 235, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,2400        32421 1     04616 1  C: 20621 0     04616 1  C: 17201 1     04616 1  C: 17707 1     05472 0
43,2410        32417 1     04616 1  C: 17314 1     04616 1  C: 17707 1     05472 0     05472 0  C: 02737 0
43,2420     C: 06335 1  C: 12400 0     04433 1     34201 0     00006 1     01007 1     04635 0  C: 62001 1
43,2430        02076 1     34740 0     05105 0  C: 02005 0  C: 64064 1     05155 0     31301 1     00006 1

43,2440        16745 0     02116 0     02076 1     04635 0  C: 64002 1     02700 1     30077 1     74743 1
43,2450        10300 0     02116 0     05504 0  C: 00117 0     12461 1     02700 1     02076 1     05504 0
43,2460     C: 00063 1     34741 1     54003 0     32676 1     55777 0     34755 1     55776 1     55575 0
43,2470        00004 0     42677 1     70110 0     54110 0     32677 0     00006 1     02033 0     26110 0

43,2500        00003 1     40077 0     74743 1     10000 0     12633 1     34753 1     55051 0     34751 0
43,2510        55050 1     32673 1     04616 1  C: 20353 0     12641 1     12522 1     12511 1     34751 0
43,2520        05464 1     05155 0     31051 1     55773 1     36245 1     71773 1     10000 0     12635 1
43,2530        55775 1     34752 0     00006 1     02033 0     00006 1     12546 0     32675 1     55044 1

43,2540        32674 0     04616 1  C: 20345 1     12641 1     12531 0     12536 1     34736 1     00006 1
43,2550        05012 1     34752 0     55774 0     05203 0  C: 02003 0  C: 52104 0     00003 1     40077 0
43,2560        74743 1     10000 0     12117 0     36245 1     71773 1     10000 0     12603 1     32667 1
43,2570        04616 1  C: 20334 1     12641 1     12575 0     12567 0     32670 1     04616 1  C: 20334 1

43,2600        12641 1     12617 1     12567 0     32671 0     04616 1  C: 20334 1     12641 1     12611 1
43,2610        12603 1     32672 0     04616 1  C: 20334 1     12641 1     12617 1     12603 1     34755 1
43,2620        55777 0     04616 1  C: 01735 1     32676 1     55777 0     34755 1     55776 1     11775 1
43,2630        44753 0     64752 0     12523 0     34766 1     55777 0     34752 0     55775 1     36245 1

43,2640        12552 0     34755 1     55777 0     34744 1     04616 1  C: 01736 1     00004 0     44736 0
43,2650        00006 1     03012 1     05516 0  C: 00063 1     05472 0     34741 1     54003 0     34755 1
43,2660        55777 0     34746 0     04616 1  C: 01736 1     05516 0  C: 00117 0     12117 0  C: 04110 0
43,2670     C: 04116 0  C: 04102 0  C: 04103 1  C: 01014 0  C: 14431 1  C: 00201 1  C: 00145 1  C: 00444 0

43,2700        40077 0     74741 0     10000 0     02116 0     30101 1     74741 0     10000 0     02116 0
43,2710        40103 1     74746 1     10000 0     12720 1     30107 1     74735 0     00006 1     12116 1
43,2720        40075 1     74747 0     10000 0     00002 0     02116 0     02076 1     34740 0     05105 0
43,2730     C: 03606 1  C: 64104 0     05155 0     02121 1     34763 1     00006 1     02012 0     10000 0

43,2740        12116 1     34355 0     00006 1     06031 0     74355 1     00006 1     12750 0     12116 1
43,2750        02076 1     32234 0     04616 1  C: 20334 1     05472 0     02756 1     32771 1     04616 1
43,2760     C: 20621 0     34746 0     00006 1     05012 1     34752 0     05203 0  C: 02035 0  C: 64100 1
43,2770        15472 1  C: 12600 1     02076 1     35021 1     05146 1     00006 1     33001 0     05165 0
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OCTAL LISTING FOR PARAGRAPH # 236, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3000     C: 03242 0   C: 44104 1      02076 1      34752 0      05203 0   C: 03737 1   C: 60107 1      05155 0
43,3010        02121 1      02076 1      34737 0      05105 0   C: 02022 0   C: 54104 0      05155 0      02076 1
43,3020        35021 1      05105 0   C: 02642 0   C: 10107 0      15155 1      05504 0   C: 00303 1      12117 0
43,3030        05516 0   C: 00303 1      00004 0      04674 0   C: 40154 0      02117 1      02121 1      02076 1

43,3040        34737 0      05105 0   C: 02103 1   C: 46106 1      05155 0      33065 1      70074 0      00006 1
43,3050        12117 0      05516 0   C: 00010 0      05516 0   C: 00006 1      05516 0   C: 00037 0      34747 1
43,3060        70075 1      00006 1      12117 0      04635 0   C: 64054 1   C: 00500 1      33071 1      54335 0
43,3070        02117 1   C: 03721 0      05516 0   C: 00026 0      03077 1      05504 0   C: 00026 0      05516 0

43,3100     C: 00030 1      12117 0      05504 0   C: 00030 1      02117 1      02121 1      02076 1      37713 0
43,3110        05105 0   C: 02002 1   C: 76065 0      05155 0      00004 0      44753 0      70101 0      54101 0
43,3120        02117 1      02121 1      02076 1      35021 1      05146 1      34753 1      55376 0      34755 1
43,3130        55362 0      33272 0      55361 0      03547 1      23372 0      23373 1      33271 0      54156 1

43,3140        33151 1      04616 1   C: 20334 1      03146 1      03660 1      03136 0      33272 0      55371 1
43,3150        05472 0   C: 01201 0      31376 1      00006 1      13363 0      03547 1      02076 1      35021 1
43,3160        05146 1      14635 0   C: 40004 1      40104 0      74744 0      00006 1      12116 1      34737 0
43,3170        05105 0   C: 03174 0   C: 66103 0      05155 0      06042 1   I: 77624 1   C: 27410 1   I: 43014 0

43,3200     C: 04063 0   C: 04304 1   C: 67205 1   I: 77614 1   C: 04263 1   I: 77776 1      33231 1      05544 1
43,3210     C: 01626 1   C: 01554 1      00003 1      06042 1   I: 77624 1   C: 26757 0   I: 45154 0   C: 02030 0
43,3220     C: 26114 1   I: 77776 1      33232 1      50120 1      54052 1      04635 0   C: 27421 0   I: 77634 0
43,3230     C: 21051 0   C: 00051 0   C: 67227 1      05504 0   C: 00221 0      34755 1      04635 0   C: 10040 1

43,3240        02076 1      35017 1      05105 0   C: 02007 1   C: 62064 1      05155 0      05504 0   C: 00115 1
43,3250        02117 1      05516 0   C: 00115 1      02117 1      02076 1      04635 0   C: 60000 1   C: 00061 0
43,3260     C: 01373 1   C: 01461 0   C: 01773 0   C: 00060 1   C: 60017 1   C: 17777 0   C: 25252 0   C: 52400 1
43,3270     C: 76777 1   C: 01371 0   C: 03363 1      31360 0      00006 1      13304 1      00006 1      31376 1

43,3300        51377 0      52001 1      34755 1      55360 1      00004 0      30002 0      55357 0      55363 1
43,3310        25365 0      05571 1   C: 01102 0      11362 0      34755 1      55362 0      03363 1      01357 1
43,3320        10000 0      13273 0      13273 0      10000 0      13273 0      00002 0      00006 1      23371 0
43,3330        03357 0      11362 0      03337 0      03330 1      03337 0      25366 0      01371 0      65650 1

43,3340        00006 1      63343 0      03314 1      25366 0      64757 0      50000 1      03347 1      01371 0
43,3350        01371 0      01371 0      03364 0      03545 0      01371 0      01371 0      01371 0      00006 1
43,3360        23361 1      04635 0   C: 03215 1      03326 0      34753 1      55372 1      34755 1      54003 0
43,3370        33261 1      55377 1      35012 1      55373 0      03414 0      35007 0      55377 1      35012 1
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OCTAL LISTING FOR PARAGRAPH # 237,  WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD, "@" DENOTES UNUSED FIXED MEMORY

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS)

43,3400       55373 0     03414 0     35007 0     55377 1     33262 1     55373 0     03414 0     55372 1
43,3410       33257 1     55377 1     33260 0     55373 0     00004 0     30003 1     55374 1     00006 1
43,3420       51377 0     30001 0     53376 0     31377 0     55360 1     54001 1     24001 0     50000 1
43,3430       52001 1     51377 0     40001 1     51377 0     60000 1     03320 0     31360 0     00006 1

43,3440       13464 0     00006 1     51377 0     40001 1     51377 0     52001 1     51377 0     40000 0
43,3450       51377 0     60001 0     03320 0     31360 0     00006 1     13464 0     00006 1     31376 1
43,3460       51377 0     52001 1     34755 1     55360 1     00003 1     03357 0     31374 0     54003 0
43,3470       25377 0     41377 1     61373 1     00006 1     13476 0     03414 0     11372 1     03407 1

43,3500       25372 0     30003 1     64743 0     54003 0     63270 1     00006 1     13402 0     10003 0
43,3510       03375 0     35007 0     54003 0     34771 1     55372 1     64750 1     50000 1     40000 0
43,3520       11372 1     03514 1     33266 0     54020 1     54022 0     54021 0     54023 1     60020 0
43,3530       60022 1     60021 1     60023 0     63267 1     03320 0     60020 0     60022 1     60021 1

43,3540       60023 0     64753 1     03320 0     25367 1     03326 0     34754 0     55376 0     34755 1
43,3550       55374 1     34753 1     55377 1     34755 1     55371 1     55373 0     34753 1     55375 0
43,3560       31374 0     54001 1     74350 1     61373 1     04651 1     03610 0     64741 1     03621 1
43,3570       40000 0     55377 1     00006 1     13576 1     34740 0     03577 1     35020 0     55373 0

43,3600       34755 1     55371 1     34753 1     55375 0     51373 1     30000 1     03610 0     03621 1
43,3610       55372 1     61371 0     55371 1     34755 1     61371 0     55371 1     41372 1     61373 1
43,3620       00002 0     22000 1     31373 1     75012 0     64350 0     00006 1     13715 0     11375 0
43,3630       03633 1     03633 1     03715 1     10001 1     03643 0     03643 0     03643 0     11375 0

43,3640       03644 1     37752 0     03644 1     34753 1     55375 0     11376 0     10067 1     05122 0
43,3650       03652 1     03357 0     25373 1     11377 1     03560 1     03560 1     03604 0     03604 0
43,3660       41374 1     63750 0     00006 1     13152 0     31374 0     64741 1     55374 1     03673 0
43,3670       34735 1     27374 1     03707 1     74350 1     00006 1     13705 1     63265 0     00006 1

43,3700       13702 0     03707 1     33263 0     27374 1     03707 1     63264 1     27374 1     11377 1
43,3710       03552 0     34753 1     03570 0     34745 0     03552 0     31374 0     74350 1     04331 1
43,3720       54001 1     31374 0     74357 0     00006 1     13732 0     54021 0     30001 0     74757 1
43,3730       60021 1     54301 1     31376 1     00006 1     13736 1     03134 1     11371 1     03741 0

43,3740       03742 0     64753 1     55371 1     40001 1     61371 0     67752 0     03320 0     03660 1
43,3750    C: 66100 0     34755 1     13760 1     34753 1     13760 1     34752 0     13760 1     36250 0
43,3760       55165 0     02076 1     31010 1     00006 1     13767 0     04635 0  C: 11740 1     55170 1
43,3770       31165 1     55171 0     34753 1     55172 0     04635 0  C: 11357 0  C: 03776 1  CKSM 71300 1
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OCCUPIED LOCATIONS   PAGE      OCCUPIED LOCATIONS   PAGE      OCCUPIED LOCATIONS   PAGE      OCCUPIED LOCATIONS   PAGE

   4000  TO     4045  155         5360  TO     5425 1291         6526  TO     6561 1014      00,2236  TO  00,2276 1048
   4046  TO     4065  156         5426  TO     5435 1292         6562  TO     6627 1015      00,2277  TO  00,2331 1049
   4066  TO     4101  157         5436  TO     5444 1296                      6630 1016      00,2332  TO  00,2352 1050
   4102  TO     4123  383         5445  TO     5455 1298         6631  TO     6671 1017      00,2353  TO  00,2421 1051

   4124  TO     4144  443                      5456 1299         6672  TO     6725 1018      00,2422  TO  00,2436 1052
   4145  TO     4153  450         5457  TO     5463 1301         6726  TO     6751 1019      00,2437  TO  00,2477 1053
   4154  TO     4203  456         5464  TO     5503 1346         6752  TO     7005 1020      00,2500  TO  00,2537 1054
   4204  TO     4206  458         5504  TO     5532 1367         7006  TO     7007 1021      00,2540  TO  00,2567 1055

   4207  TO     4243  459         5533  TO     5543 1368         7010  TO     7064 1022      00,2570  TO  00,2607 1056
   4244  TO     4302  460         5544  TO     5562 1371         7065  TO     7073 1023      00,2610  TO  00,2624 1057
   4303  TO     4335  464         5563  TO     5566 1372         7074  TO     7105 1024      00,2625  TO  00,2641 1058
   4336  TO     4377  465         5567  TO     5617 1373         7106  TO     7140 1025      00,2642  TO  00,2653 1059

   4400  TO     4436  466         5620  TO     5635 1374         7141  TO     7156 1026      00,2654  TO  00,2720 1060
   4437  TO     4461  468         5636  TO     5715 1375         7157  TO     7217 1027      00,2721  TO  00,2747 1061
   4462  TO     4511  469         5716  TO     5742 1376         7220  TO     7241 1028      00,2750  TO  00,3006 1062
   4512  TO     4522  525         5743  TO     5764 1397         7242  TO     7257 1029      00,3007  TO  00,3022 1063

   4523  TO     4536  526         5765  TO     5766   28         7260  TO     7320 1030      00,3023  TO  00,3072 1064
   4537  TO     4563  527                      6000   40         7321  TO     7333 1031                   00,3073 1065
   4564  TO     4577  528         6001  TO     6010  226         7334  TO     7344 1032      00,3074  TO  00,3132 1066
   4600  TO     4615  529         6011  TO     6021  520         7345  TO     7403 1033      00,3133  TO  00,3150 1067

   4616  TO     4644  992         6022  TO     6024  566         7404  TO     7427 1034      00,3151  TO  00,3173 1068
   4645  TO     4673  993         6025  TO     6031  598         7430  TO     7462 1035      00,3174  TO  00,3206 1069
   4674  TO     4726  994         6032  TO     6041  745         7463  TO     7530 1036      00,3207  TO  00,3231 1070
   4727  TO     4731  995         6042  TO     6061  996         7531  TO     7574 1037      00,3232  TO  00,3277 1071

   4732  TO     4762 1089         6062  TO     6105  997         7575  TO     7626 1038      00,3300  TO  00,3342 1072
   4763  TO     5010 1090         6106  TO     6117  998         7627  TO     7657 1039      00,3343  TO  00,3405 1073
   5011  TO     5031 1091         6120  TO     6146  999         7660  TO     7712 1040      00,3406  TO  00,3455 1074
   5032  TO     5071 1096         6147  TO     6215 1000         7713  TO     7725 1091      00,3456  TO  00,3516 1075

   5072  TO     5127 1097         6216  TO     6217 1001         7726  TO     7752 1092      00,3517  TO  00,3552 1076
   5130  TO     5132 1098         6220  TO     6251 1002         7753  TO     7756 1294      00,3553  TO  00,3607 1077
   5133  TO     5164 1099         6252  TO     6265 1003         7757  TO     7760 1451      00,3610  TO  00,3651 1078
   5165  TO     5172 1110         6266  TO     6276 1004         7761  TO     7762   28      00,3652  TO  00,3713 1079

   5173  TO     5234 1113         6277  TO     6336 1005      00,2000  TO  00,2016 1007      00,3714  TO  00,3734 1080
                5235 1114         6337  TO     6356 1006      00,2017  TO  00,2041 1041      00,3735  TO  00,3767 1369
   5236  TO     5260 1115         6357  TO     6374 1008      00,2042  TO  00,2100 1042      00,3770  TO  00,3774 1370
   5261  TO     5276 1123         6375  TO     6416 1009      00,2101  TO  00,2120 1043      00,3775  TO  00,3776   28

   5277  TO     5300 1124         6417  TO     6436 1010      00,2121  TO  00,2143 1044      01,2000  TO  01,2001   43
   5301  TO     5310 1125         6437  TO     6462 1011      00,2144  TO  00,2171 1045      01,2002  TO  01,2032  240
   5311  TO     5326 1286         6463  TO     6472 1012      00,2172  TO  00,2213 1046      01,2033  TO  01,2070  241
   5327  TO     5357 1290         6473  TO     6525 1013      00,2214  TO  00,2235 1047      01,2071  TO  01,2133  242
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OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

35,2455  TO 35,2510  663        36,2575  TO 36,2630  736        37,3212  TO 37,3273  707        40,3550  TO 40,3551  460
35,2511  TO 35,2571  664        36,2631  TO 36,2670  737        37,3274  TO 37,3351  708        40,3552  TO 40,3576  461
35,2572  TO 35,2634  665        36,2671  TO 36,2741  738        37,3352  TO 37,3407  709        40,3577  TO 40,3643  462
35,2635  TO 35,2673  668        36,2742  TO 36,3004  739        37,3410  TO 37,3436  852        40,3644  TO 40,3645  463

35,2674  TO 35,2753  669        36,3005  TO 36,3050  740        37,3437  TO 37,3502  853        40,3646  TO 40,3713  474
35,2754  TO 35,3035  670        36,3051  TO 36,3116  741        37,3503  TO 37,3535  854        40,3714  TO 40,3736  475
35,3036  TO 35,3117  671        36,3117  TO 36,3136  742                    37,3536  864        40,3737  TO 40,3755  705
35,3120  TO 35,3201  672        36,3137  TO 36,3151  743        37,3537  TO 37,3610  865        40,3756  TO 40,3757   36

35,3202  TO 35,3203  673                    36,3152  744        37,3611  TO 37,3651  866        41,2000  TO 41,2033  408
35,3204  TO 35,3215  674        36,3153  TO 36,3174  748        37,3652  TO 37,3710 1327        41,2034  TO 41,2112  409
35,3216  TO 35,3273  675        36,3175  TO 36,3241  749        37,3711  TO 37,3744 1328        41,2113  TO 41,2167  410
35,3274  TO 35,3306  676        36,3242  TO 36,3311  750        37,3745  TO 37,3770 1329        41,2170  TO 41,2220  411

35,3307  TO 35,3351  677        36,3312  TO 36,3355  751        37,3771  TO 37,3772   36        41,2221  TO 41,2264  412
35,3352  TO 35,3356  678        36,3356  TO 36,3424  752        40,2000  TO 40,2042  301        41,2265  TO 41,2342  413
35,3357  TO 35,3431  679        36,3425  TO 36,3472  753        40,2043  TO 40,2076  302        41,2343  TO 41,2354  414
35,3432  TO 35,3477  680        36,3473  TO 36,3543  754        40,2077  TO 40,2150  400        41,2355  TO 41,2432  416

35,3500  TO 35,3514  681        36,3544  TO 36,3611  755        40,2151  TO 40,2216  401        41,2433  TO 41,2477  417
35,3515  TO 35,3561  682        36,3612  TO 36,3666  756        40,2217  TO 40,2277  402        41,2500  TO 41,2552  418
35,3562  TO 35,3602  683        36,3667  TO 36,3737  757        40,2300  TO 40,2351  403        41,2553  TO 41,2621  419
35,3603  TO 35,3612  684        36,3740  TO 36,3770  758        40,2352  TO 40,2424  404        41,2622  TO 41,2663  428

35,3613  TO 35,3631  685        36,3771  TO 36,3772   36        40,2425  TO 40,2466  405        41,2664  TO 41,2732  429
35,3632  TO 35,3655  686        37,2000  TO 37,2001   44        40,2467  TO 40,2542  406        41,2733  TO 41,3011  430
35,3656  TO 35,3701  735        37,2002  TO 37,2036  375        40,2543  TO 40,2614  407        41,3012  TO 41,3064  431
35,3702  TO 35,3706  736        37,2037  TO 37,2117  376        40,2615  TO 40,2647  420        41,3065  TO 41,3136  432

35,3707  TO 35,3725  742        37,2120  TO 37,2171  377        40,2650  TO 40,2724  421        41,3137  TO 41,3207  433
35,3726  TO 35,3735  743        37,2172  TO 37,2251  378        40,2725  TO 40,2765  422        41,3210  TO 41,3254  434
35,3736  TO 35,3737   35        37,2252  TO 37,2274  379        40,2766  TO 40,3024  423        41,3255  TO 41,3302  441
36,2000  TO 36,2021   38        37,2275  TO 37,2346  380        40,3025  TO 40,3043  427        41,3303  TO 41,3354  442

36,2022  TO 36,2023   40        37,2347  TO 37,2400  381        40,3044  TO 40,3116  435        41,3355  TO 41,3377  443
36,2024  TO 36,2045  725        37,2401  TO 37,2457  382        40,3117  TO 40,3171  436        41,3400  TO 41,3407  444
36,2046  TO 36,2112  726        37,2460  TO 37,2477  383        40,3172  TO 40,3233  437        41,3410  TO 41,3441  447
36,2113  TO 36,2150  727        37,2500  TO 37,2535  385        40,3234  TO 40,3304  445                    41,3442  448

36,2151  TO 36,2226  728        37,2536  TO 37,2576  386        40,3305  TO 40,3341  446        41,3443  TO 41,3455  450
36,2227  TO 36,2274  729        37,2577  TO 37,2656  387        40,3342  TO 40,3355  447        41,3456  TO 41,3522  451
36,2275  TO 36,2341  730        37,2657  TO 37,2736  388        40,3356  TO 40,3420  448        41,3523  TO 41,3530  452
36,2342  TO 36,2401  731        37,2737  TO 37,3004  389        40,3421  TO 40,3463  449        41,3531  TO 41,3606  457

36,2402  TO 36,2450  732        37,3005  TO 37,3057  390        40,3464  TO 40,3475  450        41,3607  TO 41,3625  458
36,2451  TO 36,2520  733        37,3060  TO 37,3112  391        40,3476  TO 40,3520  452        41,3626  TO 41,3673  471
36,2521  TO 36,2565  734        37,3113  TO 37,3132  705        40,3521  TO 40,3523  453        41,3674  TO 41,3740  472
36,2566  TO 36,2574  735        37,3133  TO 37,3211  706        40,3524  TO 40,3547  454        41,3741  TO 41,3747  473
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OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

41,3750  TO 41,3751   36        43,2200  TO 43,2205  268
42,2000  TO 42,2001   46        43,2206  TO 43,2235  269
42,2002  TO 42,2034  277        43,2236  TO 43,2303  270
42,2035  TO 42,2053  284        43,2304  TO 43,2324  271

42,2054  TO 42,2064  289                    43,2325  272
42,2065  TO 42,2102  290        43,2326  TO 43,2370  273
42,2103  TO 42,2141  306        43,2371  TO 43,2421  275
42,2142  TO 42,2207  307        43,2422  TO 43,2441  276

42,2210  TO 42,2243  308        43,2442  TO 43,2444  277
42,2244  TO 42,2270  309        43,2445  TO 43,2507  278
42,2271  TO 42,2323  310        43,2510  TO 43,2560  279
42,2324  TO 42,2375  311        43,2561  TO 43,2633  280

42,2376  TO 42,2433  312        43,2634  TO 43,2677  281
42,2434  TO 42,2474  313        43,2700  TO 43,2732  282
42,2475  TO 42,2555  314        43,2733  TO 43,2770  283
42,2556  TO 42,2637  315                    43,2771  284

42,2640  TO 42,2714  316        43,2772  TO 43,3007  285
42,2715  TO 42,2776  317        43,3010  TO 43,3027  286
42,2777  TO 42,3060  318        43,3030  TO 43,3035  287
42,3061  TO 42,3135  319        43,3036  TO 43,3044  288

42,3136  TO 42,3217  320        43,3045  TO 43,3065  289
42,3220  TO 42,3227  321        43,3066  TO 43,3074  290
42,3230  TO 42,3232  423        43,3075  TO 43,3104  291
42,3233  TO 42,3306  424        43,3105  TO 43,3144  292

42,3307  TO 42,3367  425        43,3145  TO 43,3155  293
42,3370  TO 42,3443  426        43,3156  TO 43,3162  294
42,3444  TO 42,3451  427        43,3163  TO 43,3222  299
42,3452  TO 42,3533  438        43,3223  TO 43,3253  300

42,3534  TO 42,3604  439        43,3254  TO 43,3256  301
            42,3605  440        43,3257  TO 43,3315 1278
            42,3606  490        43,3316  TO 43,3363 1279
42,3607  TO 42,3670  491        43,3364  TO 43,3437 1280

42,3671  TO 42,3752  492        43,3440  TO 43,3517 1281
42,3753  TO 42,3767  493        43,3520  TO 43,3562 1282
42,3770  TO 42,3771   36        43,3563  TO 43,3641 1283
43,2000  TO 43,2045  263        43,3642  TO 43,3720 1284

43,2046  TO 43,2115  264        43,3721  TO 43,3750 1285
43,2116  TO 43,2125  265        43,3751  TO 43,3770 1380
43,2126  TO 43,2161  266        43,3771  TO 43,3775 1381
43,2162  TO 43,2177  267                    43,3776   36
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THE SUBROUTINES IN THIS PROGRAM ARE AS FOLLOWS:

                        LUMERASE.134
                        LEMONAID.104
                        LEMP20S .145
                        LEMP30S .105
                        KISSING .055
                        FLY     .153
                        LEMP50S .119
                        SKIPPER .101
                        LMDAP   .025


THE ASSEMBLY WAS GOOD AND MANUFACTURABLE. NO LINES WERE CUSSED.

BINARY RECORDS FOR "LUMINARY.R131" NOT STORED BECAUSE: A FILE WITH THIS NAME ALREADY EXISTS.
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WILSON JONES

NYLON POST BINDER

14-1411 N

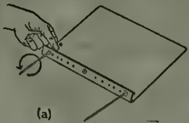
TYPE 1/.020 GENUINE PRESSBOARD

2 PURPOSE BINDER

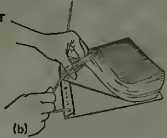
This binder may be used to bind both marginal-punched sheets and forms punched with 2¼", 4¼, 6, 7", 8½", 13⅞" and 14⅞" center-to-center holes.

1. MARGINAL-PUNCHED SHEETS

BURST

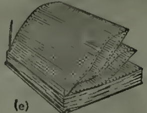


(a)
Insert posts in end holes of stub. Turn counter-clockwise until heads are flush against inside of channel.



(b)
Gather sheets in even stack. Insert posts in second holes from both ends of the sheets.

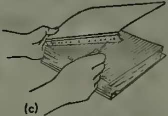
UNBURST



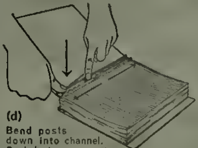
(e)
Insert posts thru end holes of stub as in illustration (a). Plug posts into top holes in both margins of sheets. Put on top cover as in illustrations (c) and (d).
(Also see No. 2 below)

TOP AND BOTTOM LOADING

This binder may be loaded from the top or bottom by using posts without screw heads. Ask the dealer from whom you bought the binder for Posts and Slides Pack No. 1323.



(c)
Put top cover on with stub turned under. Insert posts thru end holes.



(d)
Bend posts down into channel. Push locks over posts toward outside ends of channel until snug.

H

2. CONVENTIONALLY PUNCHED LOOSE LEAF SHEETS AND STRIPPED UNBURST SHEETS

Follow steps (a) thru (d) at left, except that posts should be threaded into holes in stub that correspond to holes in forms or sheets to be bound.

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(J2875 A)

Made in U. S. A.